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Contextual effects on student academic achievement : a multilevel analysis.

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CONTEXTUAL EFFECTS ON STUDENT ACADEMIC ACHIEVEMENT:

A MULTILEVEL ANALYSIS

By

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B.A., University of Louisville, 2000
M.S.S.W., University of Louisville, 2003

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A Dissertation Approved on

April 23, 2013

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Melanie Otis, Ph.D.

DEDICATION

To yesterday, today, and tomorrow.

ACKNOWLEDGMENTS

This might be the most difficult section for me to write. There is much that I am grateful for and many who have played an integral role in this accomplishment and simply my development as a person. I have decided to take an introspective approach towards this acknowledgement section by acknowledging individuals, but to also acknowledge the role they played in this accomplishment. I embrace the collectivist approach and philosophy that is interwoven into my African American cultural background and specifically within my family. I am not one who believes my accomplishments are due to how grand I am as an individual. However, if it were not for the support and sacrifices of many, specifically those written about in this section, a Ph.D. would have continued to be a dream and not my reality.

Beginning at the beginning, I would like to thank my parents, Norman and Rhonda for their endless love and tireless support. My mom and I share many of the same worldviews and no matter how far “out the box” my perspective sometimes might be, she listens with the intent to understand my perspective and always respects my thoughts. I thank you and love you, Mama. The values, love and support my father bestows upon me has influenced me in all facets of my life. One key value my father instilled was the importance of education. He nurtured it by being a father engaged in my education and quite frankly in all of

my involvements throughout my entire life. Growing up, he never allowed me to slack, nor lose focus of what was most important, which was my education. School was my job, my father told me growing up. Who would have ever thought his words nearly 20 years ago would be prophetic. School is my job, it has become my professional career and I enjoy nothing more than being in an environment where I can learn and teach. I guess the old adage is true, Father Knows Best. I love you, Daddy.

While my father required perfect school attendance, my grandmother required perfect church attendance. I recall her words, “if you can get up for school, then you can get up for church”, which translated to neither being optional and both of equal importance. My grandmother, Frances is the woman I aspire to be. In addition to my Christian faith, she introduced me to social work at an early age. As the director of a local social service agency she worked tirelessly to help her clients and often times it became a family effort with her sons and grandchildren volunteering to offer support. Her passion to help disadvantaged people became my passion. Growing up in this setting allowed me to develop compassion and an awareness of disparities that exists in our society. My exposure to the people that I met and established relationships with through my grandmother’s work allowed me to see and appreciate people as individuals and non-judgmental of their circumstances. I met some of the best people whom were on work release from the local halfway house, and it was not until later in life that I understood what it meant to be in a halfway house. I saw people for the character that they displayed and not because of their

circumstances or past indiscretions. I think this is what shaped my worldview and perspective on how I interact with people in my personal and professional lives today.

Who understands you better than your siblings? And, I believe I might have the best siblings on earth. I love that there has never been sibling rivalry among any of us. It has been a lifetime of fun, laughter, love and support. My older sister, Mikey has gone beyond what is required of a sister, in the traditional sense. Her love, support, and sacrifices as the big sister laid a smoother path for me to come behind. She finds satisfaction in my growth and accomplishments and it is because of this I share all of them with her. Mikey, this is because of you. My two younger sisters, Shanae and Ashley gives me the motivation to aspire for high achievements in all facets of life. I conscientiously live my life with the expectation to be an inspiration to them. I believe this is the responsibility of an older sister. I try to live my life as a testimony to them to demonstrate that dreams can come true and high achievements are attainable. My goal is to pave a smoother path for them, like what was done for me. Shanae and Ashley, thank you for being the loving and supportive sisters you are. No matter the circumstances, I know I can always count on you and I want you to know that you can always count on me. I also would like to express my love and appreciation for my brothers, Darrell and Chris. I have a wonderful stepmother, Connie that has loved me as if I was one of her biological children and with her I gained other siblings, Conneise, Terell, Chris, and Shawntae.

The strong bond of family was instilled in me as a child, and the close connections that I have with my family extends beyond my immediate family but to my uncles, aunts and cousins. My entire family unit has played a significant role in my development. My family's love and support equipped me with the confidence and courage that is needed to step outside my comfort zone to take the risks that come from pursuing a doctoral degree. I cannot imagine having this confidence and fortitude if it were not for the unwavering love, encouragement and support of my family. During this journey on pursuit of this doctoral degree, I unexpectedly lost two people that were instrumental in my life, my uncle, Dr. William T. Martin and his daughter, my cousin, Monica Martin. Losing both my uncle and cousin left me questioning many things about life, and specifically the importance of this degree. Being a doctoral student requires a significant amount of time and sacrifices, and I have paid a fair share of both. Time is something you can easily take for granted, and I did. I regret not spending more time with them. However, finding the appropriate balance between all the various roles and responsibilities in life is a conundrum. With my upbringing my uncle and cousin were very much like a second father and another sister. I cannot recall a period in my life when they were not actively present. I am disheartened beyond words and moved to sadden emotions as I am forced to accept the reality that this is an accomplishment I am unable to share with them. This is the first milestone when neither would be present. Although a joyous occasion, it is also a sadden occasion because years from now as I reflect over this point in my life, this marks the beginning of memories that they will no longer be apart of. My uncle was my

intellectual inspiration. I strived so hard to match his intelligence. As a psychiatrist I always asked for him to analyze me when I was younger. Of course he would not. However, after constantly probing he finally wrote one word on a napkin wrapper and handed it to me, “inquisitive,” and he instructed me to look up the word in the dictionary for its meaning. I still have that napkin wrapper in my dictionary. I suppose my naturally inquisitive nature is somewhat of a characteristic trait of value in a doctoral program. Although I wish I had more time with both, I am blessed to have had the time with them that I did. They both have left their impact on me that will last a lifetime; their legacy lives in me as well as in my Aunt Linda and cousins Miriam and Melissa, and I am blessed to still have them.

There are two people who have endured the challenges that come from my doctoral studies and have done so gracefully with love and support, Marlon and Kayden. Marlon, you and I started this journey of adult life and educational pursuits together, and I cannot imagine you not being by my side. We shared our dreams, goals and passions, and I know you are the one person who understands my drive and the pressures that I oftentimes feel. I have always shared with you the admiration I have for you. I admire how you know what you want in life and will work hard to attain it. You appear to be fearless and you do not allow any obstacles to waiver or hinder you. You have taught me much in life, and I would not be the woman I am today if you would not have come into my life. I cannot thank you enough for being the man in my life. Kayden, you are my life. I could not ask for a more perfect daughter than you. You were

approximately 4.5 months when I began this journey on pursuit of this doctoral degree. Seeing mama on the computer and reading books is your norm, and I believe it has encouraged you to be the little scholar you are. You made many sacrifices of sharing your time with my studies, but I want you to know that mama always did her best to not allow my schooling to take away from the quality time I spent with you. This road had been bumpy with many twist and turns, and sometimes the path was not clear to me, but you remained my inspiration. Since your birth, my prayers have consistently been for me to be the mother and woman you are proud of. Yes, I seek the approval of my 5 year-old daughter, and I pray that mama does you proud. I strive to model, that as an African American woman there are no limitations on what you can achieve. I do not want you to allow the constraints that can arise from being a minority and a female to hinder your aspirations. You can certainly accomplish your dreams and I encourage you to dream big.

I definitely would not be here today without the sacrifices of my committee. First, I must say, pursuing a doctoral degree reveals a vulnerable side of oneself that I was not always prepared for. Subjecting oneself to the criticism of others, which some are constructive and some are not can seriously alter one's self-esteem and make you question your intellectual abilities. There were many times when I questioned my own capabilities, but just when I needed it the most my angel, Dr. Anna Faul, restored my confidence. Her timing was impeccable and almost clairvoyant like. As a person whom internalizes much of my emotions, she was never aware of my insecurities or when I was at my lowest point; however,

somehow and someway she would contact me at the perfect moment and give me the necessary boost needed to carry on not even aware of how her words and presence resonated with me. As a minority student, I believe the challenges that we face while attempting to connect with our faculty are oftentimes unknown to others, and it is an important element that impacts students' academic performance. I have never connected with a professor not of a minority race until working with her. I almost missed out on this opportunity if it was not for her having the foresight and compassion to first extend herself to understanding the challenges that my cohort-mates and I experienced as minority students. There were some uncomfortable days during my course work, and if it was not for you, Dr. Faul, I wonder if I would have had the same passion for the doctoral studies. You are a true gem and not to mention a genius!

Dr. Pam Yankeelov brings warmth, humor and brilliance for research to my committee. She is personable and approachable and I appreciate learning from someone whom is of a high intellectual caliber but so humbly "down to earth." I aspire to be the same way in my professional career.

Dr. Daniel Withers and I have known one another for many years. I appreciated his willingness to discuss my research interest when pursuing a doctoral degree was just a distant thought of mine. Dr. Withers, you have always been nurturing, supportive and invested in my personal and now educational growth. I asked you to be on my committee long before I even had the opportunity to formulate a committee. However, this was how confident I was in

your ability to bring that expertise and perspective that would make this an awesome dissertation study.

The late Dr. J. Blaine Hudson brilliance and extensive background in examining the achievement gap between Blacks and Whites in Louisville, Kentucky were unmatchable. I could successfully argue that there was no other premier mind on this topic in the city, and I was truly honored when he accepted my invitation to join my committee. Although he passed away before I completed this dissertation, I am proud that I honored his input and was able to integrate his thoughts into this dissertation. I do believe I completed a dissertation that he would have found pride and enjoyment in. I was blessed to have had the time with him that I did, because I learned a lot.

Dr. Melanie Otis, I thank you for taking a chance on an unknown. Your expertise in issues of social justice was a perspective that I wanted on this committee. Disparities in educational achievement and the consequences from low education are issues of social justice and need to be approached as such. Your experience and voice was invaluable on this committee and helped advanced this premise.

Although Dean Terry Singer was not on my dissertation committee I would like to acknowledge him for his support. As a staff person under your leadership, I thank you for being the visionary leader that sees value in the investment of your staff persons' professional and educational development. I would also like to thank the Director of the Doctoral Program, Dr. Bibhuti Sar and Norma Kyriss for

their support. I would also like to thank Drs. Wanda Lott-Collins and Sharon Moore for their encouragement and support. I met both as a young impressionable master's student, and they inspired me through their kind support and the exemplary example they set. My father always says that you never know who is watching you and appreciates what you do. Although they might not have known, I was watching them closely and I appreciated what they did, and still do. I thank you both for being a role model of great integrity and grace. I would also like to thank some of my cohort-mates, April, Mikia and Kim. Thank you for making the 2 years of course work slightly more bearable. I enjoyed my time with you and the relationships that were established. I would also like to give a special thank you to Jefferson County Public Schools for entrusting me with their data.

I am a multi-dimensional person and there are multiple aspects of me that work together to make me whole. If it were not for my friends, Adrienne, Karla, Katina, Shaunda and Tiffany I might have jumped from the 2nd Street Bridge long ago. Our beloved sorority, Delta Sigma Theta Sorority, Inc. brought us together but our love and mutual respect keeps us together as friends. There are characteristics that each of you possesses that I admire and I strive to attain. I love each of you, because I can be me with my flaws and all. There are no expectations and no filters, and I need to have this balance in my life to help me feel whole. Additionally, I would like to thank my pastor, Rev. Bernard Crayton and my church family, Little Flock Missionary Baptist Church. I would also like to thank my local chapter members of the Louisville Alumnae Chapter of Delta Sigma Theta Sorority, Inc.

Lastly, as my dedication states, my dissertation is dedicated: to yesterday, today, and tomorrow. This has multiple meanings and encompasses all. This is dedicated to my African American ancestors (yesterday) that have paved the way for me. This is dedicated to my African American people of today and for future generations (tomorrow) to come, because I know that with this accomplishment, I have great responsibilities as a role model. This is dedicated to my family, members of yesterday, today and tomorrow for the same aforementioned reasons. This is also dedicated to my yesterday, as I had personal obstacles to overcome. I am not the person I once was and I am not the person I should have been based on statistics. This is dedicated to my today, as I continuously strive towards self-actualization, and this is dedicated to my tomorrow. I do not know what my future holds, but I walk into it with a warm smile.

ABSTRACT

CONTEXTUAL EFFECTS ON STUDENT ACADEMIC ACHIEVEMENT:

A MULTILEVEL ANALYSIS

Shawnise Martin Miller

April 23, 2013

Approximately 1 million young people annually who should do not graduate from high school, positioning them on a downward trajectory of a lifetime of lower income and limited opportunities. The effects of low education ranges from micro-level consequences, such as unemployment and health, to mezzo-level consequences, such as neighborhood crime and poverty rates, to macro-level consequences, such as increased costs in government assistance and policy implications. Data from the 2011 American Community Survey (ACS) 5-Year Estimate dataset and from the Jefferson County Public School (JCPS) Division of Data Management, Planning, and Program Evaluation were used to examine environmental factors that influence student academic achievement. The model investigated the influence of neighborhood and school characteristics, after controlling for individual characteristics on students' ACT/EPAS scores among a sample of students enrolled in Jefferson County Public Schools (JCPS) high schools.

Methods: A cross-classified random effects multilevel model was estimated using MLwiN with a two-level nested structure. The model examined individual differences in 4075 students' ACT/EPAS scores for all juniors in the JCPS system in 2009-2010, who attended 21 different schools in Jefferson County and lived in 35 different neighborhoods. Ecological theory and social disorganization theory guided the conceptual model that was tested in the analysis.

Results: The results indicated that the school students attended as well as the neighborhood in which they lived in significantly influenced their performance on the ACT/EPAS. The individual controls that contributed the most to individual student academic achievement, were being White, having a high attendance record, not receiving a free/reduced lunch, attending only one high school during the four years of high school and not attending a neighborhood school. Neighborhood characteristics that contributed the most to individual student academic achievement were neighborhoods with a higher percentage of residents with at least a bachelor's degree. These neighborhoods were also those with lower levels of poverty, unemployment and female-headed households. School characteristics that contributed the most to individual student academic achievement were schools that had an overall better climate of success (higher average ACT scores, more children going to college, better graduation rates, less dropout rates, less students failing). Significant interactions were detected between neighborhoods and a child's attendance record, showing that attendance will have a better influence on a student's ACT

scores if he/she lives in a more affluent neighborhood. Also, Black children will do consistently worse than White children, but both race groups will show better ACT scores if they are in more affluent neighborhoods. The type of neighborhood has a differential impact on children of other race groups. If living in a less affluent neighborhood, they will perform similar to Black children. However, if they live in a more affluent neighborhood, they will perform similar to White children. Another interaction was seen between type of neighborhood and type of school. Children living in less affluent neighborhoods, do better if they go to schools where there are more minorities in the school, than if they go to schools where there are less minorities. Black children did consistently worse than White children, even in schools with a less than ideal climate for success. However, the type of school in terms of climate has a differential impact on children of other race groups. If they go to a less than ideal climate for success school, they will perform similar to Black children. However, if they go to a school with a high success climate, they will perform similar to White children. When a child has a history of going to more than one high school, it will not impact him/her as much in a school with a less than ideal climate for success. However, the same child will be impacted much more if he/she is attending a school with a high success climate.

Conclusions: Implications from the results indicates there are policy and structural changes that could be made by the school district and local government that can assist in closing the achievement gap. The composition of neighborhood residents' educational attainment was shown to have an influence

on individual student academic achievement, as students residing in neighborhoods with higher percentages of residents with at least a bachelor's degree had a positive effect on a student's individual academic achievement. Although students from all racial groups suffer from residing in less affluent neighborhoods, Black students suffer greatly. The implication of having lower percentages of residents with at least a bachelor's degree not only has bearing on high school students' achievement while in high school; it also has an influence on their overall educational attainment trajectory. Owens (2010) found that the percentage of residents with a bachelor's degree or higher influences young adults earning a bachelor's degree. Interpreting these results suggest a need to have institutional or structural changes to neighborhoods. Currently, there is a polarization between Louisville, KY neighborhoods with the lowest percent of residents with at least a bachelor's degree being 5.2 percent to the highest being 65.4 percent, which is a significant range gap. Mixed-income neighborhoods could help alleviate this gap by providing disadvantaged students the necessary exposure needed to individuals with higher educational attainment. The same phenomenon of exposure has bearing within the JCPS high schools. Like neighborhoods, there is a polarization between JCPS high schools, with the highest performing school (73% students scoring above 21 on the ACT) at the extreme opposite spectrum of the lowest performing school (1.6% students scoring above 21 on the ACT). Results indicated that individual students do better in schools with higher percentages of students doing well on the ACT; therefore, rather than disadvantaged students suffering in heavily

concentrated lower-performance schools it will serve them best to be integrated in schools with students with a mixture of academic abilities. There is a common theme among lower performance schools, which include higher amounts of money spent per student and higher rates of students receiving free/reduced lunch, and they all being majority minority students enrolled. The more money spent yielded results of lower individual student achievement, which suggest that funding is not a fix to the achievement gap but it requires policy and structural changes, which can begin with examining the student assignment plan. Results have shown there is a relationship between quality of neighborhood and quality of school and this is an element that should be explored extensively by the school district as it relates to student assignment plans. Although results had shown that minority students from less affluent neighborhoods do better in schools with more minorities, it is important to ensure diversity within all schools. The life development benefits that come from being in diverse environments should not be compromised, however it will take efforts of school administrators and teachers to ensure that the school environment as a whole and within each classroom is inclusive. Having a diverse environment means nothing if those in authoritative positions, teachers and school administrators are not fostering inclusivity. Perhaps, this element of inclusivity explains why Black and White students from less affluent neighborhoods perform better in schools with more minorities. It is difficult to thrive in an environment where you are made to feel as an outsider. Professional development training on cultural competency and inclusivity throughout the school year should be provided to teachers and school

administrators to assist in their efforts. Additionally diversity extends beyond the obvious, race and the student assignment plan could include other elements of diversity such as socioeconomic status. Attending schools with students from higher socioeconomic backgrounds may expose less-advantaged students to norms about achievement or educational attainment (Owens, 2010) however, concentrated attention must be placed on making these students feel included and respected within the school's culture.. Rather than placing disadvantaged students in schools with high proportions of other disadvantaged students, a more concentrated focus by the school district could be placed on providing them opportunities to attend schools that are not only racially diverse but socioeconomically diverse.

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CHAPTER I: PROBLEM STATEMENT

"Let's concede that we have decided to let our children grow up in two separate nations, and lead two separate kinds of lives. If, on the other hand, we have the courage to rise to this challenge to name what's happening within our inner-city schools, then we also need the courage to be activist and go out and fight like hell to change it." ~Jonathon Kozol

It is estimated that every year approximately a million young people who should graduate from high school, do not, condemning many of them to a lifetime of lower income and limited opportunities (Greene & Forster, 2003). Director of the Editorial Projects in Education (EPE) Research Center, Christopher Swanson stated "Every school day, more than 7,200 students fall through the cracks of America's public high schools" ("Education Week", 2010). High school completion is related to a number of drastic long term outcomes, with minority, vulnerable and disadvantaged populations disproportionately more likely to be negatively impacted than their counterparts. These students are more likely to attend schools in urban school districts that acquire less educational resources readily accessible to them, and more likely to attend schools where there is less per capita spending spent per student. These students are more likely to reside in disadvantaged neighborhoods that are characterized with having a higher

violent crime rate, higher unemployment rate, and a higher poverty rate. Additionally, these students are disproportionately more likely to reside in households below the poverty threshold or in homes classified as low income.

There are a number of influential factors affecting student ability to complete high school, which will be examined in this dissertation study. The purpose of this study is to investigate these influential factors by way of the impact neighborhood, school and individual characteristics have on student achievement as measured by students' ACT Educational Planning & Assessment System (EPAS) scores. The fundamental question guiding this study is: **Are there any significant relationships between neighborhood characteristics and school characteristics, after controlling for individual characteristics that can help explain achievement disparities for high school students in Jefferson County Public high schools?** The following research hypotheses guided the study:

Hypothesis 1: After controlling for individual characteristics, students from neighborhoods with high unemployment -, poverty – and high school dropout rates, with higher percentages of minority residents, people without bachelor's degrees and female headed households as well as lower median household income, will achieve academically worse than students who live in neighborhoods with lower unemployment -, poverty – and high school dropout rates, with lower percentages of minority residents, people with high education, and female headed households as well as higher median household income.

Hypothesis 2: After controlling for individual characteristics, students from schools with higher percentage of students on free/reduced lunch, minority students, ECE students, ESL students, with less yearly progress goals met, less money spent per student, higher dropout and suspension rates, lower graduation and failure rates, lower advanced placement scores, higher drug and weapon incident reports, and lower PTA membership and ACT/EPAS average scores, will achieve academically worse than students from schools with lower percentage of students on free/reduce lunch, minority students, ECE students, ESL students, with more yearly progress goals met, more money spent per student, lower dropout and suspension rates, higher graduate and failure rates, higher advanced placements cores, lower drug and weapon incident reports, and higher PTA membership and ACT/EPAS average scores.

Jefferson County Public Schools (JCPS) in Louisville, Kentucky is the largest school district in the state. JCPS has over 98,000 students enrolled to date and has ranked 30th of the 100 largest public elementary and secondary school districts in the United States and jurisdictions consecutively in 2007-2008 and 2008-2009 school years (Stable, J., Plotts, C., Mitchell, L. & Chen, C-S., 2010). The district is comprised of 90 elementary schools, 24 middle schools, and 21 high schools; and employs over 6,000 teachers ("Jefferson County Public Schools", n.d.).

Nested in Jefferson County, Louisville is the largest metropolitan city in the state of Kentucky. Kentucky is divided into 120 counties, and Jefferson County demographically is the largest county with a total population of 741,096 ("U.S.

Census Bureau", 2010). The racial demographics consist of: 538, 714 (72.7%) White, 154,246 (20.8%) Black, 32,542 (4.4%) Hispanic, and 16,338 (2.2%) Asian ("Greater Louisville Project", 2011). Some of the peer comparative cities to Louisville, KY listed in alphabetical order are: Birmingham, Charlotte, Cincinnati, Columbus, Dayton, Greensboro, Indianapolis, Jacksonville, Kansas City, Nashville, Memphis, Omaha, Raleigh, and Richmond ("Greater Louisville Project", 2009).

Problem Description

In the 2009 *Programme for International Student Assessment (PISA)* report released by the Organisation for Economic Co-operation and Development (OECD) results showed that the United States has fallen to average in international education ranking ("Huffington Post", 2010). The OECD compares the knowledge and skills of 15 year old students in 70 countries around the world in math, reading and science. Results in the PISA report showed that the U.S. ranked 14th out of 34 in reading, earning a composite score of 500 out of 1000; ranked 17th in science with a composite score of 502; and ranked 25th, below average in math with a composite score of 487 ("Huffington Post", 2010). The high performing educational systems in rank order were: South Korea, Finland and Singapore, Hong Kong and Shanghai in China, and Canada ("U.S. Department of Education", 2010). In response to the U.S. standing in the international ranking as detailed in the PISA report, U.S. Secretary of Education Arne Duncan stated "The hard truth is that other high-performing nations have passed us by during the last two decades...In a highly competitive knowledge

economy, maintaining the educational status quo means America's students are effectively losing ground" ("U.S. Department of Education", 2010). Furthermore, he asserted that "The mediocre performance of America's students is a problem we cannot afford to accept and yet cannot afford to ignore" ("U.S. Department of Education", 2010).

Although the U.S. education system ranks average on an international ranking scale, national data has shown that the state of the U.S. educational system is improving. In the most recently published report examining educational trends, results in the *Trends in High School Dropout and Completion Rates in the United States: 1972-2009*[1] report showed that over a three (3) decade span there have been an improvement in the state of education in the United States and it is reflected in the increase in the national graduation rate and a decrease in the national dropout rate. Results in this report provide an illustration of the current state of the educational system within the United States by analyzing four important outcome components: the event dropout rate, status dropout rate, status completion rate, and averaged freshmen graduation rate.

"The **event dropout rate** estimates the percentage of high school students who left high school between the beginning of one school year and the beginning of the next without earning a high school diploma or an alternative credential (e.g., a GED)" (Chapman, Laird & KewalRamani, 2010, p. 2). The 2009 national event dropout rate of youth ages 15 through 24 in the United

[1] Data analyzed in this report was collected from the annual October Current Population Survey (CPS), the annual Common Core of Data (CCD) collections, and the annual General Education Development Testing Service (GEDTS) statistical reports.

States who dropped out of grades 10-12 from either public or private schools between October 2008 and October 2009 was approximately 3.4 percent (Chapman et al., 2010). While examining the event dropout rate by region, the **South** had the highest event dropout rate at **4.3** followed by the West (4.1%), Midwest (2.7%) and Northeast (2.3%) (Chapman et al., 2010). During the 2008-2009 school year the event dropout rate for 9th through 12th grade public school students in the state of **Kentucky** was **2.9** percent (Chapman et al., 2010). The event dropout rate for **Jefferson County Public School (JCPS)**, the school district used in this dissertation study was **6.0 in 2009** and **4.95 in 2010,** which are significantly higher than the national state dropout rate ("JCPS Data Book", n.d).

"The **status dropout rate** reports the percentage of individuals in a given age range who are not in school and have not earned a high school diploma or an alternative credential" (Chapman et al., 2010. p. 2). The status dropout rate is a useful measure for examining the overall educational attainment among U.S. citizens. In 2009, approximately 8.1 percent of 16 to 24 year olds residing in the United States were not enrolled in high school and had not earned a high school diploma or equivalency (Chapman et al., 2010). While examining the status dropout rate by region, the West had the highest dropout rate at 8.6 percent followed by the **South (8.4%)**, Midwest (7.6%), and Northeast (7.1%) (Chapman et al., 2010). There was no state data provided in this report. However, Kentucky is included in the Southern region and is therefore reflected in the dropout rate for the South.

"The **status completion rate** indicates the percentage of individuals in a given age range who are not in high school and who have earned a high school diploma or an alternative credential, irrespective of when the credential was earned" (Chapman et al., 2010, p. 2). Unfortunately, the status completion rate includes individuals who may or may not have received their education outside the United States (Chapman et al., 2010). In 2009, the national status completion rate of 18 to 24 year olds not enrolled in high school who had received a high school diploma or equivalency was 89.8 percent (Chapman et al., 2010). Approximately 1,479,000 (5.4%) of the 89.8 percent of the 18 to 24 year olds with a high school diploma or equivalency in 2009 obtained a General Educational Development (GED) certificate (Chapman et al., 2010). Extracting those with a GED, in 2009, 84.4 percent of the 18 to 24 year olds obtained a regular high school diploma (Chapman et al., 2010). Examining the status completion rate by region, in 2009, the Northeast region had the highest status completion rate at 90.9 percent followed by the Midwest (90.3%), **South (89.3%)** and West (89.1%) (Chapman et al., 2010). Again, Kentucky is included in the status completion rate for the South, with no state specific data available.

"The **averaged freshman graduation rate** estimates the proportion of public high school freshmen who graduate with a regular diploma 4 years after starting 9th grade" (Chapman et al., 2010, p. 2). In essence the averaged freshman graduation rate is the rate of students who graduate on-time. The national averaged freshman graduation rate among public high school students in the class of 2008-2009 was 75.5 percent (Chapman et al., 2010). In the state

of **Kentucky** the averaged freshman graduation rate for the class of 2008-2009 was **77.6 percent**, which is higher than the national average (Chapman et al., 2010). **JCPS 2008** averaged freshmen graduation rate was **67.69 percent, 65.28 percent in 2009,** and **69.27** in **2010** ("JCPS Data Book", n.d)[2] – much lower than both the national average and Kentucky average.

In addition to an upward trend in the high school graduation rate (Figure 1), national data has consistently reflected an increasing trend in overall educational attainment for all racial and ethnic groups (Stoops, 2004; Crissey, 2009). Educational attainment is defined as the highest number of years of schooling completed (Stoops, 2004). Data on educational attainment is collected annually from a representative sample of the U.S. population, and is measured by a single question on the *Current Population Survey*: "What is the highest grade of school...has completed, or the highest degree...has received?", which is used to calculate the national status completion rate. This survey has yielded results that indicate that Americans are more educated than ever. "In 2003, over four-fifths (85%) of all adults 25 years or older reported they had completed at least high school; over one in four adults (27%) had attained at least a bachelor's degree; both measures are all time highs" (Stoops, 2004, p. 1). These figures have been consistent over a 4-year span; according to the 2007 analysis on educational attainment, 84 percent of adults aged 25 years or older earned a

[2] The data in this document includes the State No Child Left Behind (NCLB) Average Freshmen Graduation Rate (AFGR) required by United States Department of Education (USED) as well as the State Kentucky AFGR. The State Kentucky AFGR is adjusted to include graduates with a diploma completing in more than four years and students with severe disabilities that earned a certificate of attainment. AFGR for NCLB will be used to meet 2011 NCLB graduation rate requirements, as defined in 703 KAR 5:060.

high school diploma or GED, and 27 percent earned a bachelor's degree (Crissey, 2009, p. 1). It is important to make mention that these figures include GED recipients.

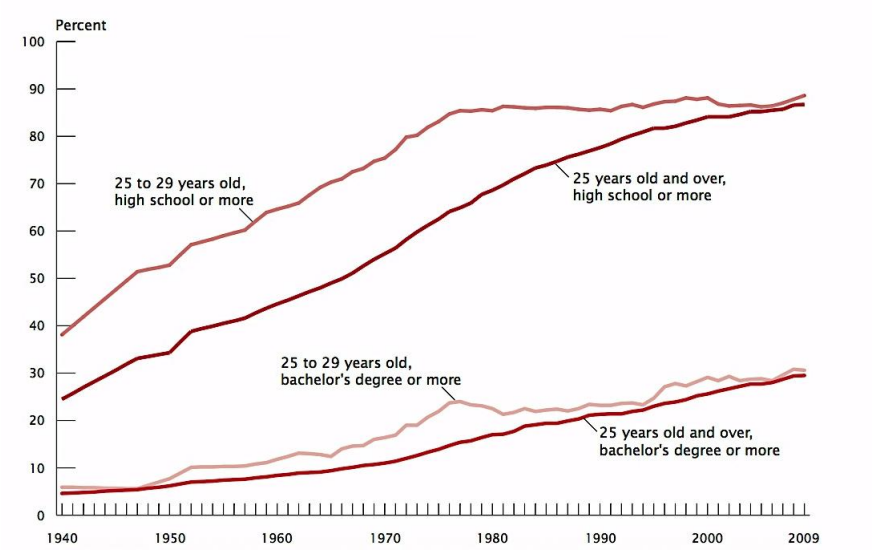

Figure 1. Educational Attainment of the Population 25 Years and Over by Age: 1947 to 2003. Source: Stoop, N. (2004). Educational Attainment in the United States: 2003. Report No. P20-550). Washington, DC: U.S. Census Bureau.

Although national data suggest that the trend in educational attainment is on the rise, it also reflects disparities in student performance and educational attainment among racial groups, with minorities disproportionately performing poorer and obtaining lower levels of educational attainment. These disparities can be seen in the same data results provided in the *Trends in High School Dropout and Completion Rates in the United States: 1972-2009* report. Black students drop out of high school at a disproportionate higher rate, and graduate at a disproportionate lower rate than their White counterparts. In 2009, 4.8 percent of the national dropout rate was of the Black race, compared to 2.4

percent for White (Chapman et al., 2010). The national status dropout rate in 2009 for Blacks was 9.3 percent, compared to a 5.2 percent rate for Whites (Chapman et al., 2010). Additionally, in 2009, the national status completion rate for Blacks was 87.1 percent, compared to a 93.8 percent rate for Whites (Chapman et al., 2010). The lower graduation rate of Black students can be seen in Kentucky state and JCPS district data. In the state of Kentucky, the graduation rate of Black students was 66.8 percent in comparison to 75.89 percent of White students in 2008; in 2009, the graduation rate of Black students was 66.06 percent in comparison to 76.25 of White students; and, in 2010, the graduation rate of Black students was 70.08 percent in comparison to 77.94 percent of White students ("JCPS Data Book", n.d.). JCPS district data reflects a more dramatic disparity between the two races. In 2008, Black students had a 60.55 percent graduation rate in comparison to a 71.31 percent graduation rate for White students ("JCPS Data Book", n.d.). In 2009, the Black student graduation rate was 58.40 percent in comparison to the 68.93 percent White student graduation rate ("JCPS Data Book", n.d.). Lastly, in 2010, the Black student graduation rate was 64.15 percent and the White student graduation rate was 73.37 percent ("JCPS Data Book", n.d.).

The most commonly used terms to describe disparities in student achievement are the *academic achievement gap* or *achievement gap*, both used interchangeably. "The term 'achievement gap' denotes a somewhat kinder way of discussing pervasive racial and socioeconomic disparities in student achievement and what Kozol (1991) terms 'savage inequalities' in America's

schools" (Lavin-Loucks, 2006, p. 2). Although the academic achievement gap between White and Black students will be discussed and statistical data will be presented in this study, the belief of the researcher is not that race contributes to the gap in student performance. The academic achievement gap between White and Black students is simply a manifestation of other contributing societal factors where there is disproportionate representation of Blacks, and it is these factors that cause the divide in student performance. The gap in achievement between White and Black students is a tangible and measurable outcome of all the other complex interwoven societal issues and environmental influences that will be discussed in this chapter and further investigated in this study. Race will not be used to explain student achievement but will be used for purposes of comparative analyses in this study.

National data has shown that White students have consistently out-performed Black students in all facets of education. In her analysis on education and poverty, Carol Swain (2006) indicated that the average Black high school student functions at a skill level four years behind the skill level of White and Asian students. Results from the *NAEP 2008 Trends in Academic Progress* report had shown that from 2004 to 2008 there were no significant changes in the gaps in reading and mathematic average scores between White and Black students, with White students consistently performing drastically better[3]. There

[3] "This report presents the results of the NAEP longterm trend assessments in reading and mathematics, which were most recently given in the 2007-2008 school year to students at ages 9, 13, and 17. Nationally representative samples of over 26,000 public and private school students were assessed in each subject area" (Rampey, Dion, & Donahue, 2009, p. 2).

were three age groups that students were assessed in this analysis: 9, 13 and 17. In 2008, the gap in *reading average scores* between White and Black students was 24 points among the 9 year olds; 21 points among the 13 year olds; and a dramatic 29 points among the 17 year olds (Rampey, Dion, & Donahue, 2009). In 2008, the gap in *mathematic average scores* between White and Black students was: 26 points among the 9 year olds; 28 points among the 13 year olds; and 26 points among the 17 year old students (Rampey et al., 2009). Additionally, NAEP results have shown that Black and Latino students score lower in science than do White students (Mickelson, 2003).

In addition to Whites earning high school diplomas at a higher percentage rate than that of Blacks and Hispanics, they are also graduating on-time at a higher percentage rate than that of their minority counterparts. According to authors Levin, Belfield, Muenning, and Rouse (2007), on-time public high school graduation rates for Black males are as low as 43 percent, comparative to 71 percent for White males. On-time public high school graduation rate refers to students graduating within the appropriate time-frame from their start date. Conversely the 47 percent of Black males that did not graduate on-time either failed a grade level and were required to repeat, or they dropped out of school completely. These figures reflect the trend in the national dropout rate, "Demographically, African Americans and Hispanics abandon high school at an even more alarming rate than other groups" (Lavin-Loucks, 2006, p.4). In 2008, the national dropout rate of Blacks (9.9%) was double that of Whites (4.8%); and

the Hispanic (18.3%) dropout rate tripled that of Whites[4] ("National Center for Education Statistics", n.d.).

Statistics from the National Center on Education Statistics (NCES) indicated that the percentage of Blacks and Hispanics who enroll in college continuously fall short of the percentage of the White enrollment in institutions of higher education. The disparity in college enrollment can partially be explained by the disparities in the college readiness rate. Black students represent a smaller percentage of students considered "*college ready*" upon high school graduation, and this is detailed and discussed further in the section titled *Implications of the Achievement Gap*. Figure 2 is a comparative illustration of national data on educational attainment (highest level of education achieved) among racial groups. Non-Hispanic Whites leads Blacks and Hispanics in the highest percentage of education achieved within each category. The largest disparity gap that exist between Whites and Blacks within the age range of 25 years or older is in relation to college. There are substantially more Whites attending and graduating from college than that of Blacks. Authors Kopkowski and Flannery (2005) stated, "At the nation's four-year colleges, Blacks and Hispanics make up only 17 percent of the undergraduate population despite that they represent 31 percent of the national college-aged population. . ." (p. 24).

[4] "The status dropout rate is the percentage of 16- through 24-year-olds who are not enrolled in high school and who lack a high school credential. A high school credential includes a high school diploma or equivalent credential such as a General Educational Development (GED) certificate" (http://nces.ed.gov).

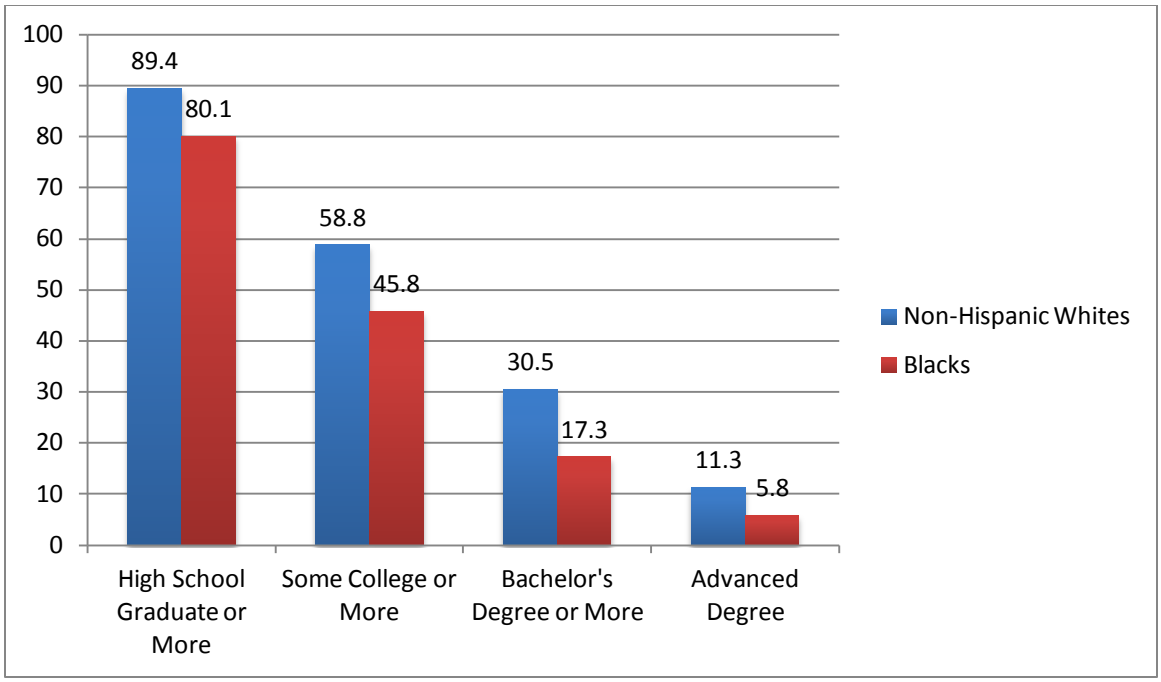

Figure 2. Educational Attainment Comparative Analysis by Race. Figures are measured in percentages. Adapted from *Educational Attainment in the United States: 2007* (Report No. P20-560). Washington, DC: US. Census Bureau.

As of 2009, 34 percent of the young adults between ages 25 to 34 in the city of Louisville have earned a bachelor's degree or higher ("Greater Louisville Project", n.d.). In order to increase this percentage of Louisville residents with bachelor's degrees, the Greater Louisville Project (GLP), an independent, non-partisan civic initiative organized by the Community Foundation of Louisville established *55,000 Degrees*. *55,000 Degrees* is an initiative of a public-private partnership, with a goal to have half of the adults in Louisville with college degrees by 2020, specifically adding 40,000 more people with bachelor's degrees and 15,000 more associate's degrees, for a total of 55,000 degrees ("Greater Louisville Education Commitment", 2010).

Consistent with the national trend of disparities in educational attainment between Whites and Blacks, Figure 3 illustrates the same disparity in educational attainment in the city of Louisville. "Just 14% of Louisville's African American population holds a Bachelor's Degree or higher, one of the lowest level among its peer cities" ("Greater Louisville Project", 2011). While attempting to move Louisville into the top tier of its competitor cities through its *55,000 Degrees* initiative it will be perilous to not focus attention and efforts to increasing the percentage of degrees held by Blacks, as Louisville's ranking is one of the lowest. In order to address this disparity a grassroots initiative, *15K Initiative* was established with the intent to ensure that 15,000 of the new degrees obtained by 2020 are obtained by Blacks (Hudson & Hines-Hudson, 2011, p. 4). The impact of achieving this goal is two-fold, "If successful, these interlocking initiatives will eliminate the educational attainment disparity between Louisville and its peer cities, and eliminate the racial gap in Louisville at the same time" (Hudson & Hines-Hudson, 2011, p. 4).

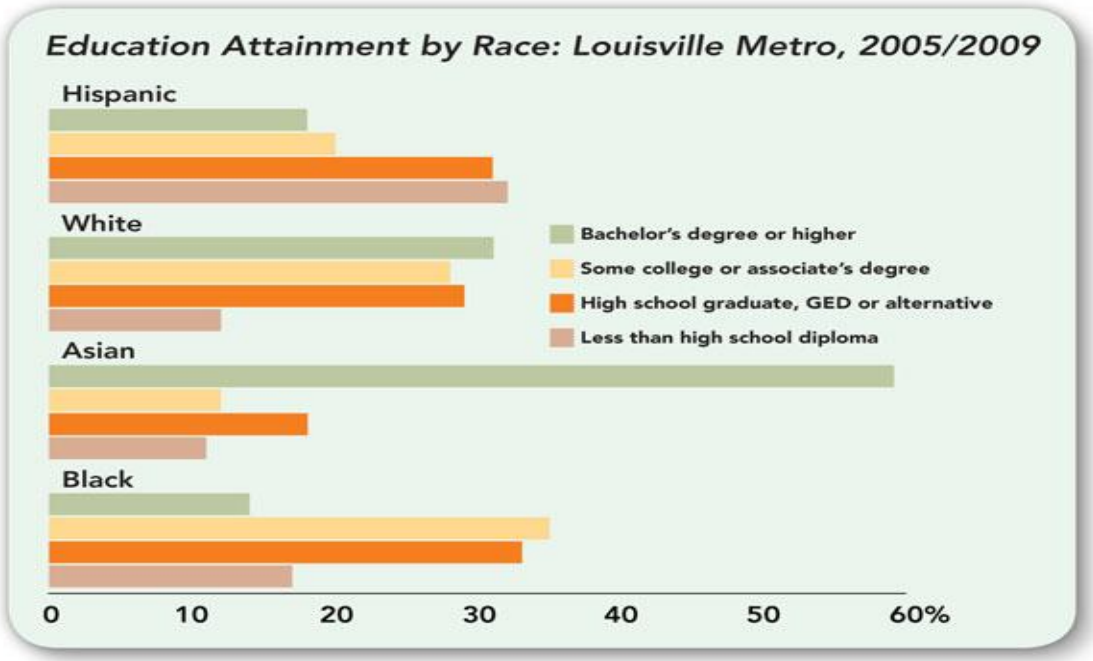

Figure 3. Education Attainment by Race: Louisville Metro, 2005/2009. Source: Greater Louisville Project. Retrieved from http://www.greaterlouisvilleproject.org/default.aspx.

In summation, based on the national dropout rate, completion rate and average of the highest educational level attained by U.S. citizens, overall the U.S. educational system is improving. However, the real persisting problem is the disproportionate academic performance level and educational attainment level between Whites and Blacks; and this is despite the national attention to the problem and initiatives and policies enacted to address the gap. In this study, the researcher is not short sighted and does not believe disparities are Black and White only; but, recognize and believe that most importantly educational attainment disparities are driven by socioeconomics and the characteristics that come along with being associated with a certain socioeconomic level. This premise will be explained in the conceptual model driving this study; however,

before examining the contributors and implications of the achievement gap, the history of the U.S. public school system will be discussed in an attempt to put this problem within a historical context.

History of Public Education

Disparities in educational attainment have existed since the inception of public school education. The early foundational structure of public school education was exclusive and discriminatory in practice; the education system was highly localized and available only for the children of wealthy families ("A History of Public Education", n.d.). Such a system was the initial cause and later helped facilitate these disparities. During the 1840s, Horace Mann of Massachusetts and Henry Barnard of Connecticut were instrumental in advocating for equal formal education for all students by arguing that common schooling (common school is an earlier term for public schools) could create good citizens, unite society, and prevent crime and poverty ("A History of Public Education", n.d.). These outcomes are the primary intent of public school education. As a result of their diligent efforts, by the end of the 19th century, free public school education was available at the elementary school level to all students ("A History of Public Education", n.d.). In 1852, Massachusetts was the first state to pass laws requiring children to attend at least elementary school, followed by New York in 1853, and by 1918 all schools had mandatory attendance laws enacted ("A History of Public Education", n.d.).

Despite the early workings of Mann and Barnard to equalize educational opportunities, education was still intended for one group of children, White

children. After the Emancipation Proclamation in 1863, southern states opposed the education of Black children because these states still favored slavery. "The separate but equal doctrine enunciated in *Plessy v. Ferguson* (1896) legalized the common practice of providing unequal public education for Black public school students in the United States" (Hunter, 2009, p. 575). "Under Jim Crow education, disparities in opportunities to learn and in outcomes were caused by official racial discrimination against blacks, Native Americans (in some states) Asians and Latinos" (Mickelson, 2003, p. 1057). Jim Crow and other discriminatory laws are examples of institutional racism, which were laws enacted to keep oppressed groups of people oppressed. Miller and Garran (2008) characterized institutional racism as "…systemic, societal, durable racism that is embedded in institutions, organizations, laws, customs, and social practices" (p. 29). They use the analogy of a web; institutional racism is a web that blocks opportunities for some and offers privilege to others. It was not until the 1954 ruling in the case of *Brown v. Board of Education Topeka, Kansas* was the legalization of separate but equal schools for Black and White students eradicated.

In 1951, a group of thirteen Topeka parents filed a class action suit against the Board of Education in Topeka, Kansas calling for the school district to reverse its policy practicing racial segregation. Prior to the ruling of *Brown v. Board of Education* under Kansas state law it was permitted but not required for school districts to have separate elementary schools for White and Black children. The law permitting separate but equal school facilities based on race

prevented Black students from attending their neighborhood schools, forcing them to travel greater distances to less desirable schools while their White counterparts were able to attend schools in close proximity to their homes.

The thirteen plaintiffs were recruited by leaders in the local chapter of the National Association for the Advancement of Color People (NAACP). In 1954, the justices on the United States Supreme Court unanimously ruled (9-0) that state laws establishing separate public schools for White and Black students were unconstitutional citing a violation of the Equal Protection Clause of the Fourteenth Amendment of the United States Constitution. Chief Justice Earl Warren read the unanimous decision of the court stating:

> We come then to the question presented: Does segregation of children in public schools solely on the basis of race, even though the physical facilities and other "tangible" factors may be equal, deprive the children of the minority group of equal educational opportunities? We believe that it does...We conclude that in the field of public education the doctrine of 'separate but equal' has no place. Separate educational facilities are inherently unequal. Therefore, we hold that the plaintiffs and others similarly situated for whom the actions have been brought are, by reason of the segregation complained of, deprived of the equal protection of the laws guaranteed by the Fourteenth Amendment (“Brown v. Board of Education”, n.d.).

The result from this ruling overturned the 1896 *Plessy v. Ferguson* law legalizing segregated schools based on race. It had become unconstitutional for states to practice "*de jure*" segregation, that is, separate but equal schools. Since the Brown decision was handed down, the new challenges have become creating and implementing a public school system that is equitable and just for all students.

The issue of school denial based on the grounds of race has been revisited since the *Brown v. Board of Education* ruling in 1954. Jefferson County Public Schools (JCPS) in Louisville, KY has created the *student assignment plan*, a system of assigning students to district schools with the school racial makeup being one of the criteria. The goal is to maintain racial integration within district schools by having a proportionate amount of each race represented, no less than 15 percent Black and no more than 50 percent Black ("Cornell University School of Law", n.d.). However, in 1998, five Black students sued JCPS to allow them admission in Central High School, which is a magnet school. The students alleged they were refused admission based on their race; Central High School had already met their racial quota. In 2000, Federal Judge John Heyburn ruled in favor of the five students citing that JCPS could not use race in the student assignment plan for magnet schools; and, in 2004, he ruled that race could not be used in traditional schools but it can be used in regular public schools.

JCPS students are assigned to what the district refers to as an *attendance area* based on their residence; and each attendance area has a primary *resides school* and a set of *cluster resides schools* ("Cornell University Law School",

n.d.). Unless parents express an interest in enrolling their students in a specific school, students are automatically placed in their resides school or a cluster school. In 2002, Crystal Meredith, a White mother joined other parents in a lawsuit against JCPS after her son was denied admission to a district elementary school. Meredith's son was enrolled in a cluster school because his resides school was full to capacity. A month after school had begun, she attempted to enroll him in a non-cluster school which was a school closer to their home; however, the school rejected his application because of concerns that his admission would compromise or imbalance the school's racial makeup ("Cornell University Law School", n.d.). Meredith alleged in her lawsuit that the JCPS student assignment plan violates the Equal Protection Clause of the Fourteenth Amendment, which was the same clause violated as cited in the 1954 federal ruling of *Brown v. Board of Education*. The court ruled in favor of JCPS citing that it is constitutional for the state and district to promote a system that ensures racial diversity in the public schools. However, since this ruling the district's student assignment plan has been under attack by many district parents, but, what most importantly emerged is the discourse centered on whether students should be able to attend their neighborhood schools, which are schools closest to their homes. The denial of admittance into their neighborhood school was the grounds for the thirteen Topeka parents to file a lawsuit against the board of education in Topeka, Kansas.

Contributors to the Achievement Gap

Disparities in educational attainment are a result of many interwoven complicated and complex factors. One of the underlining contributors to the academic achievement gap is simply the historical purpose and early structure of public school education. As previously mentioned, education was intended for wealthy White children. There were early laws enacted, such as *Plessy v. Ferguson* (1896) that legalized a system that would keep Black students from attaining equal education. In 2010, at a local community forum on educational attainment, the late Dr. J. Blaine Hudson, former Dean of College of Arts & Sciences at the University of Louisville characterized educational disparities as the legacy of slavery. Since the 1954 Brown decision, public school districts are attempting to create an inclusive and equitable learning system, one where all students are able to flourish academically. However, based on the national, state (Kentucky), and district (JCPS) data this goal has not been met, perhaps for a number of reasons that will be discussed in this section. The premise of this study suggests that the gap in achievement is not due to race but derives from the complicated characteristics that come from their existence in their school, family, neighborhood and the interconnectedness of these characteristics.

Public school education is funded by three sources: federal, state and local governments. Approximately 7 percent of public school education is funded by the federal government through programs such as Title I; and the remaining 93 percent of funding is derived from state and local governments ("Trends in Educational Funding", n.d.). At the state level, state and income taxes are the

primary source of funding; and at the local level, property taxes are the main source of funding ("Trends in Educational Funding:, n.d.). Such a method of school funding can help facilitate inequities that may contribute to disparities in educational attainment.

Funding schools through local property taxes has proven to be an unjust way of providing school funding. In an investigative analysis done on 857 elementary, high schools and unit districts in Illinois it was concluded that, "Due to the primary reliance on local property tax revenue for school funding, there are massive cumulative gaps in per-pupil spending, particularly in poor or minority communities. The 6,413 students who started elementary school in Evanston in 1994 and graduated from high school in 2007 had about $290 million more spent on their education than the same number of Chicago Public Schools students" (Lowenstein, Loury, & Hendrickson, 2008,). In *When Are Racial Disparities in Education the Result of Racial Discrimination? A Social Science Perspective*, Roslyn Mickelson (2003) argued that historically, reliance on local property taxes as the main source of school finance and the sanctity of local school district boundaries were critical to establishing inequality within and between communities; and to maintaining stratified schooling after certain educational policies shifted toward racial equality of educational opportunity in the 1950s. She furthers her argument by stating "Inequalities in funding exist largely because state actors rely on property taxes to fund schools even though this method permits striking inequalities in resources, and hence, in opportunities to learn, based on race and class" (Mickelson, 2003, p. 1070). Local property taxes

as a funding source has produced a two-tiered public education, one for the rich and the other for the poor due largely to the huge funding disparities between wealthy school districts and those situated in economically poor communities (Hunter, 2009).

"More than fifty years after *Brown v. Board of Education*, many students of color throughout the United States continue to struggle in racially isolated, under-funded and inadequate schools" ("American Civil Liberties Union", n.d.). According to authors Kahlenberg (2001), Lee, Burkam, and LoGerfo (2001), Natriello, McDill, and Pallas (1990), and Van Hook (2002), "Blacks, Latinos, and Native Americans are more likely to learn in schools with fewer material and teacher resources, a weaker academic press, and greater concentrations of poor, homeless, limited English-speaking, and immigrant students" (as cited in Mickelson, 2003, p. 1057). Findings from Carl Bankston, III and Stephen Caldas' (1996) study on the influence segregation has on academic achievement concluded that "…African Americans are, as we might expect, the most seriously affected by minority concentration schools" (p. 552).

It is a complicated task trying to discern whether educational disparities are caused by racial discrimination because of its close association with social class (Mickelson, 2003). However, poverty affects the Black population at a disproportionate rate than of Whites. Poverty is defined as a family's pretax money income being below the poverty threshold ("National Poverty Center", n.d.). The poverty threshold is established annually by the U.S. Census Bureau. Poverty rates for Blacks greatly exceed the national average ("National Poverty

Center", n.d.). In 2010, 27.4 percent of Blacks were poor, compared to 9.9 percent of Non-Hispanic Whites ("National Poverty Center", n.d.). According to the National Poverty Center, poverty rates are highest for female-headed households, particularly if they are Black or Hispanic. In 2010, 31.6 percent of the households headed by single women were poor, 15.8 percent of the households headed by single men and 6.2 percent of married couple households lived in poverty ("National Poverty Center", n.d.). Children represent a disproportionate amount of the poor population in the United States; they are 24 percent of the total population, but 36 percent of the poor population ("National Poverty Center", n.d.). In 2010, 16.4 million (22%) children were poor and of them 38.2 percent were Black (Table 1).

Table 1

Children Under 18 Living in Poverty, 2010

Category	Number (in thousands)	Percent
All children under 18	16,401	22.0
White only, non-Hispanic	5,002	12.4
Black	4,817	38.2
Hispanic	6,110	35
Asian	547	13.6

Source: U.S. Bureau of the Census, *Income, Poverty, and Health Insurance Coverage in the United States: 2010*, Report P60, n. 238, Table B-2, pp. 68-73.

Children living in low-income households are faced with many challenges that can oftentimes show manifestations in their academic performance or their overall outlook on the importance of education. The 2009 national event dropout rate by income, showed that the rate of students living in low-income families

(7.4%) was approximately five times greater than the rate of their peers from high-income families (1.4%) (Chapman et al., 2011).

Some critics argue that poverty alone does not adequately explain the academic achievement gap between White and Black students, by citing that a gap exists between the races at every socioeconomic level. In her analysis on education and poverty, Carol Swain (2006), indicated that Black children reared in families earning $50,000 a year score no better than Whites and Asians reared in families earning from $10,000 to $20,000 per year. In her analysis examining the producers of the academic achievement gap, Danielle Lavin-Loucks (2006) stated that even among the lowest income group (less than $10,000), Whites score 129 points higher than the national mean for Blacks and almost 61 points higher than Blacks whose families earn between $80,000-$100,000 annually. According to Lavin-Loucks (2006), regardless of socioeconomic status the degree of parental involvement in their children's education can account for some of the disparities in educational attainment.

There is no universal definition of *parental involvement*; however, there are two broad characteristics of what parental involvement entails: parents' involvement in the life of the school; and their involvement in support of the individual child at home and at school ("Department for Education and Skills", n.d.). "The Harvard Family Research Project (2006) emphasizes that African Americans from low-income families whose parents participate in their elementary school education are far more likely to have successful high school careers and reach graduation" (as cited in Lavin-Loucks, 2006, p.5). Other than

self-reports, there are limited methods of measuring how involved parents are in their children's education in their homes or the value parents place on education. Oftentimes, attendance at parent-teacher conferences and membership in the Parent-Teacher Association (PTA) serves as a proxy to measure parental involvement. During the 2009-2010 school year, 37 percent (17,235) of the overall district PTA memberships were in high schools.

In an analysis on public high school graduation and college readiness rates in the United States, Jay Greene and Greg Forster (2003) indicated there is a gap between what high schools require for graduation and what four-year colleges require before they can consider students' applications. The gap in what they refer to as the *educational pipeline* has many consequences with one being the impact it has on college readiness, which will be discussed further in the section titled *Implications of the Achievement Gap*. The disconnect that exist between high school graduation requirements and college admission standards lies in the high school curriculum and the types of courses students are taking while in high school.

Black high school students are less likely to take higher level or advanced mathematics and English courses than White students. The lower enrollment rates of Black and low-income students in these types of courses are speculated to be a result of low expectations from a host of sources such as: parents, teachers, counselors, and school administrators. According to Swain (2006), parental expectations and societal messages oftentimes reinforce the negative stereotypes that Blacks are less capable and less likely to benefit much from the

application of higher standards imposed by teachers and institutions; and she contributes this to a combination of cultural norms and low expectations.

It is the higher level high school courses that prepare students for standardized test such as the Scholastic Assessment Test (SAT) and American College Testing (ACT). While examining the black/white test gap, research has shown that Black students who took the SAT had not followed the same academic track as White students (Swain, 2006). Additionally, White students are more likely to take SAT and/or ACT preparation courses than Black students (Swain, 2006). Such preparation courses are known to increase SAT scores by 100 points. Poor students and minority students typically do not have access to these preparation courses due to financial reasons or lack of exposure.

Although having its influence, school and family characteristics alone do not thoroughly explain the gap in achievement; however, there is an additional key characteristic that plays an intricate role in explaining the achievement gap, which is neighborhood characteristics. "Several research and literary reports suggest that a neighborhood may have important consequences for its residents, especially its young people" (Ensmiger, Lamkin, & Jacobson, 1996, p. 2401). In their groundbreaking studies on the importance of neighborhood effects, Clifford Shaw and Henry McKay (1942) concluded that, while examining differential delinquency rates by neighborhood, delinquency is associated with the kinds of neighborhoods in which young people live rather than the kinds of families from which children come. In their *Neighborhood Effects on Educational Attainment: A Multilevel Analysis* study, researchers Garner and Raudenbush (1991)

concluded that after controlling for pupil ability, family background, and schooling, results indicated that there is a significant negative association between deprivation in the home neighborhood and educational attainment. According to Garner and Raudenbush (1991) psychological studies have shown that some types of residential environments are associated with particular personality characteristics that predispose individuals to respond differently to education. Additionally, James Nash (2002) suggested that "Attention to factors that originate outside the school environment may be especially important for intervention with students at risk of school failure" (p. 73). Furthermore, he suggested that "Academic failure and dropout seldom occur in isolation. Instead, they tend to co-occur with behaviors such as substance abuse and delinquency" (Nash, 2002, p. 73).

Implications of the Achievement Gap

Because of the correlation between education and quality of life and life opportunities, there is interconnectedness between disparities in educational attainment and other societal problems. According to Levin et al. (2007), "An individual's educational attainment is one of the most important determinants of their life chances in terms of employment, income, health status, housing, and many other amenities" (p. 2).

According to Greene and Forster (2003) the gap in the educational pipeline has serious consequences for those students whose school's failed to prepare them, and for the equality of educational opportunity among students of different races. "Students who fail to graduate high school prepared to attend a

four-year college are much less likely to gain access to our country's economic, political, and social opportunities" (Greene & Forster, 2003, p. 1). Based on data from the U.S. Department of Education, in 2001, of the 70 percent of public high school graduates, only 32 percent of these students were qualified to attend four-year colleges (Greene & Forster, 2003). "To be 'college ready' students must pass three crucial hurdles: they must graduate from high school, they must have taken certain courses in high school that colleges require for the acquisition of necessary skills, and they must demonstrate basic literacy skills" (Greene & Forster, 2003, p. 1). Based on the overall findings from their study on public high school graduation and college readiness rates, Greene and Forster (2003) concluded "…that by far the most important reason black and Hispanic students are underrepresented in college is the failure of the K-12 education system to prepare them for college, rather than insufficient financial aid or inadequate affirmative action policies" (p. 14). Furthermore, their calculations indicated there is not a large disparity between the population that is minimally qualified to attend college and the population that actually does attend college (Green & Forster, 2003).

The SAT and ACT are college admissions assessments used by colleges and universities in a combination with other criteria to measure applicants' college readiness. The SAT consists of two sections, critical reading and mathematics with scores in each section ranging from 200 to 800. In 2008, the national overall average of White students' critical reading score was 528, the highest of all racial groups; and Blacks' average score was 430, the lowest of all

racial groups (“Trends and Status”, n.d.). In 2008, The mathematics scores consisted of Whites performing the second highest behind Asians (581) with a national overall average score of 537, and Blacks again scored the lowest of all racial groups with an overall average score of 426 (“Status and Trends”, n.d.). In the state of Kentucky, in 2009, 460 JPCS students took the SAT. The overall average score in critical reading was 576 and 572 in mathematics (“Jefferson County Public Schools”, n.d.).

The ACT consists of four sections: English, mathematics, reading, and science, with scores in each section ranging from 0-36. In 2008, the composite English score among Whites was 21.7, which is the second highest score behind Asians (22.1), and Blacks with a composite score of 16.1, again the lowest of all racial groups (“Status and Trends”, n.d.). In 2008, Whites had a composite score of 21.8 in mathematics, again the second highest behind Asians (24.1), and Blacks had the lowest composite score of 17 (“Status and Trends”, n.d.). In 2009, 5779 of JCPS students took the ACT. The overall average composite score was 18.7, with a mean score of 17.8 in English, 18.5 in math, 19 in reading, and 19 in science (“Jefferson County Public Schools”, n.d.). These standardized test are given to students during grades 8 (Explore; 1-25 score), 10 (Plan; 1-22 score), and 11 (ACT; 1-37 score). During the 2008-2009 school year, 7,202 JCPS 10th grade students completed the ACT Plan. The mean composite score was 16.2, 15.5 for English, 15.9 math, 15.7 reading, and science 17.2 scores. There were 50,531 students in the entire state of Kentucky that took the ACT Plan. The mean composite score for the entire state was 16.6, English

15.9, math 16.4, reading 16, science 17.4. In 2009, 5,986 JCPS 11th grade students completed the ACT. The mean composite score was 17.8, with 16.8 in English, 17.9 in math, 18 in reading, and 18 in science. During this same timeframe 43,495 11th grade students in the state of Kentucky completed the ACT. The mean composite score for the entire state was 18.2, with 17.3 in English, 18.2 in math, 18.4 in reading, and 18.5 in science.

In addition to the national attention and resources devoted to analyzing high school graduation and dropout rates, more attention needs to be placed on examining an annual college readiness rate of public high school students. Examining the college readiness rate can provide more insight into the quality of education students are receiving within the public school system. In their examination of the college readiness rate, Greene and Forster (2003) suggested the following:

> A measurement of college readiness that more accurately reflects the minimum admissions requirements for college is essential for education policy. Such a measurement will allow us to determine the extent of our schools' failure to prepare students to apply to college. It will also answer crucial questions regarding inequality of opportunity for students in different racial groups (Greene & Foster, 2003, p. 7).

Prior to the 1954 landmark decision in *Brown v. Board of Education* data was regularly kept on the consequences that derive from race and school quality. The court decision greatly curtailed states' dissemination of data on school quality based on race. "The gap in knowledge about race and school quality is

distressing because evidence suggests that disparities in school quality that historically existed between black and white students are responsible for a portion of the gap in earning between black and white workers" (Donohue & Heckman, 1991, p. 2). Juhn, Murphy and Pierce (1991) argued that because minority workers on average attended inferior schools they acquired lower skill levels than Whites. In their analysis on the cost and benefits to society from investing in education, authors Levin et al. (2007) used data from the *2005 Current Population Survey* on a cohort of 20 year olds to assess the economic consequences of educational attainment. While investigating the economic consequences of improving education, among other findings Levin et al. (2007) concluded that the lifetime societal benefits of high school graduation includes: higher tax revenues, and lower government spending on health, crime, and welfare. There is a direct correlation between educational attainment and employment and income, with the higher an individual's educational attainment the more likely they will be employed and the higher their income. According to the 2008 Bureau of Labor Statistics, Current Population Survey data, the unemployment rate for persons 25 years of age and over that have less than an high school diploma was at 9 percent; the median weekly earnings for persons in this same group was $453 ("U.S. Bureau of Labor Statistics", n.d.). For persons 25 years of age and over with a high school diploma, the unemployment rate was 5.7 percent, with the median weekly earnings of $618 ("U.S. Bureau of Labor Statistics", n.d.). Data from this same report indicated that the unemployment rate of persons 25 years of age and older with a bachelor's degree was 2.8

percent, with a median weekly income of $1,012. Male high school graduates earn $117,000-$322,000 more than dropouts, with those with some college earning significantly more (Levin et al., 2007). However, the difference in lifetime earnings between a high school dropout and a college graduate is $950,000-$1,387,000 (Levin et al., 2007). In 2005-2007, the median earnings of individuals with less than a high school diploma in Louisville Metro was $18, 974, high school diploma $25,829, some college or a associate's degree $31,089, bachelor's degree $42,914, and $53,738 for those with a graduate or professional degree ("The Greater Louisville Project", n.d.).

Educational attainment has shown to be one of the most important determinants of the likelihood of performing and being convicted of a criminal act. In a 2007 analysis conducted by the Justice Policy Institute (JPI), a relationship between high school graduation rates and crime rates, and a relationship between educational attainment and the likelihood of incarceration was shown. The research also suggested that increased investments in quality of education can have a positive public safety benefit ("Justice Policy Institute", 2007). Results from their analysis on educational attainment as it relates to crime trends and public safety was summarized in the *Education and Public Safety* report:

> graduation rates were associated with positive public safety outcomes; states that had higher levels of educational attainment also had crime rates lower than the national average; states with higher college enrollment rates experienced lower violent crime rates than states with lower college enrollment rates; states that made bigger investments in

> higher education saw better public safety; and the risk of incarceration, higher violent crime rates, and low educational attainment are concentrated among communities of color, who are more likely to suffer from barriers to educational opportunities ("Justice Policy Institute", 2007, pp. 1-2).

Additionally, "A study reported in the *American Economic Review* on the effects of education on crime found that a one year increase in the average years of schooling completed reduces violent crime by almost 30 percent, motor vehicle theft by 20 percent, arson by 13 percent and burglary and larceny by about 6 percent" (as cited in Justice Policy Institute, 2007).

In *The Effect of Education on Crime: Evidence from Prison Inmates, Arrests, and Self-Reports*, Lochner and Moretti (2004) investigated the effect of education on crime. Results from their study indicated that the difference in educational attainment between Black and White men explain 23 percent of the black-white gap in male incarceration rates. "The United States leads the world in the number of people incarcerated in federal and state correctional facilities" ("Justice Policy Institute", 2007). As of June 30, 2009, approximately 164,400 of the inmates held in custody in state or federal prisons or in jail were young Black males between the ages of 18 through 24 ("Bureau of Justice Statistics", n.d.). During this same timeframe and within the same age group, approximately 113,400 were White, and 90,900 were Hispanics ("Bureau of Justice Statistics", n.d.).

JPI compared state-level education data with crime rates and

incarceration rates and found that those states that focused the most on education tend to have lower violent crime rates and lower incarceration rates ("Justice Policy Institute", 2007). Based on their analysis, Lochner and Moretti (2004) suggested that, "A 1% increase in the high school completion rate of all men ages 20-60 would save the United States as much as $1.4 billion per year in reduced costs from crime incurred by victims and society at large" (p. 27). However, according to the 2006 *Alliance for Excellent Education* report, a 5 percent increase in male high school graduation rates would produce an annual savings of almost $5 billion in crime-related expenses. Reviewing rates on crime-reduction and earnings from a 5 percent increase in male graduation rates by states, in the state of Kentucky it is projected a total benefit to the state economy of $87,412,144 (as cited in Justice Policy Institute, 2007).

Educational attainment is also an important determinant of quality of individual health, health care utilization, self-care and some would argue it can be seen as a driving force behind the debt in the U.S. economy. Findings from researchers Abdullah Alguwaihes and Baiju R. Shah (2009) investigation on educational attainment and its association with health care utilization and self-care behavior by individuals with diabetes suggest that persons with low educational attainment are independently at risk for worse diabetes care. Educational attainment is inversely related to diabetes prevalence (Albuwaihes & Shah, 2009). Based on the results in their study, Alguwaihes and Shah (2009) concluded that individuals with high educational attainment were more likely to have an ophthalmological examination, and were more likely to receive care from

a specialist or paramedical practitioner for medical care. Conversely, they found that those with lower educational attainment were more reliant on their primary care physicians for medical care. As it relates to self-care, individuals with higher educational attainment levels are more likely to report following a meal plan and less likely to smoke. Alguwaihes and Shah (2009) suggests that better self-care regimes and medical care can be explained by the following, "Individuals with high educational attainment may have a greater awareness of, motivation for, or ability to implement healthy behaviors to improve their diabetes care" (p. 26).

Not only does educational attainment have implications on individual's health, but, it also has implications on the U.S. society, particularly the economy. "Those with higher educational attainment are less likely to use public programs such as Medicaid and they typically have higher quality jobs that provide health insurance" (Levin et al., 2007, p. 9). Medicaid eligibility is based on wages earned; thus, suggesting that those with less education being more likely to qualify for this assistance. According to Levin et al., (2007), increasing educational attainment will likely produce the following effects:

> First, given the causal link between educational attainment and income, the public sector will save money by reducing enrollment in Medicaid and other means-tested programs. Second, if there is a causal link between educational attainment and disability, the sector will save money by reducing enrollment in Medicare among persons under age of 65. It may also reduce expenditures among Medicaid beneficiaries by reducing the number of severely ill enrollees (p. 10).

High school dropouts are more likely to be uninsured and are more likely to be dependent on government assistance for medical care for their families and themselves. Such services have proven to have a substantial line item in the U.S. annual budget. According to the analysis conducted by Levin et al. (2007), while examining per capital cost of Medicaid and Medicare across educational attainment, the greater cost are on African Americans with low educational attainment. Per capital spending on Medicaid and Medicare for White male dropouts is $43,500, $82,400 for Black male dropouts, $60,800 for White female dropouts, and $107,200 for Black female dropouts (Levin et al., 2007). The rate of per capital spending decreases as the educational attainment level increases. The per capital spending for White male high school graduates is $17,000, $34,200 for Black male graduates, $23,200 for White female graduates, and $48,500 for Black female graduates (Levin et al., 2007). For White male college graduates the per capital spending is $3,100, $6,000 for Black males, $3,600 for White females, and $7,800 per capital spending for Black female college graduates (Levin et al., 2007).

Summary

Although there have been many strives toward shrinking the gap in achievement between White and Black students the gap still persist, with manifestations being seen in educational attainment rates, poverty rates, the gap in income, and crime and incarceration rates. The gap in academic achievement is well documented within the literature and empirical research studies. Research

on this topic is advanced beyond the question whether a gap exist; however, future research on this topic needs to explore from a holistic approach the predictors of the gap using sophisticated research designs and statistical analysis that allows for evaluating the interconnection between multiple environments.

Chapter II provides a review of the literature and empirical studies related to investigating predictors of educational attainment and student achievement. Additionally, relevant theoretical perspectives are reviewed to guide an understanding of student development within the context of their environments. The proposed conceptual model, which integrates those theories and empirical studies are discussed in this chapter.

CHAPTER II: LITERATURE REVIEW

"Child development takes place through processes of progressively more complex interaction between an active child and the persons, objects, and symbols in its immediate environment." ~Urie Bronfenbrenner

Can the fundamental question, what influences child development including intelligence be explained by genetic inheritance (nature), or can it be explained by environmental factors (nurture)? This dichotomous approach towards answering such a complex question has dominated the discourse on child development in developmental psychology for centuries. Historically, scholars have argued the exclusivity of how genetic or environmental factors make individuals who they are. However, within modern times and under more careful scrutiny the debate no longer centers around, which of these epistemological approaches exclusively explains human development; however, the debate has now evolved into: In what ways and to what extent does genetics and environment explain human development including intelligence?

Psychologist Kenneth A. Dodge (2004) furthered this transformational approach towards understanding and explaining human development by stating "Discoveries over the past decade have revealed how neither genes nor the environment offers a sufficient window into human development" (p. 418). He

suggests "…the most important discoveries have come from unearthing the manner in which the environment alters gene expressions (and how genes impose limits on environmental effects), how biology and the environment influence each other across time, and how maximizing gene-environment fit leads to optimal outcomes for children" (Dodge, 2004, p. 418). It is the influence of genetic and environmental factors in tandem that offer a more accurate attempt of understanding and explaining child development and intelligence.

In this chapter, a detailed literary analysis is done to inform a heightened understanding of the mechanisms that influence the educational attainment of students attending Jefferson County Public high schools using theory and empirical research studies. An integration of theory and empirical research studies on educational attainment were used to build this study's conceptual framework, which will be discussed in greater detail later in this chapter. The foundation of this study and structure of the conceptual framework is that of an ecological perspective, which acknowledges the existence of a reciprocal relationship between individual and environment. The conceptual model is structured to include main predictor variables that are of environmental and individual characteristics. This is also consistent with the premise that genetics and environment in tandem better informs an understanding and explanation of child development and intelligence.

Ecological Systems Theory

Ecology is the scientific study of the distribution and abundance of organisms, and it "…seeks to understand how species maintain themselves by

using the environment, shaping it to their needs without destroying it; and how such adaptive processes increase the environment's diversity and enhance its life-supporting properties" (Germain & Gitterman, 1995, pp. 4-5). Organisms include animals and plants. Based on Western scientific and religious teachings and beliefs, historically, human beings were once viewed as separate entities from their environments. Conversely, more advanced, Eastern religious teachings and beliefs viewed human beings and nature as each being a part of the other. Today, Western society has embraced the ideological beliefs and teachings that humans and nature are reciprocal. The transformation of Western thoughts in the twentieth century can be attributed to the works of Charles Darwin, Sigmund Freud, Niels Bohr, Albert Einstein and Werner Heisenberg (Germain & Gitterman, 1980). The paradigm shift in ideological beliefs and teachings led to the emergence of new perspectives of ecology such as *human ecology*. Human ecology is the study of relationships between humans and their environments.

One of the most prominent scholars and contributors to the field of human ecology is psychologist Urie Bronfenbrenner. Urie Bronfenbrenner (1917-2005) was a Russian born renowned American psychologist who specialized in child development. He earned his undergraduate degrees in psychology and music from Cornell University, and later earned his M.A. in developmental psychology from Harvard University, and his Ph.D. from the University of Michigan. After earning his doctoral degree he served as a psychologist within various branches of the U.S. Army. "In 1965, his ideas and ability to translate them into operational

research models and effective social policies spurred the creation of Head Start, the federal child development program" ("New World Encyclopedia", n.d.). As a co-founder of the national Head Start program, and lifelong advocate for children, Bronfenbrenner is referred to as the father of Head Start. The legacy of his scholarly work made him regarded as one of the leading scholars in developmental psychology, child-rearing and human ecology. Cornell University President Hunter R. Rawlings stated, "Perhaps more than any other single individual, Urie Bronfenbrenner changed America's approach to child rearing and created a new interdisciplinary scholarly field, which he defined as the ecology of human development" (as cited in New World Encyclopedia, n.d.).

"Bronfenbrenner's ecological paradigm, first introduced in the 1970s (Bronfenbrenner, 1974, 1976, 1977, 1979), represented a reaction to the restricted scope of most research being conducted by developmental psychologist" (Bronfenbrenner, 1994, p.37). He argued "…that in order to understand human development, one must consider the entire ecological system in which growth occurs" (Bronfenbrenner, 1994, p. 37). Viewed as an evolving scientific perspective, in his groundbreaking work, *The Ecology of Human Development*, Bronfenbrenner (1979) defined "The ecology of human development involves the scientific study of the progressive, mutual accommodation between an active, growing human being and the changing properties of the immediate settings in which the developing person lives, as this process is affected by relations between these settings, and by the larger contexts in which the settings are embedded" (p. 21). The focus of his

perspective is on the environment, the quality and context of the environment in which the child inhabits; and in his early work [*The Ecology of Human Development*] he identified four types of nested environmental systems that influence development:

- A *microsystem* is a pattern of activities, roles, and interpersonal relations experienced by the developing person in a given setting with particular physical and material characteristics.
- A *mesosystem* comprises the interrelations among two or more settings in which the developing person actively participates (such as, for a child, the relations among home, school, and neighborhood peer group; for an adult, among family, work, and social life).
- An *exosystem* refers to one or more settings that do not involve the developing person as an active participant, but in which events occur that affect, or are affected by, what happens in the setting containing the developing person
- The *macrosystem* refers to consistencies, in the form and content of lower-order systems (micro-, meso-, and exo-) that exist, or could exist, at the level of the subculture or the culture as a whole, along with any belief systems or ideology underlying such consistencies (Bronfenbrenner, 1979, pp. 22-26).

These systems are characterized as bi-directional, influences occur within and between these systems. For instance, individuals are not only influenced by the interactions within the microsystem settings but are also active in influencing

these settings. In the 1980s Bronfenbrenner expanded on his theory and introduced a fifth system, *chronosystems*. Chronosystem is a result from the growing number of researchers no longer treating the passage of time as synonymous with chronological age; however, researchers begun using time not only as an age attribute, but as a property of the surrounding environment over the life course as well as across historical time. "A chronosystem encompasses change or consistency over time not only in the characteristics of the person but also of the environment in which that person lives (e.g., changes in the life course in family structure, socioeconomic status, employment, place of residence, or the degree of hecticness and ability in everyday life)" (Bronfenbrenner, 1994, p. 40).

Bronfenbrenner's theoretical perspective for research in human development was used as a springboard for the development of his *ecological systems theory.* Unlike other human development theories, the ecological systems theory emphasizes the influence of environmental factors as the primary contributor to development. In essence, the ecological systems theory examines a child's development within the context of the system of relationships that form his or her environment (Paquette & Ryan, 2001). One of the primary questions this theory attempts to answer is "…how does the world that surrounds a child help or hinder continued development?" (Paquette & Ryan, 2001). According to Bronfenbrenner, as a child develops, the interaction between these environments becomes complex; and the complexity of these environments occur as the child's physical and cognitive structures grow and mature (Paquette & Ryan, 2001).

"Although most of the systemic theory-building in this domain has been done by Bronfenbrenner, his work is based on an analysis and integration of results from empirical investigations conducted over many decades by researchers from diverse disciplines…" (Bronfenbrenner, 1994, p. 37). One of the first was a Berlin study conducted by Schwabe and Bartholomai (1870) on the effects of neighborhood on the development of children's context (Bronfebrenner, 1994, p. 37). Schwabe and Bartholomai's (1870) study used a framework of empirical findings that was later used in the development of his [Bronfenbrenner] theoretical framework. His foundational perspective allows for the building of context into the research model at the levels of both theory and empirical work (Bronfenbrenner, 1979), and empirical studies that have used this perspective will be examined.

In Catherine L. Garner and Stephen W. Raudenbush's (1991) study titled, *Neighborhood Effects on Educational Attainment: A Multilevel Analysis*, researchers used multilevel models to investigate the existence of neighborhood effects on educational attainment among 2,500 young people who left school between 1984 and 1986 in one Scotland school district. The authors found that after controlling for pupil ability, family background, and schooling, there is a significant negative association between deprivation in the home neighborhood and educational attainment (Garner & Raudenbush, 1991). Based on the results from their study, Garner and Raudenbush (1991) concluded "...that policies to alleviate educational disadvantage cannot be focused solely on schooling, but

must form part of a broader initiative to tackle social deprivation in the society at large" (p. 251).

Researchers Michael H. Boyle, Katholiki Georgiades, Yvonne Racine, and Cameron Mustard's (2007) used multilevel models to examine the longitudinal associations between contextual influences (neighborhood and family) and educational attainment in their study, *Neighborhood and Family Influences on Educational Attainment: Results from the Ontario Child Health Study Follow-Up 2001*. A cohort of 2,355 students, ages 4 through 16 were first assessed in 1983 and their educational attainment during a follow-up in 2001. Results from this study indicated that the final model explained 33.64 percent of the variance in educational attainment; 14.53 percent of the variance was explained by a combination of neighborhood and family-level variables. Interestingly, 10.94 percent of the variance was explained by child-level variables. "Among the neighborhood and family-level variables, indicators of status (5.29%) versus parental capacity/family process (4.03%) made comparable predictions to attainment while children from economically disadvantaged families did not benefit educationally from living in more affluent areas" (Boyle et al., 2007, p. 168).

Building upon the ecological perspective and using multilevel models, this study will examine the influence of the contextual effects (neighborhood, school, individual) on educational attainment (ACT score). The ecological systems theory provides a holistic approach toward understanding children and the interactions between them and their environments. According to Germain and

Gitterman (1980), the ecological theoretical perspective emphasizes the importance of understanding the influence on behavior and development of factors that characterize the different life settings, or microsystems, in which children function. Students operate within multiple microsystems, such as home and family, school, peer groups, church, and neighborhoods, and this study will account for that. In this study, the microsystems under investigation are: school and neighborhood. Psychologist and researcher John K. Nash (2002) suggested that characteristics of these multiple microsystems affect behavior and development within the microsystem as well as within other microsystems. In his investigation of the influences of neighborhood effects on educational behavior in middle and high school students identified as being at risk of school failure, Nash (2002) grounded his conceptual framework in ecological-development and social disorganization theories; social disorganization theory will be used to inform an understanding of the importance quality of neighborhood has on educational attainment.

Investigating the role neighborhood characteristics play in the development of individual behavior is too important to be ignored. According to authors Garner and Raudenbush (1991) psychological studies have shown that some types of residential environments are associated with particular personality characteristics that predispose individuals to respond differently to education. Additionally, Nash (2002) suggested, “Attention to factors that originate outside the school environment may be especially important for intervention with students at risk of school failure” (p. 73). Furthermore, he suggested, “Academic

failure and dropout seldom occur in isolation. Instead, they tend to co-occur with behaviors such as substance abuse and delinquency" (Nash, 2002, p. 73). These are illustrations of how students are influenced by and are influencing multiple microsystems.

Based on the ideologies of this theory, the researcher posits that neighborhood, school and individual characteristics do influence individual student outcomes; but more specifically, the researcher is most interested in how it influences individual student educational attainment. The principles of this theory, along with the analysis and results of prior empirical studies that examined the aforementioned contextual effects and student outcomes were used in the development of the testable conceptual model, *Contextual Effects on Student Academic Achievement Model* (Figure 4); this model will be the conceptual framework guiding the investigation of environmental and individual effects on educational attainment.

Overall, the ecological perspective is gaining an increased influence on helping professions, such as psychiatry, psychology, and social work. "For social work, ecology appears to be a more useful metaphor than the older, medical-disease metaphor that arose out of the linear world view, because social work has always been committed both to helping people and to promoting more humane environments" (Germain & Gitterman, 1980, p. 5). The ecological perspective provides a holistic view of the interchange of human beings and elements of their environment. Germain and Gitterman (1980) characterized the

possibilities of these exchanges between human beings and the environment as follows:

> Human beings change their physical and social environments and are changed by them through processes of continuous reciprocal adaptation. When it goes well, reciprocal adaptation supports the growth and development of people and elaborates the life-supporting qualities of the environment. When reciprocal adaptation falters, however, physical and social environments may be polluted. Physical environments become polluted by man's release of non-biodegradable matter produced by his technology. Social environments become polluted by poverty, discrimination and stigma produced by man's social and cultural processes. When human beings use any component of their physical or social environments destructively, the environmental systems are damaged and will tend, reciprocally, to have a negative impact on all who function within them, whether the system is a family, a school, a geriatric facility, or a redwood forest (p. 5).

Germain and Gitterman's characterization of the possible exchanges between human beings and their social environments is germane to this study because as previously stated, the reciprocal exchange between individuals and environment is the foundation of this study for understanding educational attainment.

Social Disorganization Theory

"When the orderly processes of social interaction and effective functioning of a group break down there is social disorganization" (Elliott & Merrill, 1961, p. 23). The concept *social disorganization* is a frame of reference for the study of the sociological aspects of social problems. In this particular dissertation study, the researcher applied this concept along with social disorganization theory to explain disparities that lie within educational attainment, while using the findings from empirical studies where this theory was tested. In addition to the concept of human ecology and the Ecological Systems Theory, the concept of social disorganization and its theory was used to build upon this study's conceptual framework. Within this section of the theoretical analysis, first, social disorganization as a concept will be defined, and the implications from it will be discussed. Second, social disorganization theory will be defined; the implications this theory has on this study will be examined; and lastly, prior empirical studies guided by this theory will be discussed.

According to sociologists and authors Mabel A. Elliott and Francis E. Merrill (1961) "*Social Disorganization*, as the name implies, is an attempt to study these problems from the standpoint of the social processes which bring them about" (p. ix). Social disorganization focuses on understanding the starting point of anti-social attitudes in the individual, family and community; and the conflict that occurs between these anti-social attitudes and those attitudes held by the larger defining group (Elliot & Merrill, 1961). Some specific manifestations of disorganization that can be seen in individual behaviors, families and

communities will be discussed later. The aforementioned is simply a general prelude and a brief synopsis of social disorganization; however, in order to have an adequate understanding of social disorganization, one must first understand the concept *social organization* and the functionality of it as it relates to social systems. Understanding social organization is imperative because, in essence, social disorganization is the reverse of social organization. Additionally, examples of social organization will be used to help illustrate social disorganization and vice versa.

"Social organization is characterized by the harmonious operation of the different elements of a social system. When a group functions harmoniously, it is (relatively) organized" (Elliott & Merrill, 1961, p. 4). The organization of the group can be that of a family, community, a nation; however, for purposes of this study the organizations of focus are: individual, school and neighborhood. The achievement and maintenance of social organization is contingent upon the sharing of common goals and beliefs among all group members. The group sets the norms and deems what are acceptable attitudes and behaviors that are required for all group members to adhere to. Social organization is at a constant threat. There is no known utopian society that has achieved consistent social organization due largely to social change and the rate of it. Elliott and Merrill (1961) stated, "The *fact* of change is therefore by no means new, but the *rate* of change is unprecedented" (p. 3). Social change is not used in a bad connotation because it has been used to usher in more equitable conditions, and has helped to create a more inclusive society. Presently, social change is largely due to

modern technological innovations. For instance, with the Internet, we now have a society of a 24-hour media outlet. Although social change can be for the betterment of society, there are still stresses and maladjustments associated with change due to the sacred norms, values, and laws being impacted. Historically, the United States has seen the contention that results from making positive change. It has been manifested in the Women's Suffrage Movement, Civil Rights Movement, and during Brown vs. Board of Education Topeka, Kansas to name a few. Although the social change previously mentioned were for a more equitable and inclusive society, the breakdown and discourse displayed in our society are examples of social disorganization. Another breakdown and discourse of social change has manifestations in social roles and status. Social roles and status are defined by society. When these roles and statuses are clearly defined then you have an organized society; however, in our evolving society, for example, roles such as: teacher, mother, husband, and wife are ambiguously defined. The ambiguity has created social disorganization as it relates to these social roles.

As previously stated, social disorganization is the contrast to social organization and offers a reverse aspect of the same functioning of social systems. "Social disorganization occurs when there is a change in the equilibrium of forces, so that many former expectations no longer apply and many forms of social control no longer function effectively" (Elliott & Merrill, 1961, p. 23). "Social disorganization is the decline, breakdown, and dissolution of the interpersonal relationships binding human beings together in groups" (Elliott & Merrill, 1961, p. 457). The breakdown of the group is caused by the same

combination of factors that produces it (Elliott & Merrill, 1961). The process of decline, breakdown, and dissolution is essentially the same with the individual, the family, or other social systems; however, to look at this process within each group, is merely looking at disorganization of the group from a different point of view (Elliott & Merrill, 1961). In the text *Social Disorganization, Fourth Edition*, authors Elliott and Merrill (1961) examined social disorganization within the context of: individual, the family and community. Their analysis of the disorganization in individual, family and community is imperative because it was used to build the conceptual model used in this study, and represents individual and environmental characteristics that will be analyzed.

Individual Disorganization

"The same dynamic forces that produce social disorganization produce the disorganization of the individual. Social disorganization is the impairment or dissolution of the network of patterned relationships binding individuals together in a series of functioning groups" (p. 46). Individuals are not seen as a separate entity from the group, but like the ecological perspective, individuals are influenced by their group and they are the influencers of the group. Elliott and Merrill (1961) suggested, "The individual is the microscosm of the social macrocosm – a small part of a larger whole" (p. 47). Individual disorganization can be a result of the disorganization of the group, and the disorganization of the group can be a result of an individual. Disorganized groups or a disorganized society is composed of disorganized individuals. Manifestations of individual

disorganizations are: juvenile delinquency, alcoholism, crime, and suicide to name a few.

Family Disorganization

"Family disorganization is thus the weakening, breakdown, or dissolution of the small group comprising the nuclear family" (Elliot & Merrill, 1961, p. 339). The values, attitudes, customs and beliefs of the family are typically the same as of the larger society; thus suggesting the family unit is an extension of the larger society. Relationships between family members are of particular importance; however, the most important relationship is between the parents. Discourse between parent and child, and sibling and sibling may cause stress, however, it is the discourse between parents that may have greater consequences on individual family members.

Community Disorganization

There are geographical and sociological elements that together characterize community. "In a geographical sense, the community is a contiguous distribution of people and institutions. In a sociological sense, it may be regarded in terms of the psychological elements that make it a living entity" (Elliott & Merrill, 1961, p. 457). Some of the general problems of social disorganization within the community are: crime, unemployment, mobility, migration, discrimination, and segregation.

Social disorganization theory was developed by a group of sociologist at the *Chicago School*, during the 1920s, and advanced by the works of Clifford

Shaw and Henry McKay (1942). The Chicago School is used to refer to the University of Chicago's Sociology Department, which is one of the oldest and one of the most prestigious departments of sociology. Researchers at the Chicago School were some of the first to conduct research on what is considered urban sociology. In their studies conducted in the city of Chicago, Shaw and McKay (1942, 1969) applied social disorganization to explain juvenile delinquency by analyzing the urban growth and examining the delinquency rates within five concentric zones. Results from their study concluded that rates of delinquency decreased as one moved from the zones located in or near the central business district out towards the commuter's (suburb) zone (Shoemaker, 1996). Four of the basic assumptions of this theory as an explanation of delinquency are:

> …delinquency is primarily the result of a breakdown of institutional, community-based controls. The individuals who live in such situations are not necessarily themselves personally disoriented; instead, they are viewed as responding "naturally" to disorganized environmental conditions. A second assumption of this approach to delinquency is that the disorganization of community-based institutions is often caused by rapid industrialization, urbanization, and immigration processes, which occur primarily in *urban* areas. Third it is assumed that the effectiveness of social institutions and the desirability of residential and business locations correspond closely to natural, ecological principles, which are influenced by the concepts of competition and dominance. Largely because of this assumption, the social disorganization explanation of

> delinquency is associated with the term "ecological approach." A fourth assumption is that socially disorganized areas lead to the development of criminal values and traditions, which replace conventional ones, and that this process is self-perpetuating (Shoemaker, 1996, p. 77).

Furthermore, social disorganization in relationship to delinquency refers to either "(1) a breakdown in conventional institutional controls, as well as informal social control forces within a community or neighborhood (cf. Thomas and Znaniecki), or (2) the inability of organizations, groups, or individuals in a community or neighborhood to solve common problems collectively" (Shoemaker, 1996, p. 77).

In addition to explaining delinquency, social disorganization theory has been one of the premiere theories used to explain neighborhood crime. Shaw and McKay (1942) concluded that neighborhood risk factors such as: high crime, high poverty, and a high degree of racial diversity substantially contributes to the lack of social control in Chicago neighborhoods. According to authors Na'im Madyun and Moosung Lee (2010) neighborhood crime itself is the best index of social disorganization because it typically reflects the amount of control a community has over events within their neighborhood.

"Within this context, since the 1990s, the majority of research literature addressing the community effects on individual development has relied theoretically on social disorganization theory (Shaw & McKay, 1942; Wilson, 1987), which was mostly applied to neighborhood crime" (Lee & Madyun, 2009, p. 151). In his study *Neighborhood Effects on Sense of School Coherence and*

Educational Behavior in Students at Risk of School Failure, James K. Nash (2002) used a conceptual framework based on ecological-development and social disorganization theories that highlighted the importance of, and links between neighborhood factors and sense of school coherence. He conducted a path analysis of data from a sample of 4,772 middle and high school students identified as being at risk of school failure. In this study, Nash (2002) investigated relationships among neighborhood informal social control, crime, and negative peer culture; students' *sense of school coherence*; and students' educational behavior. School coherence is defined as the belief that school is a comprehensible, manageable, and responsive environment (Nash, 2002). Results from this study concluded that neighborhood *informal social control* was the most important predictor of sense of school coherence, with a standardized path coefficient of .19. "*Informal social control* is defined as the ability of neighborhood residents to intervene effectively with adolescents who are violating agreed-upon values and norms related to the safety of residents. For example, willingness on the part of adults to put a stop to dangerous behavior is evidence of informal social control" (Nash, 2002, p. 75). Unfortunately, due to the limitation of using secondary data exclusively, this variable will not be examined in this dissertation study; however, the researcher wants to acknowledge the importance this variable as a neighborhood characteristic and the potential impact it has on educational attainment. Additionally, results from Nash's study also yielded that, "Neighborhood crime and negative peer culture were negatively related to sense of school coherence" (Nash, 2002, p. 83).

While examining the dependent variable *educational behavior*, results indicated, "…sense of school coherence fully mediated the effects of neighborhood informal social control and negative peer culture on educational behavior. Sense of school coherence was significantly and positively related to educational behavior, and this path had the largest standardized path coefficient in the model (.30)" (Nash, 2002, p. 84). Nash (2002) conceptualized educational behavior as a multidemensional construct comprising behavior at school, grades, and attendance. Additionally, "Neighborhood crime was significantly negatively related to educational behavior (-.24), after estimating a path from crime to sense of school coherence" (Nash, 2002, p. 84).

In their study, *The Impact of Neighborhood Disadvantage on the Black – White Achievement Gap*, Moosung Lee and Na'im Madyun (2009) empirically examined the impact neighborhood disadvantage (crime and poverty) has on educational outcomes (math and reading achievement scores) among a sample of 2,577 seventh and eighth grade students in an urban school district in the upper Midwestern region of the United States. Using hierarchical linear modeling, they analyzed 79 neighborhoods organized by the level of crime and poverty by rearranging these neighborhoods into the following four groups: low crime-low poverty, low crime-high poverty, high crime-low poverty, and high crime-high poverty. Results from their analyses indicated that math and reading scores were at the lowest for both Black and White students within the total 32 high poverty neighborhoods (low crime-high poverty and high crime-high poverty) than in low poverty neighborhoods. The lowest math (37.9) and reading (37.9)

scores demonstrated by both Black and White students resided in the high crime-high poverty neighborhoods.

Analysis from their data had shown that as neighborhood crime and poverty increased, the academic achievement of White students decreased (Lee & Maydun, 2009). While controlling for all student demographics, White students residing in the 16 disadvantaged neighborhoods underperformed in both math and reading than their White peers residing in other types of neighborhoods (Lee & Madyun, 2009). Interestingly, "White students slightly, but surely, lagged behind their Black counterparts residing within the same disadvantaged neighborhoods with the other predictors held constant" (Lee & Madyun, 2009, p. 164). For students residing in the high crime-high poverty neighborhoods, the predicted mean math achievement for Black students was 56.9 and 56.0 for White students; the predicted mean reading achievement was 57.7 for Black students and 56.5 for White students (Lee & Madyun, 2009). Despite White students underperformance, the researchers identified that the White students in the 16 disadvantaged neighborhoods had better student demographics (i.e. SES and special education status) on average than Black students within the same neighborhoods; Black students in these neighborhoods were 4.33 times more likely to receive a free lunch program than Whites in the same neighborhoods (Lee & Madyun, 2009). Conversely, "Black students' achievement was positively associated with neighborhood disadvantage (high crime and/or high poverty). When all predictors were controlled, "disadvantaged" Blacks outperformed the "advantaged" Blacks" (Lee & Madyun, 2009, p. 164).

Authors Lee and Madyun (2009) used social disorganization theory to explain the performance of White students. There was a negative association between neighborhood disadvantage and achievement among White students; this negative association is a classic example of the philosophical principles of social disorganization.

Conceptual Model

The *Contextual Effects on Student Academic Achievement Model* (Figure 4) is the conceptual framework used to guide this dissertation study's investigation of influences on educational attainment. As previously stated, the structure of the conceptual framework is that of an ecological perspective. The main predictor variables in this conceptual model are structured to include environmental and individual characteristics, which are consistent with the fundamental premise of ecological systems theory, a reciprocal relationship between individual and environment. In order to understand students' academic performance it is imperative to examine all the ecological systems they exist within, which are the neighborhood and school in this model. Not ignoring the significance literature placed on the role of family, some family characteristics will be evaluated as an individual characteristic due to the limited information available through the use of secondary data.

The *Contextual Effects on Student Academic Achievement Model* was built through careful examination of theory and empirical research studies, and was significantly influenced by the existing data available to the researcher.

While ecological systems theory served significantly as a structural guide informing knowledge on the importance of examining students within all of their ecological systems, social disorganization theory lent to understanding the importance of the quality of these systems or organizations as this theory refers to on student behaviors and their academic performance. Social disorganization theory and empirical research studies helped identify the main predictor variables of this model. The significance of each variable will be discussed.

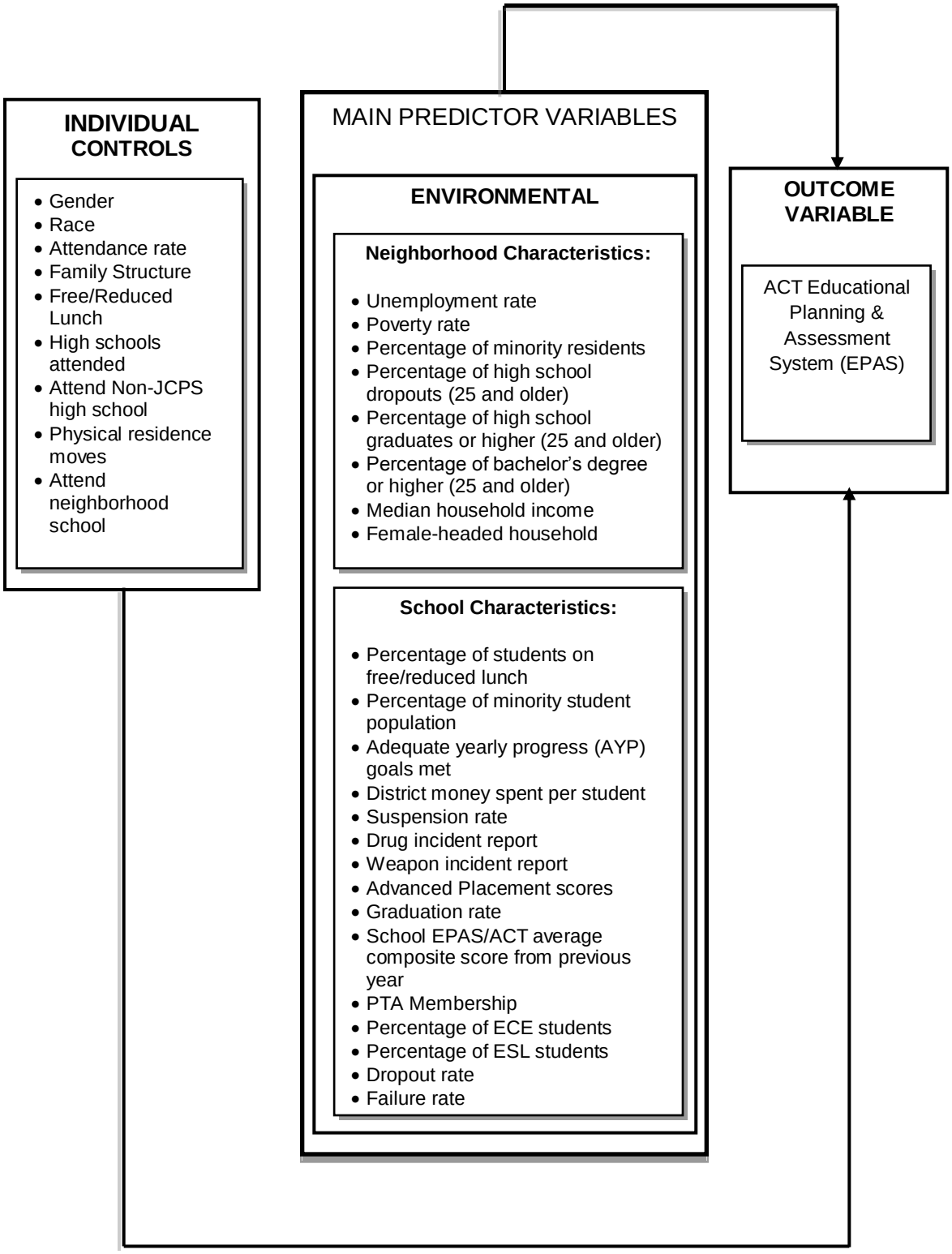

Figure 4. Contextual Effects on Student Academic Achievement

Individual Control Variables

Gender differences in educational attainment continue to exist (Ryan & Siebens, 2012). In 2009, a higher proportion of females completed high school earning their diploma; whereas, a higher proportion of males completed college earning their bachelor's degree (Ryan & Siebens, 2012). While females are graduating from high school at higher proportions, males are more likely to attain a bachelor's degree. While examining gender differences in student academic achievement by way of ACT, national data found that there was no significant difference in ACT composite scores among the graduating class of 2011 ("ACT Profile Report", n.d). The composite score for males was slightly higher at 21.2 than females at 21.0 ("ACT Profile Report", n.d.). Females scored slightly higher (20.9) on the reading section than males (20.2); and, males' math scores were higher (21.6) than females' (20.6) ("ACT Profile Report", n.d.).

A gap in student academic performance and educational attainment can be seen by way of **race.** Minorities disproportionately perform poorer and obtain lower levels of educational attainment than their White counterparts. While analyzing trends in the student achievement gap from 2004-2008, a NAEP report concluded that Black students have consistently performed lower than White students in reading and math (Rampey et al., 2009). Chapman et al. (2011) concluded that Black students dropout of high school at a disproportionate higher rate, and graduate at a disproportionate lower rate than White students. In 2008, nationally, Black students had lower composite English and math ACT scores than other racial/ethnic groups ("Status and Trend", n.d.).

Analysis from their data had shown that as neighborhood crime and poverty increased, the academic achievement of White students decreased (Lee & Maydun, 2009). While controlling for all student demographics, White students residing in the 16 disadvantaged neighborhoods underperformed in both math and reading compared to their White peers residing in other types of neighborhoods (Lee & Madyun, 2009). Interestingly, "White students slightly, but surely, lagged behind their Black counterparts residing within the same disadvantaged neighborhoods with the other predictors held constant" (Lee & Madyun, 2009, p. 164). For students residing in the high crime-high poverty neighborhoods, the predicted mean math achievement for Black students was 56.9 and 56.0 for White students; the predicted mean reading achievement was 57.7 for Black students and 56.5 for White students (Lee & Madyun, 2009). Despite White students underperformance, the researchers identified that the White students in the 16 disadvantaged neighborhoods had better student demographics (i.e. SES and special education status) on average than Black students within the same neighborhoods; Black students in these neighborhoods were 4.33 times more likely to receive a free lunch program than Whites in the same neighborhoods (Lee & Madyun, 2009). Conversely, "Black students' achievement was positively associated with neighborhood disadvantage (high crime and/or high poverty). When all predictors were controlled, "disadvantaged" Blacks outperformed the "advantaged" Blacks" (Lee & Madyun, 2009, p. 164).

Attendance is credited as being an important component of school success (Gottfried, 2010). In his investigation of the attendance-achievement

relationship, Gottfried (2010) found that attendance has predictive capability not only on GPA but also on standardized reading and math subject test performance.

Results from an investigation on the influence **family structure** has on educational attainment conducted by Scott Boggess (1998) supports the belief that growing up outside a traditional two-parent home has a negative effect on educational attainment. Boggess (1998) conducted his analysis using secondary data from the first twenty-one waves of the *Panel Study of Income Dynamics (PSID)* longitudinal survey and from the PSID's 1985 Ego-Alter File. The PSID is administered annually by the University of Michigan's Survey Research Center (SRC). His final sample consisted of 3,635 individuals, which includes: 1,040 White males, 955 White females, 774 Black males, and 866 Black females who were living in either mother-only, mother-stepfather, or first families at age 17. Results from this study indicated that family structure has the greatest effect on the educational attainment of Black females (Boggess, 1998). According to the logistic regression models performed, the primary source of the effect is the negative relationship between growing up in a home with a mother who is widowed, divorced, or separated and school completion (Boggess, 1998). Results from this study also shown that each additional year a Black female spends in this type of household, instead of a traditional two-parent household, lowers her probability of graduating by 1.6 percentage points (Boggess, 1998). Furthermore, Black females were the only group who the effect persisted after income and needs were controlled for in additional analysis (Boggess, 1998).

While examining the impact family structure has on other racial and gender groups, results from this same study indicated that growing up in a stepfather family has a significant negative effect on White male's likelihood of high school completion; for each year spent in this type of home lowers the likelihood of their graduation by approximately 1 percentage point (Boggess, 1998). Similar to the effect family structure has on White males, living in a stepfather family lowers the likelihood of high school completion by approximately 1 percentage point for White females. However, results also shown that growing up with a single mother has a negative effect on White female's educational attainment. The author explained this negative effect as attributed to lower income in a single mother household. When adding the initial economic variables in additional models the widowed, divorced, or separated variable decreases and is no longer statistically significant (Boggess, 1998). Lastly, results had shown that ever having a parent absent during childhood reduces the probability of graduation by approximately 15 percentage points for Black males (Boggess, 1998). However, interestingly, the fact of living with a never married mother seemed less detrimental than living with a widowed, divorced, or separated mother. Boggess (1998) suggested this may be attributed to the stress associated with marital dissolution. The effects of marital dissolution and conflict between parents were discussed in the analysis of social disorganization theory and the underpinnings of this theory is demonstrated in the results from this study as it relates to family structure and Black males.

Free/reduced lunch serves as a proxy for income and is the principle measure of students' economic status. Measuring students' economic status by way of free/reduced lunch status has been used in previous studies (Bankston & Caldas, 1996; Lee & Madyun, 2009; Madyun & Lee, 2010). Bankston and Caldas (1996) found in their study examining the influence of school and individual level data on public high school students scores on the Louisiana Graduation Exit Examination (GEE) exam that "Having a low income, as indicated by free or reduced lunch status, does have a fairly strong negative effect on GEE scores (-120), and including this variables does cause the coefficient of minority status to decrease from -377 to -313…" (p. 544). Children living in low-income households are faced with many challenges that can oftentimes show manifestations in their academic performance or their overall outlook on the importance of education. The 2009 national event dropout rate by income, showed that of the rate of students living in low-income families (7.4%) was approximately five times greater than the rate of their peers from high-income families (1.4%) (Chapman et al., 2011).

Continuity and a sense of stability can have a significant impact of students' academic performance. Owens (2010) found in her analysis that students who lived longer at their current residences are more likely to graduate from high school and college. Owens' results indicate the significance of students being in a stable environment on their academic performance. In order to examine the influence stability has on students' academic achievement the **number of times the student moved residences**, **the number of different**

JCPS high schools attended, and **whether they attended an non-JCPS high school** were included in this model.

There are advantages and disadvantages for attending a **neighborhood school**. An obvious advantage is the close proximity to home, which makes it easier for students and parents to access the school. It is easier for parents to be involved in school activities and for students to participate in extra-curricular activities if they attend a neighborhood school. Parental involvement reinforces the importance of education for their students and it helps build an alliance between school and home. Additionally students' participation in extra-curricular activities has a positive influence on their grades, as there is a GPA requirement to be eligible for participation. Benefits from attending a school close to home were sited in the lawsuit in the Brown vs. Board of Education Topeka, Kansas case heard by the U.S. Federal Supreme Court. Attending a neighborhood school can also be a disadvantage if their school is in a disadvantaged neighborhood. Based on social disorganization theory, schools located in neighborhoods with high unemployment and poverty rates will have an adverse affect on students' academic performance.

Main Predictor Variables

Environmental: Neighborhood characteristics. While attempting to evaluate the effects that neighborhood characteristics have on educational attainment certain neighborhood characteristics such as the **unemployment rate** among other characteristics are often used in conjunction as part of an index to

establish a neighborhood deprivation or disadvantage score (Garner & Raudenbush, 1991; Catsambis & Beveridge, 2001; Stewart et. al., 2007; Owens, 2010). Results from these studies indicated that the unemployment rate of these neighborhoods under investigation had influence on students' college aspirations (Stewart et. al. 2007) and students' educational attainment (Garner & Raudenbush, 1991).

Poverty rate is oftentimes used in conjunction with other neighborhood characteristics to establish a neighborhood deprivation or disadvantage score (Garner & Raudenbush, 1991; Catsambis & Beveridge, 2001; Stewart et al., 2007; Owens, 2010). According to Lee and Madyun (2009) neighborhood poverty has been most commonly focused as a primary indicator of neighborhood disadvantage. "As Shaw and McKay (1942) pointed out, the more poverty exists in a neighborhood, the less likely the residents would have the ability to control the delivery of expectations and norms (Sampson & Groves, 1989) related to individual development" (Lee & Maydun, 2009, p. 151).

The racial composition of a neighborhood has shown to have influence on educational attainment. Neighborhoods with higher levels of **minority residents** are more likely to be neighborhoods classified as disadvantaged than neighborhoods predominately of White residents. According to researchers Dornbush, Ritter, and Steinberg (1991) high levels of residential segregation reduce the positive influence of family advantages on the academic achievement of African Americans.

The composition of neighborhood residents' educational attainment has

an influence on students' educational attainment (Owens, 2010). Neighborhoods with overall lower educational attainment reduce the opportunities for students to have access to mentors and role models within their own neighborhood. In order to examine the influence neighborhood educational attainment has on students' educational attainment, Owens (2010) created an educational and occupational attainment index. Based on the variables in this index, this study will examine the **percentage of high school dropouts, high school graduates or higher, and bachelor's degree or higher** within the neighborhood. Results from her analysis found that the neighborhood educational and occupational attainment does not predict high school graduation (Owens, 2010). However, results do indicate that this has an influence on earning a BA, suggesting that they are more likely to earn a BA (Owens, 2010). Although results from Owens' study yielded results that the educational and occupational attainment index, which included additional variables did not predict high school graduation, these variables will be under investigation to examine whether they influence JCPS students' ACT/EPAS scores.

"Many studies show that living in advantaged neighborhoods increases the odds of educational success, even when individuals' own family characteristics are controlled" (Owens, 2010, pp. 288-289). In an investigation of neighborhood and school effects on educational attainment, Linda Datcher (1982) used zip codes to define neighborhoods in her examination of the effect the area-averaged income had on individual education attainment in 1978. Like this study conducted by Datcher (1982), this dissertation study will use zip codes

to examine the effect neighborhood **median household income** has on students' academic achievement on the ACT/EPAS exam. After controlling for various individual, family and neighborhood characteristics, Datcher found that an increase of $1,000 (10%) in zip code area income raised the educational attainment of the men by approximately one-tenth of a school year for both Blacks and Whites (Crane, 1991).

In an analysis on the influence of **female-headed households** on black achievement, researchers Madyun and Lee (2010) argued that the development of Black students is influenced by not only individual parenting but also the aggregation of parenting across the community. Using a series of multilevel modeling analyses, Maydun and Lee (2010) discovered in the final model examining neighborhood risk factors, the interaction effect of female-headed households turned out to be significant for the estimated achievement of Black male students only (-3.50). The results indicated that Black male students were likely to be particularly vulnerable to the increase of female-headed household in their neighborhoods (Maydun & Lee, 2010). "As adolescents develop goals and expectations based on the quality of the individuals within their community and the number of options they feel the adults have (Wilson, 1987), they may be vulnerable on multiple levels to negative social conditions" (Maydun & Lee, 2010, p. 441). In their investigation they concluded, "If Black male adolescents reside in neighborhoods where there appears to be a high proportion of female-headed households, we argue that this demographic composition will have an important influence on their educational trajectory" (Madyun & Lee, 2010, p. 441). It is

important to note that results from their study does not infer that female-headed households is a priori of parent deficiency, nor does it suggest that Black mothers are ineffective at raising their Black males; however, it points out the complexities that ensues from being a single parent raising a Black male (Maydun & Lee, 2010, p. 441).

Environmental: School characteristics. While examining school characteristics and the influence they have on student outcomes, the composition of students' socioeconomic status (SES) has shown to have an influence on individual students' academic achievement and aspiration (Owens, 2010). Schools' mean SES has shown to positively affect high school graduation rates (Owens, 2010). This dissertation study will use schools' mean **free and reduced lunch** as a proxy for SES. Results from the *Equality of Educational Opportunity Report* found that classmates' socioeconomic backgrounds were a more substantial predictor of an individual's success than school resources were (Owens, 2010). Students from a more disadvantaged neighborhood and attending a school with a higher proportion of students on free or reduced lunch are both negatively associated with math achievement (Catsambis & Beveridge, 2001).

Research investigating student academic achievement have revealed that the **percentage of the minorities enrolled** in schools have an influence on student achievement (Bankston & Caldas, 1996; Goldsmith, 2009). While examining the influence of percentage of minority students in schools on academic achievement, Bankston and Caldas (1996) concluded that after

controlling for the student's own race, they found that the influence of being of a minority race attending a predominately minority school had an impact on their test scores. Furthermore, they concluded that the proportion of minority students in schools has a significant negative effect on the performance of individual students independent of those students' own race (Bankston & Caldas, 1996). Using longitudinal data from the *National Education Longitudinal Study* (NELS), Pat Rubio Goldsmith (2009) conducted an investigation to examine whether racially segregated schools, neighborhoods, or both affect educational attainment. Based on his analyses, he concluded that students attending predominantly Black or Latino schools are less likely to earn a high school diploma and a bachelor's degree or more than similar students in predominantly White schools. Additionally, his analyses had shown that 6 disadvantaged students out of every 100 attending a predominantly White school are expected to lack a diploma by age 26; while 30 and 40 out of every 100 disadvantaged students at predominantly Black and predominantly Latino schools are expected to lack a diploma by age 26 (Goldsmith, 2009). Based on these results he concluded that schools with high proportions of Blacks or Latinos are not able to help disadvantaged students to the extent that predominantly White schools can (Goldsmith, 2009).

Since 2001, the *No Child Left Behind Act* (Public Law 107-110) set demanding accountability standards for schools, school districts and states implementing new state testing requirements that are designed to improve education (Jackson & Lunenburg, 2010). States are required to identify

adequate yearly progress (AYP) objectives and disaggregate test results for all students and subgroups of students based on socioeconomic status, race/ethnicity, English language proficiency, and disability (Jackson & Lunenburg, 2010). AYP is the measure states use to assess whether a school is making continuous and substantial improvement ("Jefferson County Public Schools", 2005). The *No Child Left Behind* law mandates that 100 percent of students must score at the proficient level on state test by 2014 (Jackson & Lunenburg, 2010). JCPS schools are evaluated annually on whether they've met the goals set forth in their AYP; and, whether they've met this annual goal is included in this conceptual model to determine whether meeting the AYP objectives has an influence on students' ACT/EPAS scores.

Spending per student is the current expenditures made in a year divided by the end of year average daily attendance in the school and it includes actual salaries of staff, categorical programs in the school, ECE programs, and ESL programs ("JCPS Data Book", n.d.). Whether the amount of money spent matters on student outcomes has been a longstanding debate since the 1960s with the Coleman Report (1966) where results indicated it did not matter (Mickelson, 2003). There has been an increasing body of knowledge that suggests that money does matter (Ferguson, 1998a, 1998b; Greenwald et al., 1994; Hedges et al., 1994a, 1994b; Weglinsky, 1997); although there are some who are unconvinced (Hanushek, 1994, 1996, 1997) of the importance of money spent (Mickelson, 2003). Most analyses on school funding and academic achievement are comparing district level spending, meaning predominately White school

districts and Black urban school districts (Bifulco, 2005); however, in this study spending per student will be examined between the high schools within the same school district. Based on the demographics of the JCPS high schools it is feasible to identify between the predominately White and Black schools.

The social disorganization of a school environment has an impact on student achievement. Disruptions in students' learning environments from crime and violence were shown to have lowered academic achievement of 8th graders (Carroll, n.d.). "Lee and Bryk (1989) found that a safe and orderly school climate is associated with more equitable academic achievement between White students and students of color or non-White students" (Stewart, 2008, p. 184). Using secondary data this study will use schools' **suspension rate, drug incident report and weapon incident report** to account for school safety.

There is an interesting dynamic of the influence the overall academic performance of the school has on individual students, particularly students of average- to lower-abilities. It is believed that attending school with students from higher-SES backgrounds may expose less-advantaged students to norms about achievement or educational attainment; however, attending school with higher-ability peers may depress educational outcomes (Owens, 2010). Applying relative deprivation theory to demonstrate how schools can serve as frog ponds for students, James Davis (1966) concluded that it is better to be a big frog in a small pond than a small frog in a big pond (Owens, 2010). The frog pond concept suggests that students of average- to lower-abilities attending schools with higher-ability peers are less likely to select prestigious careers than those

students attending schools with lower-ability peers (Owens, 2010). Researchers Espenshade, Hale, and Chung (2005) examined this 1966 frog pond concept and effects and concluded that “Attending high school with higher-ability peers decreases one’s odds of admission to a highly selective college, holding individual academic performance constant” (Owens, 2010). Espenshade et al. (2005) results suggest that for some students of an average- and lower-ability attending schools with higher-ability students do not benefit these students but can possible hinder their aspirations; and, perhaps possibly they would have done better attending a school with more students on their academic level. To examine the frog pond concept, schools’ **advanced placement scores, graduation rate** and their **average composite score on the ACT/EPAS** exam are used to determine the schools’ overall academic performance.

Parental involvement should positively influence student achievement (Stewart, 2008). Results from an analysis conducted by Ho and Willms (1996) found that parents were more likely to participate in parent-teacher organizations and to volunteer at school if their children attended schools of high socioeconomic background (Catsambis & Beveridge, 2001). Furthermore, it is suggested that the social context of the school may mediate the positive relationship between parental involvement and student achievement (Catsambis & Beveridge, 2001). Using secondary data, this study will examine schools’ parental involvement by their Parent-Teacher Association **(PTA) membership.**

Using secondary data provided by JCPS, there were other variables made available to the researcher that became of interest: **percentage of Exceptional**

Child Education (ECE) students, percentage of English as a Second Language (ESL) students, **dropout rate,** and **failure rate.** It is important to note that the failure rate is what Jefferson County Public Schools (JCPS) refers to as retention rate. However, it was decided to use the term failure rate because that is what is measured; it measures schools' ability to retain the students whom failed a grade level. These variables are characterized as non-academic indicators in which describe school success on their nonacademic goals. These non-academic indicators were built into the conceptual model as school characteristics to see if a relationship between these non-academic variables and student achievement exist.

Criterion Variable

The outcome variable under investigation is students' scores on the standardized ACT/EPAS exam. "ACT's EPAS Educational Planning and Assessment System was developed in response to the need for all students to be prepared for high school and the transitions they make after graduation. The EPAS systems provide a longitudinal, systematic approach to educational and career planning, assessment, instructional support and evaluation. The system focuses on the integrated, higher-order thinking skills students develop in grades K-12 that are important for success both during and after high school" ("Educational Planning and Assessment", n.d.).

Measuring educational attainment or education as an outcome variable is commonly done by evaluating student performance on a standardized test. Madyun and Lee (2010) measured achievement by using standardized reading

scores from the *Metropolitan Achievement Test-7* (MAT-7). Lee and Madyun (2009) measured achievement by using the standardized reading and math scores from the MAT. Bankston and Caldas (1996) measured achievement by the *Louisiana Graduation Exit Examination* (GEE). Lastly, Garner and Raudenbush (1991) measured educational attainment by using students' scores from a national examination administered in Scotland.

Summary

In conclusion, much theory-based literature exists in informing the understanding of the influence neighborhood and school characteristics have on student development and achievement, yet there are limited studies examining these environmental characteristics along with individual characteristics simultaneously. Ecological systems theory argues that you cannot fully understand student development unless you attempt to evaluate them within the context of all of their microsystems because they begin to intersect due to the students' involvement in all; hence, individuals are influenced by their microsystems and they are influencing their microsystems. Social disorganization theory informs our understanding that the type or quality of these microsystems matter. Students operating within disadvantaged or disorganized environments are more likely to have lower academic achievement and overall educational attainment. Based on these theories it is apparent that students in disadvantaged neighborhoods and schools will have lower ACT/EPAS scores than their counterparts in more affluent neighborhoods and schools. In this study, what becomes important is the influence of the interception of these environments in

identifying which of these characteristics are and to what degree predictors of academic performance. This will contribute to the gap in knowledge in which will help school districts and local governments in policy decisions that will help improve residents' educational attainment and quality of life. The next chapter will describe the plan and analytic strategy for this study.

CHAPTER III: METHODOLOGY

"Research on neighborhood and school composition suggests that each context influences individuals' educational success, but very little research examines both school and neighborhood characteristics simultaneously" ~Linda Owens

Research Goal and Hypotheses

The purpose of this dissertation study is to investigate the impact neighborhood, school and individual characteristics have on educational attainment as measured by students' ACT Educational Planning & Assessment System (EPAS) scores. During this investigation the researcher attempted to answer: **Are there any significant relationships between neighborhood characteristics and school characteristics, after controlling for individual characteristics that can help explain achievement disparities for high school students in Jefferson County Public high schools?** The following research hypotheses guided the study:

Hypothesis 1: After controlling for individual characteristics, students from neighborhoods with high unemployment -, poverty - and high school dropout rates, with higher percentages of minority residents, people with less education, and female headed households as well as lower median household income, will achieve academically worse than students who live in neighborhoods with lower

unemployment -, poverty – and high school dropout rates, with lower percentages of minority residents, higher rates of people with more education, and female headed households as well as higher median household income.

Hypothesis 2: After controlling for individual characteristics, students from schools with higher percentage of students on free/reduced lunch, minority students, ECE students, ESL students, with less yearly progress goals met, less money spent per student, higher dropout and suspension rates, lower graduation and failure rates, lower advanced placement scores, higher drug and weapon incident reports, and lower PTA membership and ACT/EPAS average scores, will achieve academically worse than students from schools with lower percentage of students on free/reduce lunch, minority students, ECE students, ESL students, with more yearly progress goals met, more money spent per student, lower dropout and suspension rates, higher graduate and failure rates, higher advanced placements cores, lower drug and weapon incident reports, and higher PTA membership and ACT/EPAS average scores.

This study is a secondary analysis of existing data from the US Census Bureau and the Jefferson County Public School (JCPS) district. A cross-classified random effects modeling. A cross-classified random effects modeling design is employed because the data is not purely hierarchical; neighborhoods and schools are cross-classified. “Schools are not purely clustered by neighborhood, nor are neighborhoods purely clustered within schools” (O’Connell & McCoach, 2008, p. 161). The design is therefore a two-level cross-classified

random effects modeling (Figure 5), in which students (level one) are crossed-classified by neighborhoods (level-two) and schools (level-two).

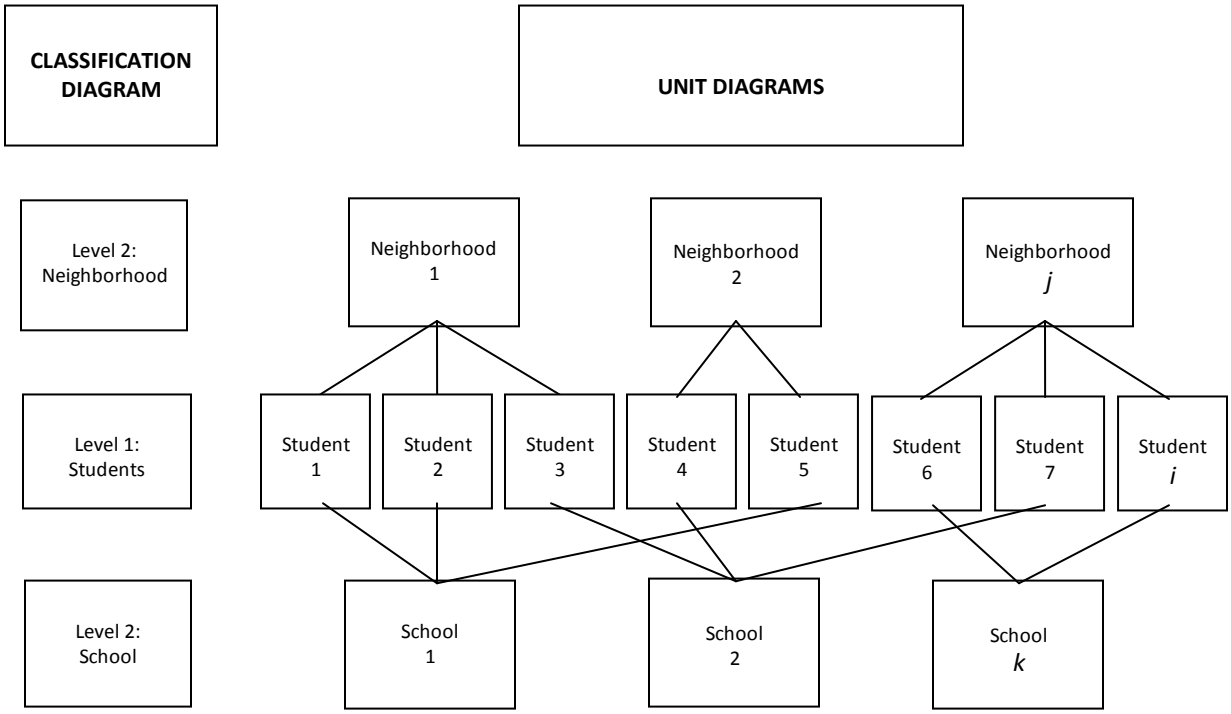

Figure 5. Cross-Classified Structure Classification Diagram

Multilevel modeling or hierarchical models have become the premier design to analyzing educational data (Garner & Raudenbush, 1991; Bankston & Caldas, 1996; Boyle e al., 2007; Lee & Madyun, 2009; Madyun & Lee, 2010). Multilevel modeling makes three important contributions to the analysis of social-scientific data with a nested structure (Garner & Raudenbush, 1991).

> First, because these models explicitly recognize the clustering of individuals within higher-level units, such as schools, they avoid violating the assumption of independence of observations that traditional ordinary least-square analysis commits in analyzing hierarchical data. Second,

> hierarchical models are powerful in estimating cross-level effects, including the effects of group characteristics on both the average level of outcomes within the group and on certain interesting structural relationships within groups. ...Third, hierarchical models can partition the variance between levels and can statistically separate the "true" variance of the microparameters from sampling variance. This partitioning is important to allow the appropriate interpretation of the explanatory power of hierarchical models (Garner & Radenbush, 1991, p. 253).

Data Source

All data used in this study is secondary data provided by the US Census Bureau and JCPS. The main predictor variables that make up *neighborhood characteristics* were from the *2011 American Community Survey (ACS) 5-Year Estimate* dataset retrieved using the American Fact Finder database on the official US Census Bureau website. JCPS Division of Data Management, Planning, and Program Evaluation provided the data for the *school characteristic*, *individual characteristic* and *outcome* variables.

Sampling

There were a total of 4171 JCPS students whom were eligible and should have completed the ACT/EPAS exam during the 2009-2010 school year. After reviewing the data provided by JCPS there were some students that were removed from the final sample for reasons that will be outlined. Of the 4171 students, 13 students were removed from the final sample because there was no ACT/EPAS score available for them. There were an additional 27 students

removed from the final sample because they were students currently enrolled in alternative schools. There was no school level data provided for these alternative schools, as a result these students were removed. Additionally, 56 students were removed because they did not have a neighborhood id, zip code. After the deletions the final sample size was 4075 students. There were a total of 21 JCPS high schools used in this analysis. Schools were arranged in alphabetical order and then assigned a numerical number. Lastly, there were a total of 35 neighborhoods used and they were each classified by a US postal zip code.

Power

Power depends on sample size and other design aspects—effect size or parameter values and the level of significance. With multilevel modeling, statistical power must be addressed on all levels. Power for level 1 depends on the number of students, while power for level 2 depends on the number of neighborhoods and schools (Snijders, 2005) Statistical power issues in multilevel modeling are complicated as the power differs for fixed effects versus random effects as a function of effect size, intraclass correlation, and the number of groups and cases per group(J. Cohen, Cohen, West, & Aiken, 2003). Simulation studies (Kreft & De Leeuw, 1998) suggest that large samples are needed for adequate power in multilevel models, and the number of schools and neighborhoods included are more important than the number of students. According to Snijders (2005), it is desirable to have as many units as possible at the top level of the multilevel hierarchy. Kreft and De Leeuw (1998) suggested that at least 20 schools and neighborhoods are needed to detect cross-level

interactions when group sizes are large. Based on the fact that there were 21 schools in the JCPS district, the required amount of groups were available on the school level. There were 35 neighborhoods based on zip code information provided by JCPS for the students in the analysis, therefore an adequate number of neighborhoods were included in the study to ensure enough power.

Operationalization of Variables

The conceptual model presented in Figure 4 includes independent control variables; and neighborhood and school variables as predictors of ACT/EPAS scores, the dependent variable.

Individual Control Variables

The individual control variables were measured on Level 1.

Table 2

Individual Control Variables (Level 1)

Variable	Operationalization	Values used in analysis
INDIVIDUAL CONTROL VARIABLES (LEVEL 1)		
Gender	Student's gender 0=Female, 1=Male	
Race	Student's race 1=Black 2=Asian 3=White 4=Hispanic 5= Two or more races	Race was recoded as follows: 1=Black 2=Other 3=White
Attendance Rate	Student's percentage of days attended school in an academic school year.	Due to this variable being negatively skewed and not meeting normality assumptions scores were reversed and transformed. Attendance rate was

		reversed so higher scores will indicate a lower attendance rate and lower scores indicate higher attendance rates.
Family Structure	Student's family structure in their home. 1=One parent 2=Two parents 3=Three adults 4=Four adults	Family Structure was recoded as follows: 0=2 or more adults 1=1 parent
Free/Reduced Lunch	Did student receive free or reduced lunch? 0=No, 1=Yes This is a proxy to measure family income.	
Different JCPS High Schools Attended	The number of different high schools a student attended prior to June 2010.	Different JCPS High Schools Attended was recoded as follows: 0=Attended more than 1 high school 1=Attended 1 high school
Residence Moves	The number of times student moved physical residency while matriculating as a high school student between 7/10/07-8/1/10.	Residence Moves was recoded as follows: 0=No moves 1=Moved once 2=Moved more than once
Non-JCPS High Schools Attended	Did the student attend a non-JCPS high school prior to June 2010? 0=No, 1=Yes	Non-JCPS High Schools Attended was removed from model because due to no variance; no students attended a non-JCPS high school.
Neighborhood School	Did the student attend a high school in the same neighborhood that they reside in; were both home residence and high school located within the same zip code? 0=No, 1=Yes	

Main Predictor Variables

The main predictor variables that made up neighborhood and school characteristics were measured on Level 2.

Table 3

Main Predictor Variables (Level 2)

Variable	Operationalization	Values used in analysis
ENVIRONMENTAL: NEIGHBORHOOD (LEVEL 2)		
Unemployment Rate	The percentage of the civilian labor force 16 and older whom are unemployed.	
Poverty Rate	The percentage of families that earn less than the minimum income as illustrated in the Federal Poverty Guidelines.	
Minority Residents	The percentage of non-White residents residing in a neighborhood.	Due to not meeting normality assumptions, minority residents variable was transformed.
High School Dropouts	The percentage of residents 25 years of age and older whom have not earned a high school diploma or GED.	
High School Diploma or Higher	The percentage of residents 25 years of age and older whom earned a high school diploma or higher.	
Bachelor's Degree or Higher	The percentage of residents 25 years of age and older whom earned a bachelor's degree or higher.	
Median Household Income	The median household income of neighborhood residents, measured in	

	dollars.	
Female-Headed Households	The percentage of households headed by females with their own children under 18 years.	
Variable	**Operationalization**	**Values used in analysis**
ENVIRONMENTAL: SCHOOL (LEVEL 2)		
Free/Reduced Lunch	The percentage of students enrolled receiving free or reduced lunch during the 2009-2010 school year.	
Minority Student Population	The percentage of students enrolled that are non-White during the 2009-2010 school year.	Minority Student Population did not meet the assumption of normality. This variable was transformed.
AYP Goals Met	Were school goals met as measured by the Adequate Yearly Progress (AYP) Summary for the 2009-2010 school year (0=No; 1=Yes).	
District Money Spent Per Student	The dollar amount spent per student during the 2009-2010 school year.	
Suspension Rate	The total number of out of school suspensions during the 2009-2010 school year.	
Drug Incident Report	The total number of incidents where some form of a narcotic drug was found on school property during the 2009-2010 school year.	Drug Incident Report
Weapon Incident Report	The total number of incidents where some form of a weapon was found on school property during the 2009-2010 school year.	Weapon Incident Report did not meet the assumption of normality. This variable was transformed.
Advanced Placement Scores	The percentage of students scoring a 3, 4, or 5 on the AP exam during the 2009-	

	2010 school year.	
Graduation Rate	The percentage of students who graduated during the 2009-2010 school year.	
ACT/EPAS Average Composite Score	The average composite score of students in Grade 11 (Juniors) during the 2008-2009 school year.	
PTA Membership	The total number of parents enrolled as members of Parent Teacher Association (PTA) during the 2009-2010 school year.	PTA Membership did not meet the assumption of normality. This variable was transformed.
ECE Students	Percentage of Exceptional Child Education (ECE) students enrolled during the 2009-2010 school year. ECE students are students with a learning disability.	
ESL Students	The percentage of English as a Second Language (ESL) students enrolled during the 2009-2010 school year. ESL are students whose primary language is not English.	ESL Students did not meet the assumption of normality. This variable recoded into a categorical variable. 0=No ESL students 1=Yes ESL students
Dropout Rate	The percentage of students that dropout during the 2009-2010 school year.	
Failure Rate	The percentage of students whom failed but retained for the following school year.	

Criterion Variable

The criterion variable, ACT/EPAS scores are measured on Level 1.

Table 4

Criterion Variable (Level 1)

Variable	Operationalization	Values used in analysis
CRITERION VARIABLE (LEVEL 1)		
ACT/EPAS	The composite score student earned on the ACT/EPAS exam.	In addition to the raw ACT/EPAS scores that will be used in analyses, scores were arranged into the following categories based on the likelihood of being accepted to a 4-year college/university: Below 17: *Not likely to get accepted* Between 17-21: *May get accepted* Above 21: *Will get accepted*

Analysis

Data was analyzed using MLwiN, a statistical software package used for analyzing multilevel models. The outcome variable was a binary variable and a generalized hierarchical linear analysis will be performed.

Unconditional Model. The unconditional model is:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_i = \beta_{0i}Constant_i$$

$$\beta_{0i} = \beta_0 + u^{(3)}_{0,NeighborhoodID(i)} + u^{(2)}_{0,SchoolID(i)} + e_{0i}$$

$$[u^{(3)}_{0,NeighborhoodID(i)}] \sim N(0, \Omega^{(3)}_u) : \Omega^{(3)}_u = [\Omega^{(3)}u_{0,0}]$$

$$[u^{(2)}_{0,SchoolID(i)}] \sim N(0, \Omega^{(2)}_u) : \Omega^{(2)}_u = [\Omega^{(2)}u_{0,0}]$$

In this model *i* identifies the lowest level units. The (2) and (3) superscripts distinguish the different higher classifications. The ***NeighborhoodID*(*i*)** and ***SchoolID*(*i*)** subscripts are classification functions which return the neighborhood and the school attended by student *i* (Browne, 2012). Neighborhoods and schools are both conceptually at level 2. ACT, the criterion variable is the students' ACT/EPAS scores.

Analysis in the unconditional model will allow for estimation of three intraunit correlations: The intraneighborhood correlation, the intraschool correlation, and intracell correlation. "The intraneighborhood correlation is the correlation between outcomes of two students who live in the same neighborhood but attend different schools" (Raudenbush & Bryk, 2002, p. 387). The intraneighborhood correlation is:

$$VPC_u = \sigma^2_{u(3)} / \sigma^2_{u(3)} + \sigma^2_{u(2)} + \sigma^2_e$$

"The intraschool correlation is the correlation between outcomes of two students who attend the same school; but live in different neighborhoods" (Raudenbush & Bryk, 2002, p. 387). The intraschool correlation is:

$$VPC_u = \sigma^2_{u(2)} / \sigma^2_{u(3)} + \sigma^2_{u(2)} + \sigma^2_e$$

Lastly, "the intracell correlation is the correlation between outcomes of two students who live in the same neighborhood and attend the same school" (Raudenbush & Bryk, 2002, p. 387). The intracell correlation is:

$$VPC_u = \sigma^2_e / \sigma^2_{u(3)} + \sigma^2_{u(2)} + \sigma^2_e$$

Conditional Model. Conditional model, with individual variables is:

$$ACT_i = \beta_{0i}Constant_i + \beta_1 control_i + u^{(3)}_{NeighborhoodID(i)} + u^{(2)}_{SchoolID(i)} + e_i$$

$$u^{(3)}_{NeighborhoodID(i)} \sim N(0, \sigma^2 u_{(3)})$$

$$u^{(2)}_{SchoolID(i)} \sim N(0, \sigma^2 u_{(2)})$$

$$e_i \sim N(0, \sigma^2_e)$$

All continuous predictors will be grand-mean centered and the reference group for categorical predictors will be set as the privilege group. For instance, the reference group for free/reduced lunch will be no, which indicate they did not receive free/reduced lunch.

Neighborhood predictor model is:

$$ACT_i = \beta_{0i}Constant_i + \beta_1 control_i + \beta_2 neighpredict_i + u^{(3)}_{NeighborhoodID(i)} + u^{(2)}_{SchoolID(i)} + e_i$$

$$u^{(3)}_{NeighborhoodID(i)} \sim N(0, \sigma^2 u_{(3)})$$

$$u^{(2)}_{SchoolID(i)} \sim N(0, \sigma^2 u_{(2)})$$

$$e_i \sim N(0, \sigma^2_e)$$

School predictor model is:

$$ACT_i = \beta_{0i}Constant_i + \beta_1 control_i + \beta_2 neighpredict_i + \beta_3 schoolpredict_i$$

$$u^{(3)}_{NeighborhoodID(i)} + u^{(2)}_{SchoolID(i)} + e_i$$

$$u^{(3)}_{NeighborhoodID(i)} \sim N(0, \sigma^2 u_{(3)})$$

$$u^{(2)}_{SchoolID(i)} \sim N(0, \sigma^2 u_{(2)})$$

$$e_i \sim N(0, \sigma^2_e)$$

Summary

This chapter detailed the methodological plan and analytic strategy for investigating neighborhood and school variables and how they affect students' ACT/EPAS scores. Chapter 4 will provide details of each step of the analysis as well as results.

CHAPTER IV: RESULTS

"Essentially, all models are wrong, but some are useful."

~George E.P. Box

The purpose of this study was to develop an understanding of the factors that influence students' academic achievement as measured by the ACT/EPAS exam. More specifically, the study attempted to test the conceptual model, *Contextual Effects on Student Academic Achievement*. This model investigated the influence of neighborhood, school and individual characteristics on students' ACT/EPAS scores.

Findings related to the following research question will be described in this chapter: *Are there any significant relationships between neighborhood characteristics and school characteristics, after controlling for individual characteristics that can help explain achievement disparities for high school students in Jefferson County Public high schools?* This chapter will explain data preparation activities and preliminary analyses, describe the study sample, detail the model building process and present the results.

Data Preparation and Preliminary Analyses

Retrieving Data

Data for this dissertation study were provided from two sources, the US Census Bureau and Jefferson County Public Schools (JCPS). Data for the main predictor variables that made up neighborhood characteristics were retrieved from the *2011 American Community Survey (ACS) 5-Year Estimate* dataset. This dataset was accessed online from the US Census Bureau American Fact Finder database (http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml).

JCPS Division of Data Management, Planning, and Program Evaluation provided data for school main predictor variables, individual control variables and the criterion outcome variable. School level data were retrieved using the *2011-2012 High School Data Book*, which is prepared by the Division of Data Management, Planning, and Program Evaluation, and can be accessed via the web at http://www.jefferson.k12.ky.us/Departments/AcctResPlan/databook/index.html. For access to individual level student data, the researcher placed a formal application request to the Division of Data Management, Planning, and Program Evaluation and approval was provided. All individual level data and the criterion outcome data were made available through the Data Request Management System.

Data Screening

Criterion variable. As previously stated in the description of the sample, there were 13 students removed from the final sample because they were

missing an ACT/ESPAS score. After removing the 13 students there were a total of 4,158 students remaining with an ACT/EPAS score. The criterion variable was inspected for normality assumptions. Skewness and kurtosis analyses indicated that the criterion variable is normally distributed. Additionally, this variable, ACT/EPAS scores were arranged in categories for descriptive purposes based on the likelihood of whether students would be admitted to a 4-year college/university. The ranges were as follows: *Not likely to get accepted* (below 17); *May get accepted* (between 17-21); and *Will get accepted* (above 21). These ranges were based on and supported by national data and the ACT scores of students currently matriculating in local 4-year college/universities in the state of Kentucky. In 2010, the national average ACT score was 21; students' goal should be to aim for an ACT score in the top 50th percentile, meaning above the national average ACT score of 21 if they want to attend college ("TheCollegeHelper", n.d.). In the state of Kentucky, examining the college profiles of thirteen 4-year private and public colleges/universities it was found that the lower 25th percentile of students admitted received scores ranging from 18 to 26 (Grove, n.d.). To account for the other 4-year private and public colleges/universities that were not in the report, in this study's analysis the *May get accepted*, which is the equivalency of the 25th percentile minimum score was set at 17.

Individual control. An additional 83 students were removed from the final sample because either they attended an alternative school and not one of the 21 traditional JCPS high schools, or because they did not have a neighborhood id,

zip code. **Gender** was coded as 0=female and 1=male. The original data JCPS provided listed each student's **race** and they were: Black, Asian, White, Hispanic, and Two or more races. The racial composition of the individual students were 35.4 percent Black, 2.5 percent Asian, 58.1 percent White, 3.2 percent Hispanic, and .8 percent Two or more races. Due to the low representation of students whom identify as Asian, Hispanic and of two or more races, the race variable was recoded combining the three racial groups into a new category, Other. Therefore race was recoded into 1=Black; 2=Other; and 3=White. There were no missing individual level data for gender and race. There were no individual data missing for the **neighborhood school** and **attended a non-JCPS high school** control variables. Whether the student attended a non-JCPS high school variable was removed and not used in the model due to no variance; no students attended a non-JCPS high school.

Individual data were missing for attendance rate, family structure and free/reduced lunch variables. Eighteen individuals had missing values for **attendance rate** that were replaced with the mean attendance rate, 97.75. Fifteen individuals had missing values for **family structure**. Of the fifteen individuals it was decided that 12 students resided in a single-parent household and 3 students resided in a two-parent household, based on other indicators in the dataset. Family structure was recoded into 0=2 or more adults, 1=one parent. Four individuals were missing values for **free/reduced lunch,** and after reviewing other control variables a decision was made that these four students were not recipients of free/reduced lunch**.**

Each continuous control variable was inspected for normality assumptions. Skewness and kurtosis analyses indicated that **attendance rate,** the **number of high schools attended and** the **number of times student moved residence** were not normally distributed. The non-normality of these variables was addressed in order to ensure their use in parametric statistical analyses. A transformation was performed on the attendance rate variable to change the shape of the distribution. Because attendance rate was negatively skewed the scores were first reversed and then transformed by computing the logarithm (LG10). The **number of high schools attended** variable was made into a categorical variable, 0=attended more than 1 high school and 1=attended 1 high school. The **number times student moved residence** was made into a categorical variable, 0=no moves, 1=moved once, and 2=moved more than once.

Environmental: Neighborhood characteristics. There were a total of 35 neighborhoods under investigation, and data were provided for every main predictor variable for each of the 35 neighborhoods resulting in no neighborhood or neighborhood main predictor variables being deleted. Each continuous variable was inspected for normality assumptions. Skewness and kurtosis analyses indicated that not all neighborhood predictor variables were normally distributed. Skewness and kurtosis analyses indicated that the **unemployment rate**, **poverty rate**, **high school dropouts**, **residents with a high school diploma or higher**, **residents with a bachelor's degree or higher**, **median income** and **female-headed households** predictors were normally distributed; however, **minority residents** was not normally distributed. Minority residents

predictor variable was transformed by calculating the square root to make it have a normal distribution.

Environmental: School characteristics. There were a total of 21 high schools under investigation. Data were provided for every main predictor variable for each high school. There were no missing data, as a result there were no schools deleted. Each continuous variable was inspected for normality assumptions. Skewness and kurtosis analyses indicated that not all school predictor variables were normally distributed. Skewness and kurtosis analyses indicated that the **free/reduced lunch**, **spending per student**, **ECE students**, **dropout rate, graduation rate, failure rate, suspension total, AP exam scores**, **drug incident reports** and **ACT composite score** predictors were normally distributed. However, **minority population**, **ESL students**, **PTA membership**, and **weapon incident reports** predictors were not normally distributed. Addressing the non-normality of these predictor variables a transformation was performed on each, changing the shape of the distribution to ensure their normality. Minority population was transformed by computing the logarithm (LG10). ESL students variable was recoded into a categorical variable, 0=No ESL students and 1=Yes, ESL students. PTA membership variable was transformed by computing the square root. Lastly, weapon incident report was transformed by computing the square root.

Description of Sample

The final sample included 4075 students (Level 1) nested in 35 neighborhoods (Level 2) and attending 21 high schools (Level 2).

Individual Control Variables

Individual control variables are Level 1 individual student data, which consists of student demographics and other student and family characteristics. Table 5 below presents a summary of individual control variables for the overall sample. For the sole purpose of providing an illustration of the students whom make up the overall sample, Table 5 arranged individual control descriptive data by race. Although race is not a predictor of student achievement and simply a control variable itself, illustrating the disparity by way of race is consistent with national literature and empirical investigations on student achievement. Examining individual control variables by the categorical criterion variable is discussed in the *Criterion Variable* section. The **racial** composition of the sample was 35.4 percent Black, 6.5 percent Other, and 58.1 percent White. The sample majority was **female** (51.5%). Majority (51.1%) of the sample were not **free/reduced lunch** recipients; however, majority of the Black students were (75%), which is the only racial group where a majority received it. Fifty-three percent of the sample lived in homes with at least two adults; however, Blacks is the only group where the majority (66.7%) lived in a **single parent household**. Majority of the sample had the continuity of having **attended only one JCPS high school** (94.8%) and **resided within the same home** (64.1%). Majority of

the students (75.8%) did not attend a **neighborhood school**, which is defined as a school in the same zip code as their home residence. The mean **attendance rate** was 93.63 percent. Black students had a slight lower attendance rate than White students (93.35 vs. 93.73); however, students classified as Other had the highest attendance rate (94.30%).

Table 5

Description of Individual Control Variables

Individual Control Variable	**Total Sample f (%)**	**Black f (%)**	**Other f (%)**	**White f (%)**
Gender				
Female	2099 (51.5)	772 (53.5)	110 (41.5)	1217 (51.4)
Male	1976 (48.5)	671 (46.5)	155 (58.5)	1150 (48.6)
Family Structure				
One parent	1902 (46.7)	962 (66.7)	88 (33.2)	852 (36.0)
2 or more adults	2173 (53.3)	481 (33.3)	177 (66.8)	1515 (64.0)
Free/Reduced Lunch				
Yes	1991 (48.9)	1082 (75.0)	151 (57.0)	758 (32.0)
No	2084 (51.1)	361 (25.0)	114 (43.0)	1609 (68.0)
High Schools Attended				
One	3865 (94.8)	1324 (91.8)	258 (97.4)	2283 (96.5)
More than 1	210 (5.2)	119 (8.2)	7 (2.6)	84 (3.5)
Physical Moves				
No moves	2613 (64.1)	736 (51.0)	171 (64.5)	1706 (72.1)
1 move	802 (19.7)	330 (22.9)	61 (23.0)	411 (17.4)
More than 1 move	660 (16.2)	377 (26.1)	33 (12.5)	250 (10.6)
Attends Neighborhood School				
Yes	988 (24.2)	267 (18.5)	47 (17.7)	674 (28.5)
No	3087 (75.8)	1176 (81.5)	218 (82.3)	1693 (71.5)
Individual Control Variable	**Total Sample M (SD)**	**Black M (SD)**	**Other M (SD)**	**White M (SD)**
Attendance Rate	93.63 (6.61)	93.35 (6.82)	94.30 (6.47)	93.73 (6.48)

Neighborhood Predictors

There were 35 neighborhoods under investigation in this study. Students (Level 1) and schools (Level 2) were nested within the 35 neighborhoods. Table 6 highlights descriptive characteristics of each neighborhood. First, examining neighborhood predictors by race, Table 6 indicates the sample of Black students are overwhelmingly represented in more disadvantaged neighborhoods based on each neighborhood predictor. The mean for Black students in neighborhoods with **unemployment rate** (14.13 vs. 10.72), **poverty rate** (29.14 vs. 20.05), **minority population** (40.45 vs. 24.60), **high school dropouts** (17.15 vs. 1391), and **female-headed households** (13.41 vs. 9.76) are higher than the overall sample mean for each. Additionally, the mean for **residents with high school diplomas or higher** (82.84 vs. 86.09), **residents with a bachelor's degree or higher** (18.59 vs. 24.16) and **median income** ($38,701.46 vs. $48,376.58) are lower than the overall sample mean for Black students.

Table 6

Description of Neighborhood Predictors

Predictor	Total Sample f (%)	Black M (SD)	Other M (SD)	White M (SD)
Unemployment Rate	10.72 (5.85)	14.13 (6.96)	9.36 (4.70)	8.80 (3.99)
Poverty Rate	20.05 (15.17)	29.14 (17.89)	17.01 (12.39)	14.85 (10.28)
Minority Population	24.60 (3.72)	40.45 (4.66)	22.00 (1.56)	17.14 (1.54)
High School Dropout	13.91 (7.38)	17.15 (7.30)	12.36 (7.07)	12.10 (6.77)
High School Diploma or Higher	86.09 (7.4)	82.84 (7.31)	87.64 (7.11)	87.90 (6.80)
Bachelor's Degree or Higher	24.16 (17.73)	18.59 (14.68)	28.47 (18.53)	27.07 (18.51)
Median Income	48376.59 (19174.58)	38701.46 (17966.62)	53445.32 (21655.63)	53707.39 (17193.54)
Female-Headed Households	9.76 (5.72)	13.41 (6.88)	8.34 (4.49)	7.69 (3.57)

School Predictors

There were 21 high schools under investigation in this study. Students (Level 1) attended one of these high schools and each high school was nested in one of the 35 neighborhoods (Level 2). Table 7 highlights a description of school predictors categorized by race. Similar to neighborhoods, Black students are overwhelmingly represented in schools that are disadvantaged in comparison to White students. Black students had higher rates of attending schools with higher rates of **free/reduced lunch** (55.31% vs. 45.30%), **minority population**

(48.89% vs. 38.41%), **per pupil spending** ($8027.90 vs. $7356.89), **suspension total** (433.44 vs. 412.56), **weapon incident reports** (1.13 vs. 1.21), **ECE population** (10.06% vs. 8.65%), **ESL students** (37.60% vs. 18.90%), **dropout rate** (2.53% vs. 2.02%), and **failure rate** (7.98% vs. 7.27%) than White students. Also, Black students attended schools with lower **drug incident reports** (21.45 vs. 23.32), **AP exam scores** (29.11% vs. 35.15%), **graduation rates** (69.13% vs. 72.92%), **ACT/EPAS composite scores from previous year** (17.46 vs. 18.51), and lower parental involvement through **PTA membership** (1013.32 vs. 1315.34).

Table 7

Description of Continuous School Predictors

Predictor	Total Sample f (%)	Black M (SD)	Other M (SD)	White M (SD)
Free/Reduced Lunch	49.08 (22.05)	55.31 (22.48)	48.94 (23.60)	45.30 (20.71)
Minority Population	42.47 (15.68)	48.89 (19.26)	43.89 (17.66)	38.41 (10.99)
Per Pupil Spending	7616.06 (1626.31)	8027.90 (1721.32)	7688.35 (1488.31)	7356.89 (1526.43)
Suspension Total	417.93 (267.17)	433.44 (268.06)	381.45 (267.38)	412.56 (266.11)
Drug Incident Report Total	22.57 (16.80)	21.45 (15.83)	21.98 (16.86)	23.32 (17.32)
Weapon Incident Report Total	1.15 (1.81)	1.21 (2.08)	.97 (1.97)	1.13 (1.60)
Graduation Rate	71.53 (12.84)	69.13 (13.21)	72.06 (13.41)	72.92 (12.33)
AP Exam	33.11 (23.25)	29.11 (22.13)	36.75 (26.70)	35.15 (23.19)

ACT/EPAS Composite	18.13 (2.90)	17.46 (2.72)	18.43 (3.26)	18.51 (2.89)
PTA Membership	1188.37 (1245.25)	1013.32 (1200.29)	1007.55 (1028.90)	1315.34 (1278.82)
ECE Population	9.17 (5.28)	10.06 (5.62)	8.95 (5.20)	8.65 (4.99)
Dropout Rate	2.20 (1.83)	2.53 (1.91)	2.04 (1.78)	2.02 (1.72)
Failure Rate	7.50 (4.98)	7.98 (5.33)	6.95 (5.35)	7.27 (4.69)
Predictor	**Total Sample f (%)**	**Black f (%)**	**Other f (%)**	**White f (%)**
AYP Goals Met				
Yes	1075 (26.40)	295 (20.40)	69 (26.00)	711 (30.00)
No	3000 (73.60)	1148 (79.60)	196 (74.00)	1656 (70.00)
ESL Students				
ESL Students Attend	1085 (26.60)	542 (37.60)	96 (36.20)	447 (18.90)
No ESL Students Attend	2990 (73.40)	901 (62.40)	169 (63.80)	1920 (81.10)

Criterion Variable

There is one criterion variable in this study, **ACT/EPAS** score. Student exam scores ranged from 9 to 36, with a 36 being a perfect score, and the mean was 18.64 with a SD of 5.03. ACT/EPAS is a continuous variable, however it was also transformed for descriptive purposes into a categorical variable in order to give meaning and interpretation to students' scores. In order to assess the implications from students achieving a particular score, ACT/EPAS scores were

arranged in the following categories to assess whether they would be able to attend a 4-year college/university: **Not likely to get accepted (score below 17)**; **May get accepted (score between 17-21)**; and **Will get accepted (score above 21)**. ACT/EPAS categorical scores were examined by individual control variables (Table 8), neighborhood predictors (Table 9), and school predictors (Table 10).

The national achievement gap between Black and White students is definitely present among this sample of JCPS students. The greatest polarization between Black and White students' individual achievement were seen in the far extreme ends of the spectrum, *not likely to get accepted* and *will get accepted*. Frequency data in Table 8 indicated that Black students (54.4%) were overwhelmingly represented in the category of *not likely to get accepted* to college based on their ACT scores, which is consist with national data. Only 7.6 percent of the Black students were in the category, *will get accepted* compared to 37.4 percent of their White counterparts. Additionally, majority of the sample of students whom received free/reduced lunch (58.3%) and resided in a single-parent household (50.6%) were *not likely to get accepted* into a 4-year college/university. After looking at the frequencies chi-square test of association were performed to statistically examine the association between the categorical individual control variables and the categorical criterion variable. The results showed a significant association between each individual control variable and ability to get accepted to college. A 7.07 percent (Cramer's V=.266)^2 of the variance in ability to get accepted to college was accounted for by **race**. Less

than 1 percent (.23%) (Cramer's V=.048)^2 of the variance in ability to get accepted to college is accounted for by **gender**. **Family structure** showed 5.76 percent (Cramer's V=.240)^2 of the variance in the ability to get accepted to college. **Free/reduced lunch** explained 17.97 percent (Cramer's V=.424)^2 of the variance in the ability to get accepted to college. A 2.04 percent (Cramer's V=.143) of the variance in ability to get accepted to college was accounted for by the **number of different high schools.** The **number of residency moves** explains 2.13 percent (Cramer's V=.146)^2 of the ability to get accepted to college. Lastly, attending a **neighborhood school** explained 2.22 percent (Cramer's V=.149)^2 of the ability to get accepted to college. An one-way ANOVA was performed to examine the significant statistical differences in individual students' attendance rate and their ability to get accepted to college, categorical criterion variable. Results showed an overall significant difference in mean scores of attendance rate between at least two get accepted to college groups. The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted to college* (Above 21) had higher attendance rate (M=97.36) than students whom *may get accepted* (Between 17 and 21) (M=95.89) or those whom are *not likely to get accepted* (Below 17) (M=94.31).

Table 8

Description of Individual Control Variables by Criterion Variable

Individual Control Variable	**Total Sample f (%)**	**Below 17: Not Likely f (%)**	**B/w 17-21: May f (%)**	**Above 21: Will f (%)**	**X^2 (df)**
Race					576.654** (4)
Black	1443 (35.4)	884 (61.3)	450 (31.2)	109 (7.6)	
Other	265 (6.5)	104 (39.2)	82 (30.9)	79 (29.8)	
White	2367 (58.1)	636 (26.9)	846 (35.7)	885 (37.4)	
Gender					9.424** (2)
Female	2099 (51.5)	795 (37.9)	752 (35.8)	552 (26.3)	
Male	1976 (48.5)	829 (42.0)	626 (31.7)	521 (26.4)	
Free/Reduced Lunch					732.795** (2)
Yes	1991 (48.9)	1160 (58.3)	633 (31.8)	198 (9.9)	
No	2084 (51.1)	464 (23.3)	745 (35.7)	875 (42.0)	
Family Structure					234.597** (2)
One parent	1902 (46.7)	962 (50.6)	626 (32.9)	314 (16.5)	
2 or more adults	2173 (53.3)	662 (30.5)	752 (34.6)	759 (34.9)	
High Schools Attended					83.705** (2)
One	3865 (94.8)	1480 (38.3)	1326 (34.3)	1059 (27.4)	
More than 1	210 (5.2)	144 (68.6)	52 (29.8)	14 (6.7)	
Physical Moves					172.637** (4)
No moves	2613 (64.1)	874 (33.4)	908 (34.7)	831 (31.8)	
1 move	802 (19.7)	384 (47.9)	258 (32.2)	160 (20.0)	
More than 1 move	660 (16.2)	366 (55.5)	212 (32.1)	82 (12.4)	
Attends Neighborhood School					9.424** (2)
Yes	988 (24.2)	508 (51.4)	314 (31.8)	166 (16.8)	
No	3087 (75.8)	1116 (36.2)	1064 (34.5)	907 (29.4)	
Individual Control Variable	**Total Sample M (SD)**	**Below 17: Not Likely M (SD)**	**B/w 17-21: May M (SD)**	**Above 21: Will M (SD)**	**F Value (df)**
Attendance	95.79 (2.35)	94.31 (2.39)	95.89 (2.27)	97.36 (2.16)	179.540*** (2, 4072)

Note. **The mean difference is significant at the .05 level. ***p<0.001

After reviewing the frequency data presented in Table 9, one-way ANOVAs were performed to examine the significant statistical differences in the neighborhood predictor variables and students' ability to get accepted to college, categorical criterion variable. Results showed an overall significant difference in mean scores of each neighborhood predictor between at least two get accepted to college groups, please refer to Table 9 for *F* value and degrees of freedom. The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) had less **unemployment** in their neighborhood (M=7.90) than students whom *may get accepted* (Between 17 and 21) (M=10.39) or those whom are *not likely to get accepted* (Below 17) (M=12.88). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* experienced less neighborhood **poverty** (M=13.02) than students whom *may get accepted* (M=19.15) or students whom *not likely to get accepted* to college (M=25.47). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* lived in neighborhoods with less **minorities** in their neighborhood (M=17.72) than students whom *may get accepted* (M=23.72) or students whom *not likely to get accepted* (M=30.69). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* had less **high school dropouts** (M=9.88) in their neighborhoods than students whom *may get accepted* (M=13.64) or *not likely to get accepted* (M=16.80). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* had more neighbors with at least a **high school diploma** as their highest educational

attainment (M=86.10) than students whom *may get accepted* (M=86.37) or *not likely to get accepted* (M=83.19). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* had more neighbors with at least a **bachelor's degree** as their highest educational attainment (M=34.59) than students whom *may get accepted* (M=23.97) or *not likely to get accepted* (M=17.44). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* lived in neighborhoods with higher **median income** (M=58908.86) than students whom *may get accepted* (M=48673.09) or *not likely to get accepted* (M=41166.19). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* lived in neighborhoods with less **female-headed households** (M=6.91) than students whom *may get accepted* (M=9.49) or *not likely to get accepted* (M=11.89).

Table 9

Description of Neighborhood Predictors by Criterion Variable

Predictor	Total Sample M (SD)	Below 17: Not Likely M (SD)	B/w 17-21: May M (SD)	Above 21: Will M (SD)	F Value (df)
Unemployment Rate	10.72 (5.85)	12.88 (6.25)	10.38 (5.43)	7.90 (4.20)	269.035** (2, 4072)
Poverty Rate	20.05 (15.17)	25.47 (16.19)	19.14 (14.28)	13.02 (11.00)	247.851** (2, 4072)
Minority Population	24.60 (3.72)	30.69 (4.45)	23.72 (3.50)	17.72 (1.80)	169.308** (2, 4072)
High School Dropout	13.91 (7.38)	16.80 (6.82)	13.64 (6.97)	9.87 (6.72)	331.873** (2, 4072)
High School Diploma or Higher	86.09 (7.4)	83.19 (6.83)	86.36 (7.00)	90.13 (6.74)	331.609** (2, 4072)
Bachelor's Degree or Higher	24.16 (17.73)	17.44 (13.41)	23.96 (17.02)	34.58 (19.33)	354.317** (2, 4072)
Median Income	48376.59 (19174.58)	41166.19 (15480.28)	48673.09 (18194.18)	58908.86 (20477.64)	320.244** (2, 4072)
Female-Headed Households	9.76 (5.72)	11.88 (6.08)	9.48 (5.36)	6.90 (4.05)	280.281** (2, 4072)

Note. **The mean difference is significant at the .05 level.

After reviewing the frequency data presented in Table 10, one-way ANOVAs were performed to examine the significant statistical differences in the school predictor variables and students' ability to get accepted to college, categorical criterion variable. Results showed an overall significant difference in mean scores of each continuous school predictor between at least two get accepted to college groups, please refer to Table 10 for *F* value and degrees of freedom. The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were in schools with

lower rates of **free/reduced lunch** in their school (M=32.89) than students whom *may get accepted* (Between 17 and 21) (M=47.27) or those whom are *not likely to get accepted* (Below 17) (M=61.32). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) had lower rates of **minority students** in their school (M=35.58) than students whom *may get accepted* (Between 17 and 21) (M=41.55) or those whom are *not likely to get accepted* (Below 17) (M=47.81). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were in schools with lower **per pupil spending** (M=6631.73) than students whom *may get accepted* (Between 17 and 21) (M=7419.24) or those whom are *not likely to get accepted* (Below 17) (M=8433.42). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) had lower **suspension rates** in their school (M=306.47) than students whom *may get accepted* (Between 17 and 21) (M=417.75) or those whom are *not likely to get accepted* (Below 17) (M=491.73). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were in schools with lower **drug incident reports** (M=19.81) than students whom *may get accepted* (Between 17 and 21) (M=22.82) or those whom are *not likely to get accepted* (Below 17) (M=24.19). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were in schools with lower **weapon incident reports** (M=0.57) than students whom *may get accepted* (Between 17 and 21) (M=0.71) or those whom are *not likely to get accepted*

(Below 17) (M=0.82). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were in schools with higher rates of higher **AP exam scores** (M=49.32) than students whom *may get accepted* (Between 17 and 21) (M=33.42) or those whom are *not likely to get accepted* (Below 17) (M=22.15). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were in schools with higher **graduation rates** (M=79.62) than students whom *may get accepted* (Between 17 and 21) (M=72.53) or those whom are *not likely to get accepted* (Below 17) (M=65.34). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were in school with higher **ACT average composite score from the previous school year, 2009** (M=20.35) than students whom *may get accepted* (Between 17 and 21) (M=18.28) or those whom are *not likely to get accepted* (Below 17) (M=16.56). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) had higher **PTA membership** (M=37.31) than students whom *may get accepted* (Between 17 and 21) (M=31.74) or those whom are *not likely to get accepted* (Below 17) (M=22.81). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were in schools with lower **rates of ECE students** (M=5.99) than students whom *may get accepted* (Between 17 and 21) (M=8.61) or those whom are *not likely to get accepted* (Below 17) (M=11.76). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) were

in schools with lower **dropout rates** (M=1.15) than students whom *may get accepted* (Between 17 and 21) (M=2.05) or those whom are *not likely to get accepted* (Below 17) (M=3.03). The one-way ANOVA and Bonferroni post hoc tests indicated that students whom *will get accepted* to college (Above 21) had lower **failure rates** in their school (M=5.17) than students whom *may get accepted* (Between 17 and 21) (M=7.32) or those whom are *not likely to get accepted* (Below 17) (M=9.21). Chi-square test of association was performed to statistically examine the association between AYP goals met and the categorical criterion variable. Results showed a significant association between AYP goals being met and ability to get accepted to college. AYP goals being met explained 13.47 percent (Cramer's V=.367)^2 of the variance in ability to get accepted to college. Chi-square test of association was performed to statistically examine the association between whether the school had **ESL students** and the categorical criterion variable. Results showed a significant association between ESL students in a school and ability to get accepted to college. A 3.50 percent (Cramer's V=.187)^2 of the variance in ability to get accepted to college was accounted for by whether a school had ESL students enrolled.

Table 10

Description of School Predictors by Criterion Variable

Predictor	Total Sample M (SD)	Below 17: Not Likely M (SD)	B/w 17-21: May M (SD)	Above 21: Will M (SD)	F Value (SD)
Free/Reduced Lunch	49.08 (22.05)	61.32 (18.18)	47.27 (20.56)	32.88 (17.63)	741.981** (2, 4072)
Minority Population	42.77 (15.68)	47.81 (17.69)	41.55 (14.76)	35.58 (9.45)	251.501** (2, 4072)
Per Pupil Spending	7616.06 (1626.310)	8433.42 (1638.89)	7419.24 (1481.83)	6631.73 (1064.29)	515.786** (2, 4072)
Suspension Total	417.93 (267.17)	491.73 (237.94)	417.75 (270.07)	306.47 (266.81)	168.060** (2, 4072)
Drug Incident Report	22.57 (16.80)	24.19 (14.09)	22.82 (17.04)	19.81 (19.66)	22.380** (2, 4072)
Weapon Incident Report	.71 (.62)	.81 (.77)	.71 (.58)	.56 (.42)	32.968** (2, 4072)
AP Exam	33.11 (23.25)	22.14 (18.81)	33.41 (20.88)	49.32 (22.67)	563.230** (2, 4072)
Graduation Rate	71.53 (12.84)	65.34 (11.75)	72.52 (11.95)	79.61 (10.48)	505.289** (2, 4072)
ACT/EPAS Composite Score	18.13 (2.90)	16.56 (2.02)	18.27 (2.64)	20.34 (2.86)	754.402** (2, 4072)
PTA Membership	29.64 (17.59)	22.80 (16.98)	31.74 (17.62)	37.30 (14.33)	264.516** (2, 4072)
ECE Population	9.17 (5.28)	11.75 (5.00)	8.60 (4.87)	5.98 (4.10)	492.663** (2, 4072)
Dropout Rate	2.20 (1.83)	3.03 (1.86)	2.04 (1.72)	1.15 (1.22)	417.291** (2, 4072)
Failure Rate	7.50 (4.98)	9.20 (4.81)	7.32 (4.85)	5.17 (4.38)	237.503** (2, 4072)
Predictor	**Total Sample f (%)**	**Below 17: Not Likely f (%)**	**B/w 17-21: May f (%)**	**Above 21: Will f (%)**	**X^2 (df)**
AYP Goals Met					548.251***
Yes	1075 (26.40)	148 (13.80)	396 (36.80)	531 (49.40)	(2)
No	3000 (73.60)	1476 (49.20)	982 (32.70)	542 (18.10)	

ESL Students					142.822*** (2)
ESL Students Attend	1085 (26.60)	574 (52.90)	354 (32.60)	157 (14.50)	
No ESL Students Attend	2990 (73.40)	1050 (35.10)	1024 (34.20)	916 (30.60)	

Note. ** The mean difference is significant at the .05 level.
***Significant at the .001 level

Model Building

Assessing the Need for the Multilevel Model

Table 11 illustrates the cross-classification of students nested in both neighborhoods and schools. Data in the cross-tabulation table indicates that each neighborhood has at least one student attending one of the 21 high schools, and each high school has at least one student residing in one of the 35 neighborhoods suggesting data are crossed. Because data are non-hierarchal is not enough to justify the use of cross-classified modeling. However, it is important to go through the appropriate model building steps to statistically justify the use of cross-classified modeling. During this preliminary model building phase it will be determined whether neighborhood predictors can be ignored, and whether school predictor can be ignored. Statistically, if neither of these environmental predictors can be ignored than there is justification for the use of a cross-classified model.

Table 11

Cross-tabulation of Neighborhoods by Schools

	Schools																					
Neighborhood	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**Totals**
40023	0	0	1	0	0	0	1	10	0	0	0	0	1	0	0	0	0	0	0	1	0	**14**
40047	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	**1**
40059	1	23	1	0	0	0	16	0	0	1	0	0	4	0	0	0	0	0	0	0	0	**46**
40118	5	0	0	2	1	0	3	0	67	0	0	0	1	0	4	0	2	0	0	0	0	**85**
40202	0	0	0	0	2	0	1	2	0	0	1	1	2	0	0	1	1	0	0	0	0	**11**
40203	16	12	0	0	5	3	4	5	1	2	4	2	0	1	3	2	0	8	2	1	2	**73**
40204	5	0	2	0	2	0	12	3	0	0	0	1	4	0	1	1	0	2	0	0	0	**33**
40205	33	2	2	0	0	0	16	1	0	0	1	0	8	0	0	0	0	0	0	0	0	**63**
40206	7	6	0	0	1	0	21	1	0	0	1	0	5	0	0	0	0	3	0	12	0	**57**
40207	3	9	3	0	4	0	26	2	0	0	0	1	11	0	0	0	0	0	0	10	0	**69**
40208	0	1	1	2	5	0	7	0	3	1	11	0	3	1	1	2	0	0	0	1	2	**41**
40209	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	**1**
40210	3	7	1	10	16	8	4	2	3	0	10	6	7	0	1	9	0	2	6	2	2	**99**
40211	1	10	2	7	30	13	5	8	11	1	6	6	25	1	22	10	1	7	19	12	13	**210**
40212	4	5	0	0	21	9	3	5	3	1	3	1	13	0	19	4	1	19	2	7	2	**122**
40213	8	0	0	1	1	1	3	1	2	2	1	1	12	8	0	25	7	0	2	2	0	**77**
40214	13	2	0	48	12	37	16	0	18	2	24	4	15	2	27	3	3	0	0	1	8	**235**
40215	4	5	0	18	10	11	8	0	3	0	45	0	3	4	4	1	3	1	7	1	6	**134**
40216	5	1	4	95	20	16	20	0	5	0	15	1	20	4	52	1	2	0	2	6	62	**331**
40217	9	0	1	1	2	0	6	1	1	1	0	0	6	0	1	9	2	0	0	2	0	**42**
40218	8	2	3	0	14	3	17	3	4	44	1	13	16	6	1	51	10	1	2	6	0	**205**
40219	7	2	1	8	11	0	7	2	17	24	2	2	17	34	4	16	93	1	1	5	0	**254**
40220	12	11	1	2	4	0	11	4	3	3	1	29	24	1	1	45	2	0	2	10	0	**166**
40222	3	28	1	0	0	1	13	5	0	0	0	0	7	0	0	3	0	0	0	8	1	**70**
40223	0	4	2	0	1	0	9	66	0	1	0	2	21	0	0	0	0	0	0	7	0	**113**
40228	5	0	0	0	1	1	6	4	1	21	0	1	17	28	0	11	5	0	1	4	0	**106**
40229	3	1	2	5	5	0	12	1	9	10	0	4	22	21	4	5	61	0	2	1	0	**168**
40241	6	71	2	0	1	1	35	18	0	0	0	2	23	0	0	0	0	0	0	2	0	**161**
40242	0	17	0	0	1	0	8	3	0	0	0	2	7	0	0	1	0	0	0	8	0	**47**
40243	1	1	0	0	0	0	4	48	0	0	0	0	6	0	0	0	0	0	0	0	0	**60**
40245	1	15	0	1	0	0	16	70	0	0	0	1	23	0	1	0	0	0	0	1	0	**129**
40258	4	1	1	27	4	3	8	0	3	0	2	0	4	0	147	1	0	0	9	1	11	**226**
40272	4	1	3	45	3	25	9	1	13	2	0	0	4	4	73	1	0	0	71	0	3	**262**
40291	4	1	0	2	2	0	10	6	0	90	0	12	46	4	1	17	4	1	0	0	1	**201**
40299	3	6	0	0	3	1	17	22	0	11	0	46	35	1	0	11	2	0	1	3	1	**163**
Totals	**178**	**244**	**34**	**274**	**182**	**133**	**354**	**294**	**167**	**217**	**129**	**138**	**413**	**120**	**367**	**230**	**199**	**45**	**129**	**114**	**114**	**4075**

Note. School code: 1=Atherton, 2=Ballard, 3=Brown, 4=Butler Traditional, 5=Central, 6=Doss, 7=DuPont Manual, 8=Eastern, 9=Fairdale, 10=Fern Creek, 11=Iroquois, 12=Jeffersontown, 13=Male Traditional, 14=Moore, 15=Pleasure Ridge Park, 16=Seneca, 17=Southern, 18=The Academy at Shawnee, 19=Valley, 20=Waggoner, 21=Western

Model A is a single-level model for students' ACT/EPAS scores where no covariates were included. The model simply estimated the overall mean, 18.64 (S.E.= 0.07) and overall variance, 25.30 (S.E.=0.56) of students' ACT/EPAS scores. The model equation is written as:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_{i=} \beta_{0i} Constant_i$$

$$\beta_{0i} = \beta 0 + e_{0i}$$

$$[e_{0i}] \sim N(O, \Omega_e) : \Omega_e = [\sigma^2_{e0}]$$

Model B extends Model A to a two-way cross-classified variance components model where students are at level-1 and schools and neighborhoods are both conceptually at level 2. The model simply decomposed the total variance in students' academic achievement into separate neighborhood, school and student variance components. The model expressed using classification notation, is written as:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_i = \beta_{0i} Constant_i$$

$$\beta_{0i} = \beta_0 + u^{(3)}_{0,NeighborhoodID(i)} + u^{(2)}_{0,SchoolID(i)} + e_{0i}$$

$$[u^{(3)}_{0,NeighborhoodID(i)}] \sim N(0, \Omega^{(3)}_u) : \Omega^{(3)}_u = [\Omega^{(3)} u_{0,0}]$$

$$[u^{(2)}_{0,SchoolID(i)}] \sim N(0, \Omega^{(2)}_u) : \Omega^{(2)}_u = [\Omega^{(2)} u_{0,0}]$$

$$[e_{0i}] \sim N(0, \Omega_e) : \Omega_e = [\Omega_{e0,0}]$$

In order to determine which model best fit, comparative analyses were performed comparing the Deviance Information Criterion (DIC) of each model. DIC is a measure of model fit and it is utilized in order to determine the most parsimonious model based on both fit and complexity. DIC is used as a comparative number where lower values are indicative of a more parsimonious model. A decrease of 8 is considered as a significant improvement in parsimony. As highlighted in Table 12, Model B reduces (improves) the DIC by 1,816.91 points.

Table 12

Model Comparison (A and B)

		Model A		Model B	
Parameter		**Estimate**	**Std. Err.**	**Estimate**	**Std. Err.**
β_0	**Intercept**	18.64***	0.08	18.17***	0.63
$\sigma^2_{u(3)}$	**Neighborhood variance**	-	-	2.91***	0.87
$\sigma^2_{u(2)}$	**School variance**	-	-	5.96**	2.17
σ^2_e	**Student variance**	25.30***	0.57	16.02***	0.36
	Bayesian DIC	24,733.49		22,916.58	
	pD	2.01		51.47	

Note. DIC: Diagnostic Information Criterion
pD: estimated degrees of freedom
**p<0.01, ***p<0.001

Model C is a two-level students-within-neighborhoods model, which ignores the clustering of students within schools. The model equation is written as:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_i = \beta_{0i}Constant_i$$

$$\beta_{0i} = \beta_0 + u^{(3)}_{0,NeighborhoodID(i)} + e_{0i}$$

$$[u^{(3)}_{0,NeighborhoodID(i)}] \sim N(0, \Omega^{(3)}_u) : \Omega^{(3)}_u = [\Omega^{(3)}u_{0,0}]$$

$$[e_{0i}] \sim N(0, \Omega_e) : \Omega_e = [\Omega_{e0,0}]$$

Figure 6 highlights the rank order of mean performance scores on the ACT/EPAS by neighborhood. Neighborhood zip code 40059 ranked the highest with a mean performance score of 25.15, with neighborhood zip code 40209 as the lowest ranked neighborhood with a mean score of 10. Please refer to the Appendix for a geographical map of the city of Louisville, Kentucky. In between the lowest (10) to highest (25.15) there lies the remaining neighborhoods, with 13 being average performing neighborhoods; 11 are low performing neighborhoods; and 11 are high performing neighborhoods. Figure 7 illustrates neighborhood ranking and classification of the type of neighborhood. Those neighborhoods below the zero (0) line are low performing neighborhoods, with those touching the line are neighborhoods hovering around the mean and those above the line being high achieving neighborhoods.

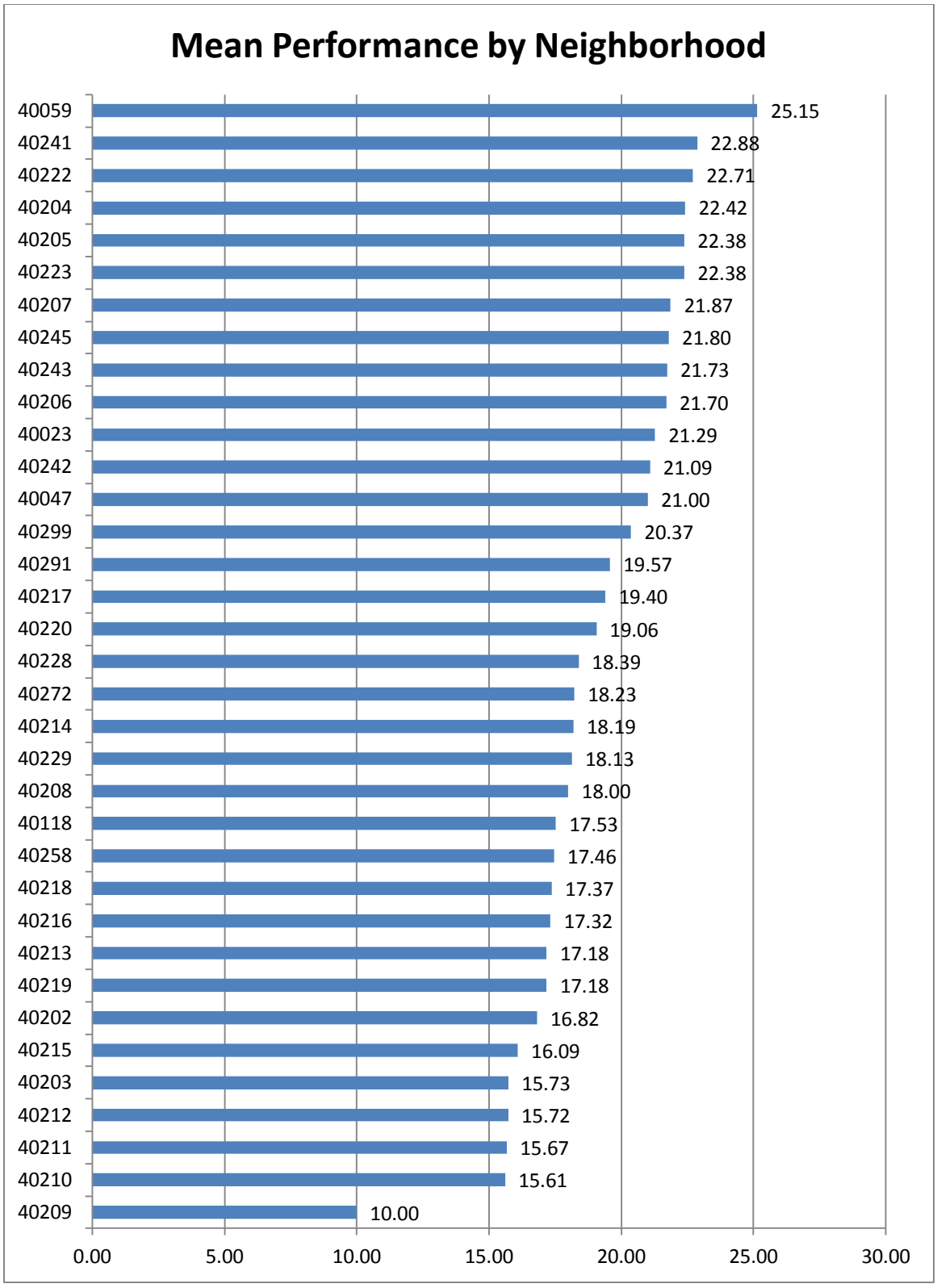

Figure 6. Mean Performance by Neighborhood

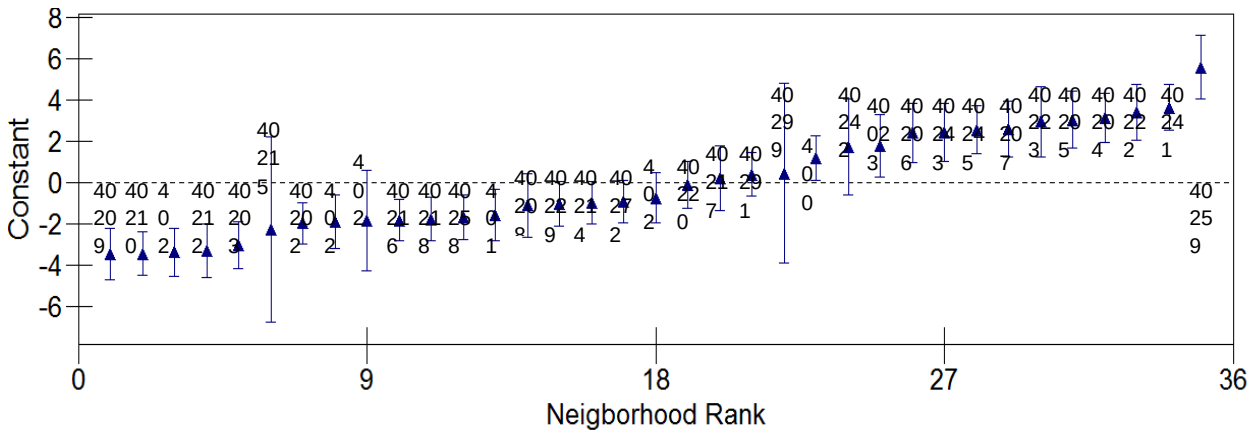

Figure 7. Neighborhood Rank

Comparing the DIC scores between Model B and Model C provided in Table 13, it was determined that ignoring school predictors increases (worsens) the DIC by 967.88 points. The school predictors are significant, even after adjusting for neighborhoods.

Table 13

Model Comparison (B and C)

		Model B		Model C	
Parameter		**Estimate**	**Std. Err.**	**Estimate**	**Std. Err.**
β_0	**Intercept**	18.17***	0.63	19.24***	0.41
$\sigma^2_{u(3)}$	**Neighborhood variance**	2.91***	0.87	6.99***	1.95
$\sigma^2_{u(2)}$	**School variance**	5.96**	2.17	-	-
σ^2_e	**Student variance**	16.02***	0.36	20.41***	0.46
	Bayesian DIC	22,916.58		23,884.46	
	pD	51.47		33.19	

Note. DIC: Diagnostic Information Criterion
pD: estimated degrees of freedom
**p<0.01, ***p<0.001

Model D is a two-level students-within-schools model, which ignores the clustering of students within neighborhoods. The model equation is written as:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_i = \beta_{0i}Constant_i$$

$$\beta_{0i} = \beta_0 + u^{(2)}_{0,SchoolID(i)} + e_{0i}$$

$$[u^{(2)}_{0,SchoolID(i)}] \sim N(0, \Omega^{(2)}_u) : \Omega^{(2)}_u = [\Omega^{(2)}u_{0,0}]$$

$$[e_{0i}] \sim N(0, \Omega_e) : \Omega_e = [\Omega_{e0,0}]$$

Figure 8 highlights the rank order of the mean performance scores on the ACT/EPAS by school. DuPont Manual had the highest mean performance score of 24.61 and the Academy at Shawnee at the lowest with a score of 13.56. In between the lowest (13.56) to highest (24.61) scores are the remaining high schools, with 9 schools being low performing schools, 6 being of average performance, and 6 being high performing schools. Figure 9 illustrates school ranking and classification of the type of school based on performance on the ACT/EPAS exam. Those schools below the zero (0) line are low performing schools. Those touching the line are schools hovering around the mean and those above the line being high achieving schools as measured by the ACT/EPAS exam.

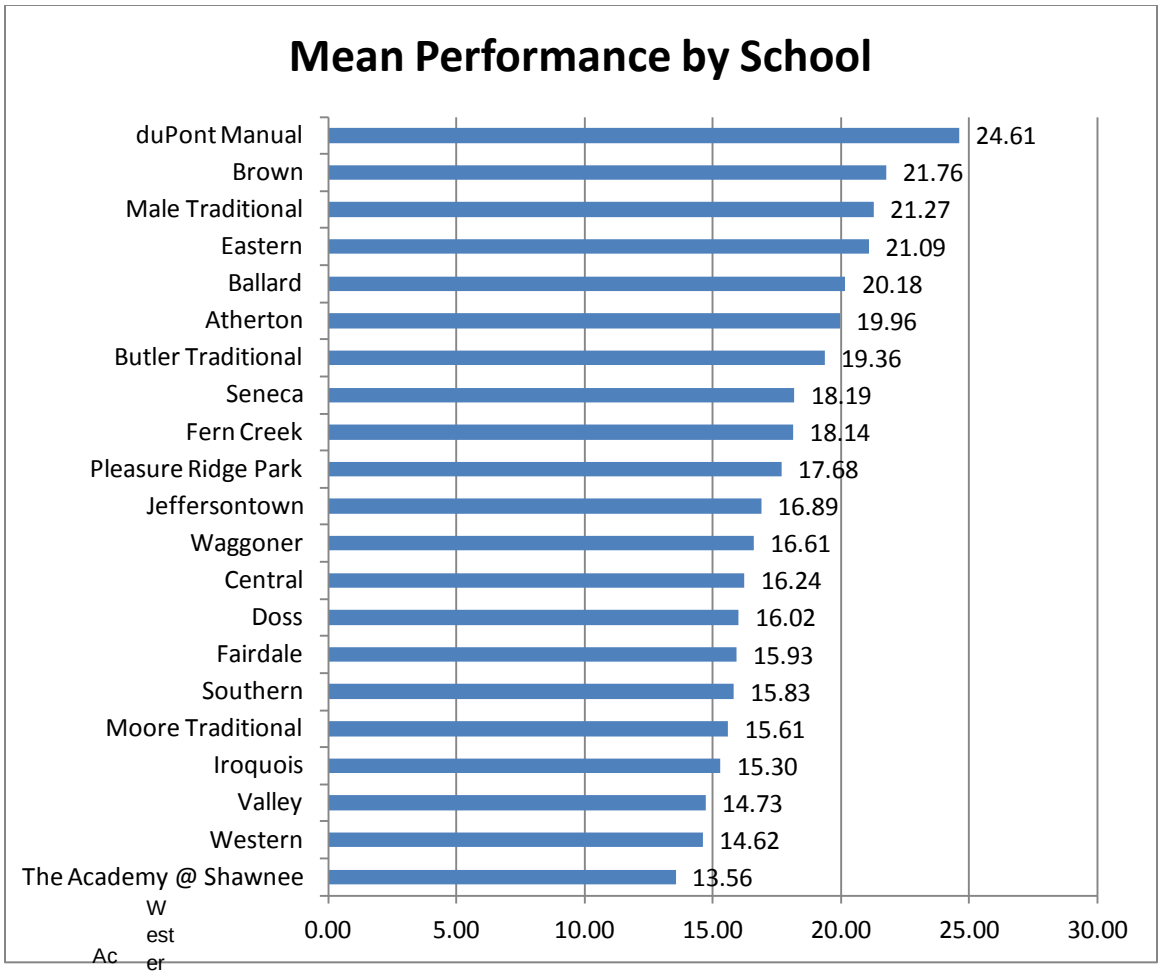

Figure 8. Mean Performance by School

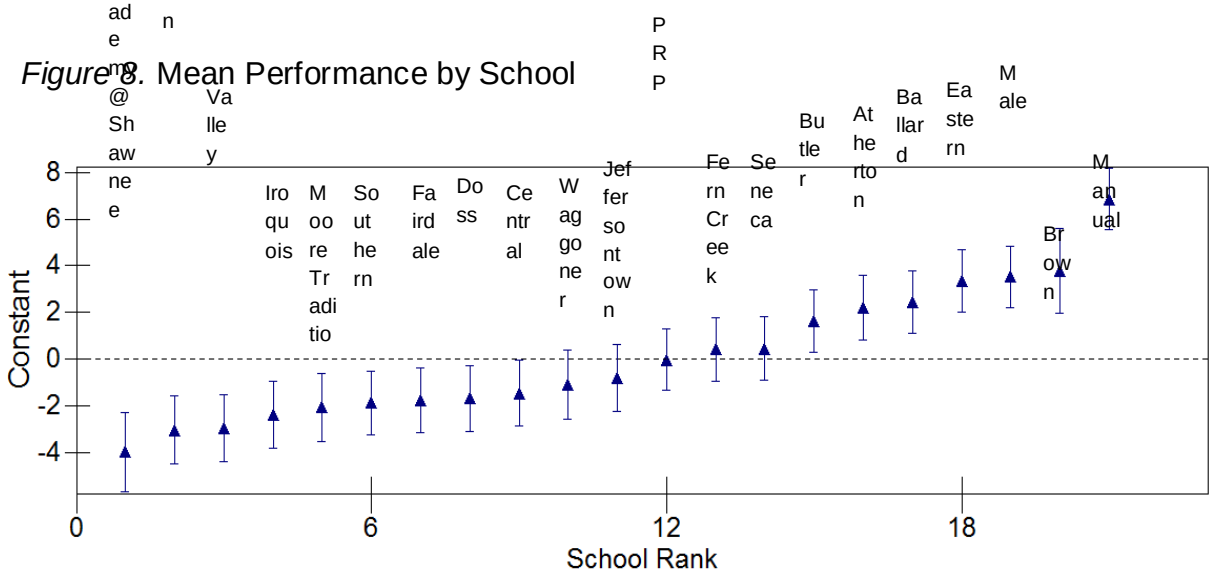

Figure 9. School Rank

Comparing the DIC from Model B and Model D in Table 14, it was concluded that ignoring the neighborhood predictors increases (worsens) the DIC by 328.71 points.

Table 14

Model Comparison (B and D)

		Model B		Model D	
Parameter		**Estimate**	**Std. Err.**	**Estimate**	**Std. Err.**
β_0	**Intercept**	18.17***	0.63	17.72***	0.61
$\sigma^2_{u(3)}$	**Neighborhood variance**	2.91***	0.87	-	-
$\sigma^2_{u(2)}$	**School variance**	5.96**	2.17	8.77**	3.21
σ^2_e	**Student variance**	16.02***	0.36	17.49***	0.38
	Bayesian DIC	22,916.58		23,245.29	
	pD	51.47		21.53	

Note. DIC: Diagnostic Information Criterion
pD: estimated degrees of freedom
**p<0.01, ***p<0.001

Results from model comparisons confirmed the significance of both neighborhood and school predictors in the analyses of student academic achievement; hence, justifying the need for a cross-classified model.

Unconditional Model

Model B the two-way crossed classified variance component model is the unconditional or null model. This model gives the probability of student achievement scores as a product of both, the neighborhoods students lived in and the high schools they attended. The unconditional model also gives empirical confirmation of the appropriateness of utilizing multilevel analyses, which has been previously discussed. Prior to deciding on this as the final unconditional model, it was first important to compare the Deviance Information Criterion (DIC)

for Model B a two-way cross-classified model, Model C a model that included neighborhood characteristics only, and Model D which included school characteristics only. Based on the DIC for each model as provided in Table 15, it was decided that Model B is the best fit because of the lower DIC statistic. This ultimately means that the individuals in this model overall showed significant variations from the mean within and between individuals, than when ignoring neighborhood characteristics, and when ignoring school characteristics. Although a cross-classified model is the best fit, schools are actually more important in predicting the achievement score than neighborhoods. Here school explains 5.96/(5.96 + 2.91 +16.02) X 100% = 23.95 percent while neighborhood only explains 2.91/(5.96 + 2.91 + 16.02) X 100% = 11.69 percent. There are stronger educational disparities across the 21 high schools than there are across the 35 neighborhoods. The individual variance is 16.02/(5.96 + 2.91 + 16.02) X 100% = 64.28 percent.

Table 15

DIC Comparison (Models A, B, C and D)

Parameter		Model A Est.	Model A Std. Err.	Model B Est.	Model B Std. Err.	Model C Est.	Model C Std. Err.	Model D Est.	Model D Std. Err.
β_0	**Intercept**	18.64***	0.08	18.17***	0.63	19.24***	0.41	17.72***	0.61
$\sigma^2_{u(3)}$	**Neighborhood variance**	-	-	2.91***	0.87	6.99***	1.95	-	-
$\sigma^2_{u(2)}$	**School variance**	-	-	5.96**	2.17	-	-	8.77**	3.21
σ^2_e	**Student variance**	25.30***	0.57	16.02***	0.36	20.41***	0.46	17.49***	0.38
	Bayesian DIC	24,733.49		22,916.58		23,884.46		23,245.29	
	pD	2.01		51.47		33.19		21.53	

Note. Est: Estimate
Std. Err: Standard error
DIC: Diagnostic Information Criterion
pD: estimated degrees of freedom
**p<0.01, ***p<0.001

Since the unconditional model has been fitted, it is now important to estimate the individual neighborhood and school residuals in order to make the comparisons between neighborhoods and comparisons between schools. Figure 10 shows the residuals and 95% confidence intervals for ACT/EPAS scores by neighborhoods for the unconditional model. In the figure below, each triangle represents the residual for each neighborhood while the lines extending represent the 95% confidence interval around the residual. The lowest ranked neighborhood, 40203 have a low residual. Looking at the confidence intervals around them, there are 9 neighborhoods at the lower end of the plot where the confidence intervals for their residuals do not overlap zero (0). The highest ranked neighborhood is 40059. Additionally the confidence intervals illustrated 7 neighborhoods at the higher end of the plot where the confidence intervals for

their residuals do not overlap zero (0). These residuals represent neighborhood departures from the overall average predicted by the fixed parameter β_0 (18.16, SE=.63), this means that these are the neighborhoods that differ significantly from the average at the 5% level.

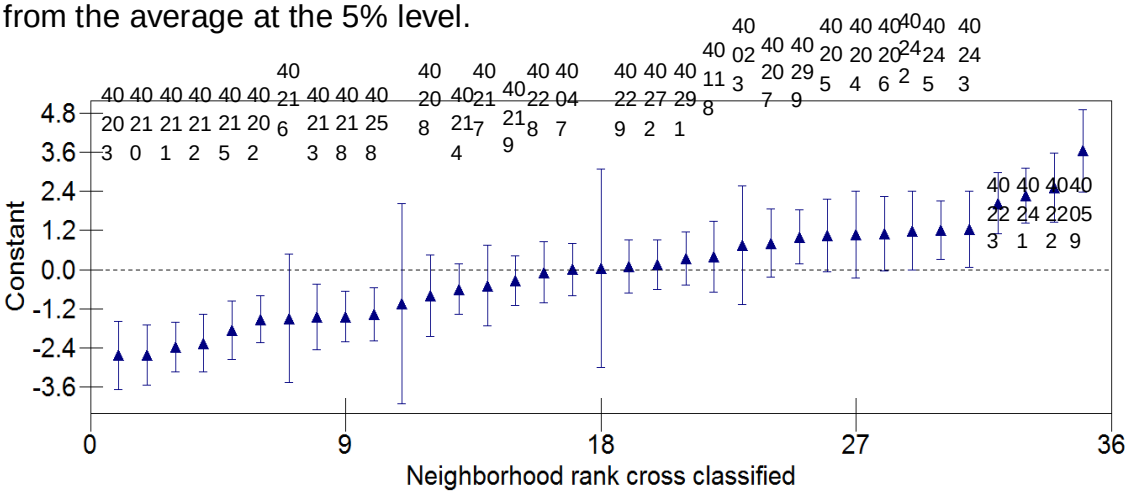

Figure 10. Ranked Residuals for Neighborhoods, Unconditional Model

Figure 11 shows the residuals and 95% confidence intervals for ACT/EPAS scores by schools for the unconditional model. The lowest ranked school, Valley has a low residual. Looking at the confidence intervals around them, there are 8 schools at the lower end of the plot where the confidence intervals for their residuals do not overlap zero (0). The highest ranked school is Manual. Additionally the confidence intervals illustrated 6 schools at the higher end of the plot where the confidence intervals for their residuals do not overlap zero (0). These residuals represent school departures from the overall average predicted by the fixed parameter β_0 (18.16, SE=.63), this means that these are the schools that differ significantly from the average at the 5% level.

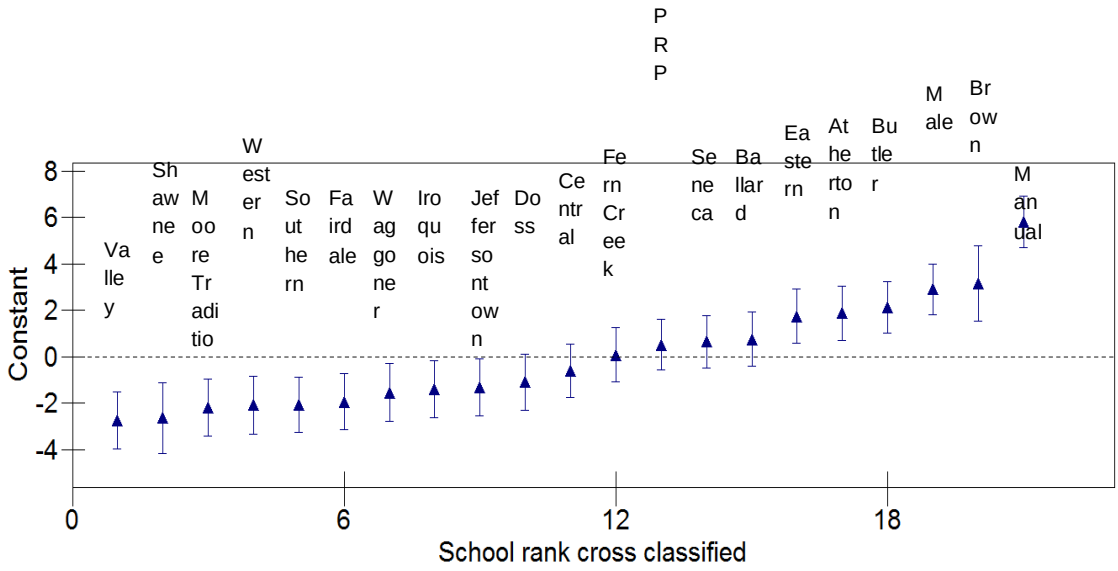

Figure 11. Ranked Residuals for Schools, Unconditional Model

Conditional Model

The next step in multilevel analysis is to add explanatory or predictor variables to the unconditional model. The first variables added were the level 1 individual control variables. Model E extends Model B by including the individual control variables. For categorical variables the reference category for each is the privilege group. For instance, with gender the reference category is male and White is the reference category for race. Attendance scores are centered on the mean for ACT scores. The model is written as:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_i = \beta_{0i}Constant_i + \beta_1 Female_i + \beta_2 African\ American/Black_i + \beta_3 Other_i + \beta_4 (Attendance\_Normal\text{-}gm)_i + \beta_5 One\ Parent_i + \beta_6 Yes_i + \beta_7 Attended\ more\ than\ 1\ high\ school_i + \beta_8 No\ School\ and\ Neighborhood\ different_i + \beta_9 1\ Move_i + \beta_{10} More\ than\ 1\ move_i$$

$$\beta_{0i} = \beta_0 + u^{(3)}_{0,NeighborhoodID(i)} + u^{(2)}_{0,SchoolID(i)} + e_{0i}$$

$$[u^{(3)}_{0,\text{NeighborhoodID}(i)}] \sim N(0, \Omega^{(3)}_{u}) : \Omega^{(3)}_{u} = [\Omega^{(3)} u_{0,0}]$$

$$[e_{0i}] \sim N(0, \Omega_e) : \Omega_e = [\Omega_{e0,0}]$$

After including individual control variables, it was found that **race**, specifically Other, **attendance**, receiving **free/reduced lunch**, student **attended more than 1 high school** and students' not attending a **neighborhood school** were all statistically significant. The non-significant control variables were removed and Table 16 includes the results from the trimmed version of Model E that includes statistically significant controls, only. Results showed that after including the statistically significant control variables, school explained 19 percent of the variation in ACT/EPAS scores and neighborhood explained 4 percent, while individual variance was 77 percent. DIC analysis showed a 578.85 reduction from Model B to Model E, which indicates that Model E is a better model fit.

Table 16

Level 1 Individual Control Variables

Parameter		Model B Est.	Model B Std. Err.	Model E Est.	Model E Std. Err.
β_0	Intercept	18.17***	0.63	19.71***	0.45
	Individual: (Level 1)				
β_1	Black	-	-	-2.74***	0.16
β_2	Other	-	-	-0.86***	0.25
β_3	Attendance	-	-	-1.88***	0.18
β_4	Receive Free Lunch	-	-	-1.44***	0.14
β_5	More than 1 high school	-	-	-0.66***	0.28
β_6	School and Neighborhood different	-	-	0.49**	0.17
$\sigma^2_{u(3)}$	Neighborhood variance	2.91***	0.87	0.70**	0.27
$\sigma^2_{u(2)}$	School variance	5.96**	2.17	3.35**	1.23
σ^2_e	Student variance	16.02***	0.36	13.89***	0.31
	Bayesian DIC	22,916.58		22,337.73	
	pD	51.47		52.57	

Note. Est: Estimate
Std. Err: Standard Error
DIC: Diagnostic Information Criterion
pD: estimated degrees of freedom
**p<0.01, ***p<0.001

Model F builds on Model E by adding neighborhood predictors and the equation is written as:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_i = \beta_{0i}Constant_i + \beta_1African\ American/Black_i + \beta_2Other_i + \beta_3(Attendance\_Normal\text{-}gm)_i + \beta_4Yes_i + \beta_5Attended\ more\ than\ 1\ high\ school_i + \beta_6No\ School\ and\ Neighborhood\ different_i + \beta_7(Unemployment\text{-}gm)_i + \beta_8(Poverty\text{-}gm)_i + \beta_9(MinorityRes\_Normal\text{-}gm)_i + \beta_{10}(WithoutHighSch\text{-}gm)_i + \beta_{11}(HighSchoolHigher\text{-}gm)_i + \beta_{12}(BachelorHigher\text{-}gm)_i + \beta_{13}(Income\text{-}gm)_i + \beta_{14}(FemaleHouse\text{-}gm)_i$$

$$\beta_{0i} = \beta_0 + u^{(3)}_{0,\text{NeighborhoodID}(i)} + u^{(2)}_{0,SchoolID(i)} + e_{0i}$$

$$[u^{(3)}_{0,\text{NeighborhoodID}(i)}] \sim N(0, \Omega^{(3)}_u) : \Omega^{(3)}_u = [\Omega^{(3)} u_{0,0}]$$

$$[e_{0i}] \sim N(0, \Omega_e) : \Omega_e = [\Omega_{e0,0}]$$

Interestingly, there was one statistically significant neighborhood predictor found, the percentage of residents with a **bachelor's degree or higher** in the neighborhood. This can be explained by the overwhelmingly presence of multicollinearity amongst these neighborhood predictors. Using a Pearson correlation coefficient, neighborhood predictors were tested for the detection of multicollinearity and a relationship with the criterion variable. Results highlighted in Table 17 indicated the presence of multicollinearity among all the neighborhood predictors and the criterion variable. While analyzing multicollinearity between the neighborhood predictors the **percentage of residents with at least a bachelor's degree** had the highest correlation with the criterion variable and the least amount of multicollinearity among other neighborhood predictors. Results showed a significant negative correlation between the percentage of residents with at least bachelor's degree and unemployment, poverty, minority population, high school dropouts, median income and female-headed households; the higher the rates of these neighborhood predictors, the lower percentage of residents with at least a bachelor's degree resided in the neighborhood. There was a significant positive correlation between the percentage of neighborhood residents with at least a bachelor's degree and those with at least a high school diploma.

Table 17

Neighborhood Correlations Matrix

	ACT	Unemployment	Poverty	Minority Pop	High School Dropouts	High School Grads or Higher	Bachelor's Degree or Higher	Median Income	Female-Headed Households
ACT	1.00	-.360**	-.347**	-.285**	-.398**	.398**	.418**	.394**	-.368**
Unemployment	-.360**	1.00	.946**	-.818**	.889**	-.889**	-.700**	-.806**	-.954**
Poverty	-.347**	.946**	1.00	.835**	.832**	-.832**	-.636**	-.831**	.910**
Minority Pop	-.285**	.818**	835**	1.00	.597**	-.596**	-.424**	-.653**	.876**
High School Dropouts	-.398**	-889**	832**	.597**	1.00	-1.000**	.873**	-.851**	.826**
High School Diploma or Higher	.398**	-.889**	-.832**	-.596**	-1.000**	1.00	.875**	.850**	-.825**
Bachelor's Degree or Higher	.418**	-.700**	.636**	-.424**	-.873**	.875**	1.00	.795**	-.682**
Median Income	.394**	-806**	-.831**	-.653**	-.851**	.850**	-795**	1.00	-.808**
Female-Headed Households	-.368**	.954**	-910**	.876**	.826**	-.825**	.682**	-.808**	1.00

Note. ** Correlation is significant at the 0.01 level (2-tailed).

All statistical non-significant neighborhood predictors were removed and results are presented in Table 18. After including neighborhood predictors, school explained 18 percent of the variation and less than 1 percent (.4%) was explained by neighborhood. The individual variance was 82 percent. An analysis of Model E and Model F DIC, there was a 10.14 reduction, which indicates that Model F is a better model fit. Although the reduction of DIC is small, it is still significant because it is greater than the standard 8. There was a decrease in the effective number of parameters, suggesting that the additional neighborhood predictor explained more of the differences in ACT/EPAS scores.

Table 18

Level 2 Neighborhood Predictors

Parameter		Model E		Model F	
		Est.	**Std. Err.**	**Est.**	**Std. Err.**
β_0	Intercept	19.71***	0.46	19.49***	0.40
	Individual (Level 1)				
β_1	Black	-2.74***	0.16	-2.65***	0.15
β_2	Other	-0.86***	0.25	-0.85***	0.25
β_3	Attendance	-1.88***	0.18	-1.86***	0.18
β_4	Received Free Lunch	-1.44***	0.14	-1.39***	0.14
β_5	More than 1 high school	-0.66***	0.28	0.66*	0.27
β_6	School and Neighborhood different	0.49**	0.17	0.48**	0.16
	Neighborhood (Level 2)				
β_7	Bachelor's degree or higher	-	-	0.04***	0.005
$\sigma^2_{u(3)}$	Neighborhood variance	0.70**	0.27	0.07	0.07
$\sigma^2_{u(2)}$	School variance	3.35**	1.23	3.02**	1.11
σ^2_e	Student variance	13.89***	0.31	13.90***	0.31
	Bayesian DIC	22,337.73		22,327.59	
	pD	52.57		38.39	

Note. Est: Estimate
Std. Err: Standard Error
DIC: Diagnostic Information Criterion
pD: estimated degrees of freedom
*p<0.05, **p<0.01, ***p<0.001

Model G extends Model F by adding school predictors and the model equation is written as:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_i = \beta_{0i}\text{Constant}_i + \beta_1\text{African American/Black}_i + \beta_2\text{Other}_i +$$

$$\beta_3(\text{Attendance\_Normal-gm})_i + \beta_4\text{Yes}_i + \beta_5\text{Attended more than 1 high school}_i +$$

$$\beta_6\text{No School and Neighborhood different}_i + \beta_7(\text{BachelorHigher-gm})_i$$

$$+\beta_8(\text{FreeLunchPer-gm})_i + \beta_9(\text{MinorityStudent\_Normal-gm})_i + \beta_{10}(\text{Spending-gm})_i +$$

$$\beta_{11}(\text{ECEper-gm})_i + \beta_{12}\text{ESL Students Attend}_i + \beta_{13}(\text{Dropout-gm})_i + 14_7(\text{Gradrate-}$$

$$gm)_i + \beta_{15}(\text{FailureRates-gm})_i + \beta_{16}(\text{Suspinc-gm})_I + \beta_{17}(\text{APscores-gm})_i +$$

$$\beta_{18}(\text{Druginc-gm})_i + \beta_{19}(\text{Weapon\_Normal-gm})_i + \beta_{20}(\text{PTA\_Normal-gm})_i +$$

$$\beta_{21}(\text{EPASACTPrev-gm})_i + \beta_{22}(\text{TeacherRet\_Normal-gm})_i$$

$$\beta_{0i} = \beta_0 + u^{(3)}{}_{0,\text{NeighborhoodID}(i)} + u^{(2)}{}_{0,SchoolID(i)} + e_{0i}$$

$$[u^{(3)}{}_{0,\text{NeighborhoodID}(i)}] \sim N(0, \Omega^{(3)}{}_u) : \Omega^{(3)}{}_u = [\Omega^{(3)} u_{0,0}]$$

$$[e_{0i}] \sim N(0, \Omega_e) : \Omega_e = [\Omega_{e0,0}]$$

After including all school predictors, **minority student population**, **failure rates**, **drug incident reports** and **ACT/EPAS composite scores from the previous school year** were found to be statistically significant. Prior to discussing the statistical results, it is important to note and discuss the presence of multicollinearity among school predictors. A Pearson correlation coefficient analysis was performed and school predictors were tested for the detection of multicollinearity and a relationship with the criterion variable. While analyzing multicollinearity between school predictors **free/reduced lunch** and **composite ACT/EPAS scores from the previous year** had the highest correlation with the criterion variable. Table 19 highlights the multicollinearity that exist among school predictors, which essentially indicates these variables measures the same thing. Results from the Pearson correlation showed presence of multicollinearity with a negative relationship between the percentage of free/reduced lunch recipients and graduation rate, AP scores and composite ACT/EPAS scores from the previous school year; the higher percentage of free/reduced lunches, the lower rates of graduation and high AP scores, and the lower composite ACT/EPAS

scores from the previous school year. There was a positive correlation between free/reduced lunch and spending per student, which is not surprising considering funding for free/reduced lunch is factored into spending per student. Failure rate and drug incident reports had some of the least amounts of multicollinearity among other school predictors. However, there was a strong positive correlation between failure and dropout rates, which failure rate is the rate of the school's ability to retain the failing students. Composite ACT/EPAS scores from previous school year showed a positive correlation with AP exam and graduation rate. After completing various part-whole correlations, four of the school level predictors were retained, namely percentage minorities, failure rates, drug reports and composite ACT/EPAS scores from the previous year.

Table 19

School Correlation Matrix

	ACT/ EPAS	Free Lunch	Minority Pop	Spend	ECE	Dropout Rate	Grad Rate	Reten Rate	Suspend Total	AP Exam	Drug Reports	Weapon Reports	PTA Members	Teacher Reten	ACT EPAS Comp
ACT/ EPAS	1	-.532**	-.335**	-.459**	-.464**	-.432**	.469**	-.350**	-.305	.493**	-.124**	-.148	.336**	-.241**	548**
Free Lunch	-.532**	1	.719**	.884**	.795**	.759**	-.823**	.536**	.443**	-.820**	.140**	.159**	-.649**	.441**	-.946**
Minority Pop	-.335**	.719**	1	.680**	.503**	.491**	-.554**	.318**	.206**	-.432**	-.071**	-.120**	-.554**	.138**	-.596**
Spend	-.459**	.884**	.680	1	.849**	.793**	-.796**	.575**	.340**	-.662**	.052**	.137**	-.684**	.534**	-.783**
ECE	-.464**	.795**	.503**	.849**	1	.867**	-.902**	.783**	.592**	-.646**	.348**	.304**	-.713**	.389**	-.819**
Dropout Rate	-.432	.759**	.491**	.793**	.867**	1	-.914**	.878**	.664**	-.683**	.456**	.540**	-.611**	.408**	-.780**
Grad Rate	.469**	-.823**	-.554**	-.796**	-.902**	-.914**	1	-.810**	-.699**	.749**	-.479**	-.336**	.741**	-.373**	.875**
Failure Rate	-.350**	.536**	.318**	.575**	.783**	.878**	-.810**	1	.735**	-.520**	.611**	.550**	-.568**	.097**	-.642**
Suspend Total	-.305**	.443**	.206**	.340**	.592**	.664**	-.699**	.735**	1	-.442**	.781**	.389**	-.360**	.025	-.618**
AP Exam	.493**	-.820**	-.432**	-.662**	-.646**	-.683**	.749**	-.520**	-.442**	1	-.266**	-.336**	.563**	-.450**	.875**
Drug Reports	-.158**	.140**	-.071**	.052**	.348**	.456**	-.479**	.611**	.781**	-.266**	1	.477**	-.245**	-.110**	-.355**
Weapon Reports	-.148**	.159**	-.120**	.137**	.304**	.540**	-.336**	.550**	.389**	-.336**	.477**	1	.014	-.023	-.268**
PTA Members	.336**	-.649**	-.554**	-.684**	-.713**	-.611**	.741**	-.568**	-.360**	.563**	-.245**	.014	1	-.110**	.613**
Teacher Retention	-.241**	.441**	.138**	.534**	.389**	.408**	-.373**	.097**	.025**	-.450**	-.110**	-.023	-.110**	1	-.395**

ACT/ EPAS Comp	.548**	-.946**	-.596**	-.783**	-.819**	-.780**	.875**	-.642**	-.618**	.875**	-.355**	-.268**	.613**	-.395**	1

Note. ** Correlation is significant at the 0.01 level (2-tailed)

Now that multicollinearity has been addressed among school predictors, results from the multilevel analysis will be presented and discussed. Table 20 shows a slight decrease of 3.5 in the DIC, which is not a significant change due to it not satisfying the 8 point standard. However, there was a decrease in the effective number of parameters, which suggest that school predictors explained more of the differences in ACT/EPAS scores. After the inclusion of the significant school predictors, school explained 1 percent variance was left on the school level to be explained, as well as less than 1 percent by neighborhood, while individual variance explained 98 percent of ACT/EPAS scores.

Table 20

Level 2 School Predictors

Parameter		Model F Est.	Model F Std. Err.	Model G Est.	Model G Std. Err.
β_0	Intercept	19.49***	0.40	20.00***	0.18
	Individual (Level 1)				
β_1	Black	-2.65***	0.15	-2.66***	0.15
β_2	Other	-0.85***	0.25	-0.83***	0.25
β_3	Attendance	-1.86***	0.18	-1.84***	0.18
β_4	Received Free Lunch	-1.39***	0.14	-1.37***	0.14
β_5	More than 1 high school	0.66*	0.27	0.63***	0.27
β_6	School and Neighborhood different	0.48**	0.16	0.40*	0.15
	Neighborhood (Level 2)				
β_7	Bachelor's degree or higher	0.04***	0.005	0.04***	0.005
	School (Level 2)				
β_8	Minority student population	-	-	2.39*	1.10
β_9	Failure rates	-	-	-0.08**	0.03
β_{10}	Drug incident reports	-	-	0.02*	0.10
β_{11}	ACT/EPAS previous year			0.59***	0.07
$\sigma^2_{u(3)}$	Neighborhood variance	0.07	0.07	0.05	0.05
$\sigma^2_{u(2)}$	School variance	3.02**	1.11	0.17	.11
σ^2_e	Student variance	13.90***	0.31	13.91***	0.31
	Bayesian DIC	22,327.59		22,324.09	
	pD	38.39		31.29	

Note. Est: Estimate
Std. Err: Standard Error
DIC: Diagnostic Information Criterion
pD: estimated degrees of freedom
*p<0.05, **p<0.01, ***p<0.001

The final step in multilevel model building analysis was to test interaction effects by extending Model G with the inclusion of various interactions between individual controls, and neighborhood and school predictors to build a final model, Model H. Model H equation is written as:

$$ACT_i \sim N(XB, \Omega)$$

$$ACT_i = \beta_{0i}\text{Constant}_i + \beta_1\text{African American/Black}_i + \beta_2\text{Other}_i + \beta_3(\text{Attendance\_Normal-gm})_i + \beta_4\text{Yes}_i + \beta_5\text{Attended more than 1 high school}_i + \beta_6\text{No School and Neighborhood different}_i + \beta_7(\text{BachelorHigher-gm})_i + \beta_8(\text{MinorityStudent\_Normal-gm})_i + \beta_9(\text{FailureRates-gm})_i + \beta_{10}(\text{Druginc-gm})_i + \beta_{11}(\text{EPASACTPrev-gm})_i + \beta_{12}\text{African American/Black.}(\text{EPASACTPrev-gm})_I + \beta_{13}\text{Other.}(\text{EPASACTPrev-gm})_i + \beta_{14}\text{Attended more than 1 high school.}(\text{EPASACTPrev-gm})_i + \beta_{15}(\text{Druginc-gm}).(\text{EPASACTPrev-gm})_i + \beta_{16}\text{AfricanAmerican/Black.}(\text{BachelorHigher-gm})_i + \beta_{17}\text{Other.}(\text{BachelorHigher-gm})_i + \beta_{18}(\text{Attendance\_Normal-gm})(\text{BachelorHigher-gm})_i + \beta_{19}(\text{MinorityStudent\_Normal-gm}).(\text{BachelorHigher})_I$$

$$\beta_{0i} = \beta_0 + u^{(3)}_{0,\text{NeighborhoodID}(i)} + u^{(2)}_{0,SchoolID(i)} + e_{0i}$$

$$[u^{(3)}_{0,\text{NeighborhoodID}(i)}] \sim N(0, \Omega^{(3)}_u) : \Omega^{(3)}_u = [\Omega^{(3)}u_{0,0}]$$

$$[e_{0i}] \sim N(0, \Omega_e) : \Omega_e = [\Omega_{e0,0}]$$

Several interaction effects were tested, which are listed in the model equation and results listed in Table 21. By adding the interaction effects, there was a 73.02 reduction in the DIC. Over the entire model building process there had been a consistent decrease in the DIC, which suggests an improvement in model fit. There was a decrease from Model B (22,916.58) to Model E (22,337.73); from Model E to Model F (22,327.59); from Model F to Model G (22,324.09); and from Model G to Model H (22,251.07). Model H showed to be the best fit by indicating it as the most parsimonious model. As a result of including interaction effects, school explained less than 1 percent (.19%) of the

variance in ACT/EPAS scores and less than 1 percent (.55%) was explained by neighborhood, while the individual student explained 99 percent of the variance.

Table 21

Model H: Final Model with Individual Controls, Neighborhood and School Predictors and Interaction Effects

	Parameter	Estimate	Std. Err.
β_0	Intercept	19.869***	0.171
	Individual (Level 1)		
β_1	Black	-2.793***	0.148
β_2	Other	-1.022***	0.251
β_3	Attendance	-1.864***	0.173
β_4	Receive Free/Reduced Lunch	-1.316***	0.139
β_5	Attended more than 1 high school	-1.148***	0.332
β_6	School and Neighborhood different	0.346*	0.151
	Neighborhood (Level 2)		
β_7	Bachelor degree or higher	0.033***	0.006
	School (Level 2)		
β_8	Minority Student population	1.678~	0.948
β_9	Failure rate	-0.090***	0.027
β_{10}	Drug incident reports	0.025**	0.008
β_{11}	ACT/EPAS score previous year	0.586***	0.066
	Interactions		
β_{12}	ACT/EPAS score previous year x Black	-0.180***	0.050
β_{13}	ACT/EPAS score previous year x Other race	0.271**	0.094
β_{14}	ACT/EPAS score previous year x Attended more than 1 high school	-0.273*	0.126
β_{15}	ACT/EPAS previous year x Drug incident reports	-0.005~	0.003
β_{16}	Bachelors degree or higher x Black	-0.013	0.009
β_{17}	Bachelor degree or higher x Other race	0.028~	0.016
β_{18}	Bachelors degree or higher x attendance	-0.021*	0.010
β_{19}	Bachelors degree or higher x minority students	-0.080*	0.035
$\sigma^2_{u(3)}$	Neighborhood variance	0.076	0.270
$\sigma^2_{u(2)}$	School variance	0.026	1.235
σ^2_e	Student variance	13.664***	0.311
	Bayesian DIC	22,251.07	
	pD	32.50	

Note. DIC: Diagnostic Information Criterion
pD: estimated degrees of freedom
***p<0.001, **p<0.01, *p<0.05, ~p<0.10

The next section gives a more detailed description of all statistically significant controls and predictors shown in Table 22, Model H. Please note that for the discussion below, it is assumed that all predictors are held constant at the grand mean or at the reference category. Information is presented in four subsections: control variables, neighborhood predictors, school predictors, and interaction effects.

Individual control variables. Individual control variables that were statistically significant included **race**, **attendance rate**, **free/reduced lunch**, the **number of high schools attended** and **attending a neighborhood school**. **Black** students demonstrated statistically significantly lower ACT/EPAS scores (β_1=-2.793, p <0.001) than White students (reference category). Students in the **Other** racial category also demonstrated statistically significantly lower ACT/EPAS scores (β_2=-1.022, p <0.001) than White students. Figure 12 below shows the predicted race main effect on ACT/EPAS scores holding everything else constant at the grand mean or reference category. Of all the racial groups, Black students had the lowest ACT/EPAS scores and this is consistent with national data.

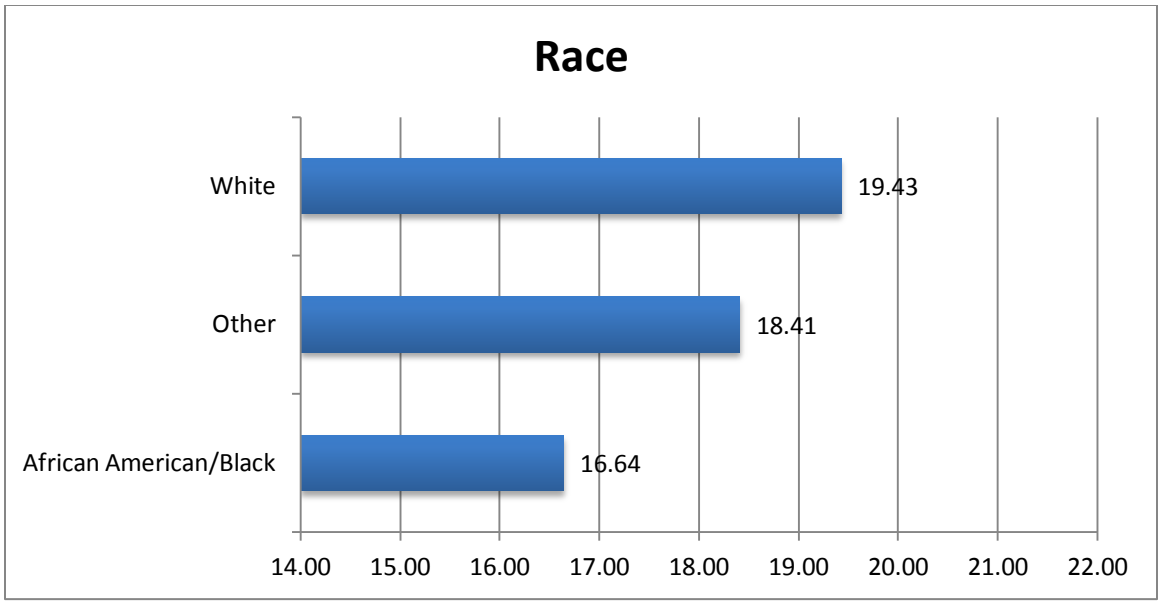

Figure12. Mean ACT/EPAS scores by race

Attendance was a statistically significant predictor of ACT/EPAS performance. Students with lower attendance rates demonstrated statistically significantly lower ACT/EPAS scores (β_3=-1.864, p <0.001) than students with higher attendance rates. Attendance rates were centered at the grand mean. Figure 13 below shows the predicted attendance rate main effect on ACT/EPAS scores, holding everything else constant at the grand mean or reference category. It is important to note that attendance rate was reversed and transformed by calculating the logarithm (LG10); as a result lower attendance scores indicates higher attendance rate and higher attendance scores indicates a lower attendance rate.

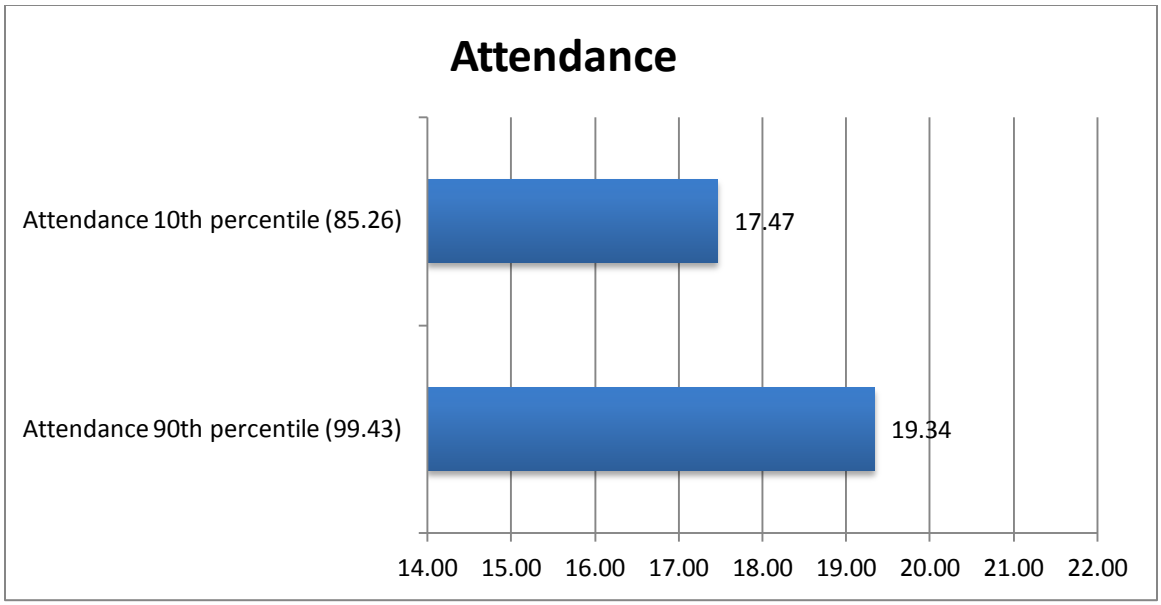

Figure 13. Attendance

Receiving a **free/reduced lunch** was a statistically significant predictor of ACT/EPAS scores. Students receiving free/reduced lunch demonstrated statistically significant lower ACT/EPAS scores (β_4=-1.316, $p < 0.001$) than students not receiving free/reduced lunch (reference category). Figure 14 below shows the predicted free/reduced lunch main effect on ACT/EPAS scores, holding everything else constant at the grand mean or reference category.

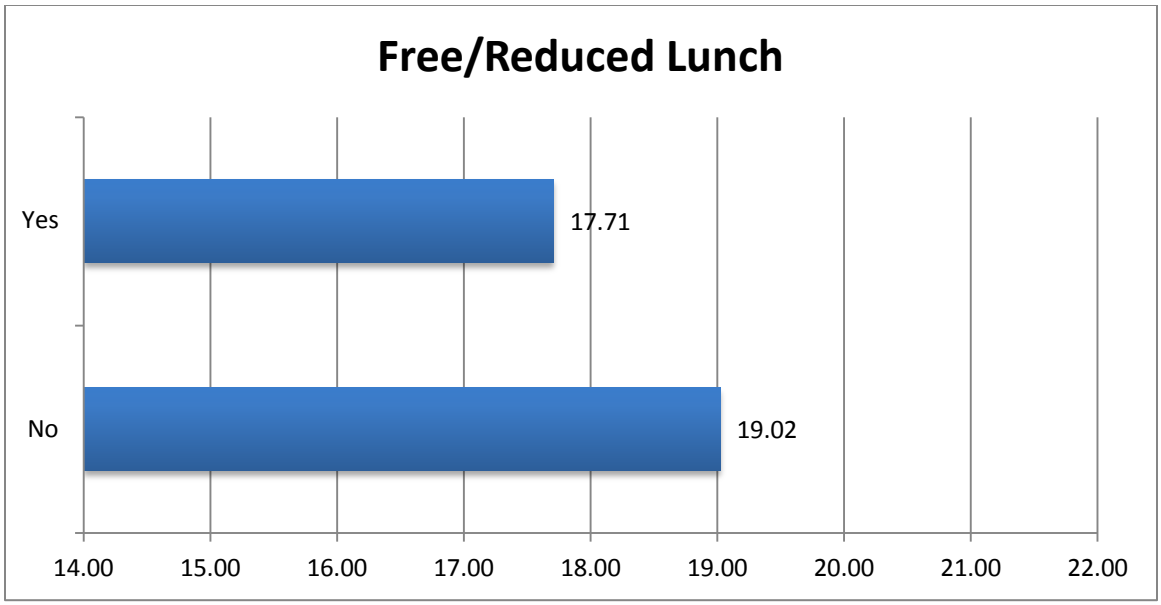

Figure 14. Free/reduced lunch

The **number of different high schools one attended** was a statistically significant predictor of ACT/EPAS scores. Students attending more than one (1) high school demonstrated statistically lower ACT/EPAS scores (β_5=-1.148, p < 0.001) than students that attended one (1) high school (reference category). Figure 15 below illustrates the predicted number of schools attended main effect on ACT/EPAS scores, holding everything else constant at the grand mean or reference category.

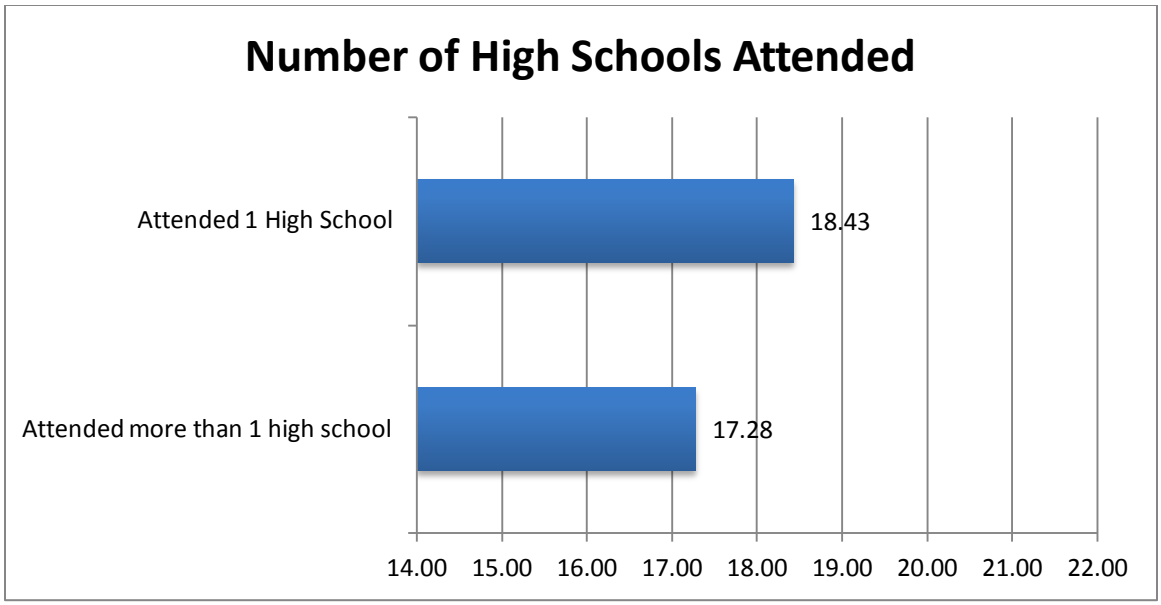

Figure 15. Number of high schools attended

Whether a student attended a **neighborhood school**, which is defined as a school located within the same zip code of their home address was a small statistically significant predictor of ACT/EPAS scores. Students attending a non-neighborhood school demonstrated statistically higher ACT/EPAS scores (β_6=0.346, $p < 0.05$) than students attending a neighborhood school (reference category). Figure 16 below illustrates the predicted attending a neighborhood school main effect on ACT/EPAS scores, holding everything else constant at the grand mean or reference category.

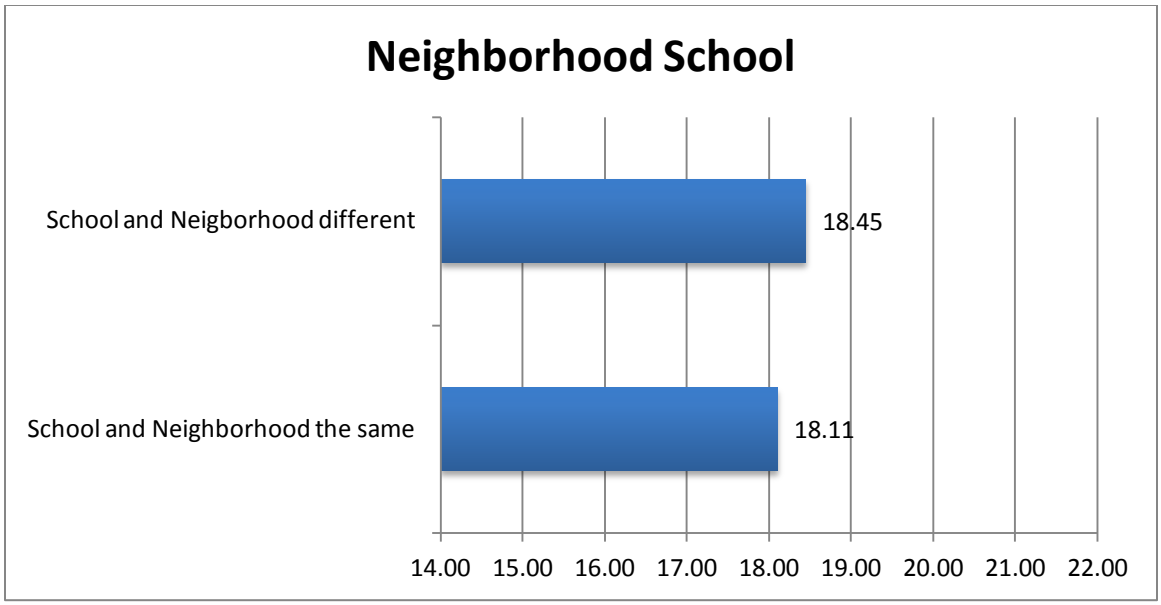

Figure 16. Neighborhood school

Neighborhood predictors. The **percentage of residents with a bachelor's degree or higher** was a statistically significant predictor of ACT/EPAS scores. Students with higher percentages of neighborhood residents with a bachelor's degree or higher demonstrated statistically higher ACT/EPAS scores (β_7=0.033, p < 0.001) than students with lower percentages of neighborhood residents with a bachelor's degree or higher. Bachelor's degree or higher was centered at the grand mean. Figure 17 below illustrates the predicted rate of neighborhood residents with at least a bachelor's degree main effect on ACT/EPAS scores, holding everything else constant at the grand mean or reference category.

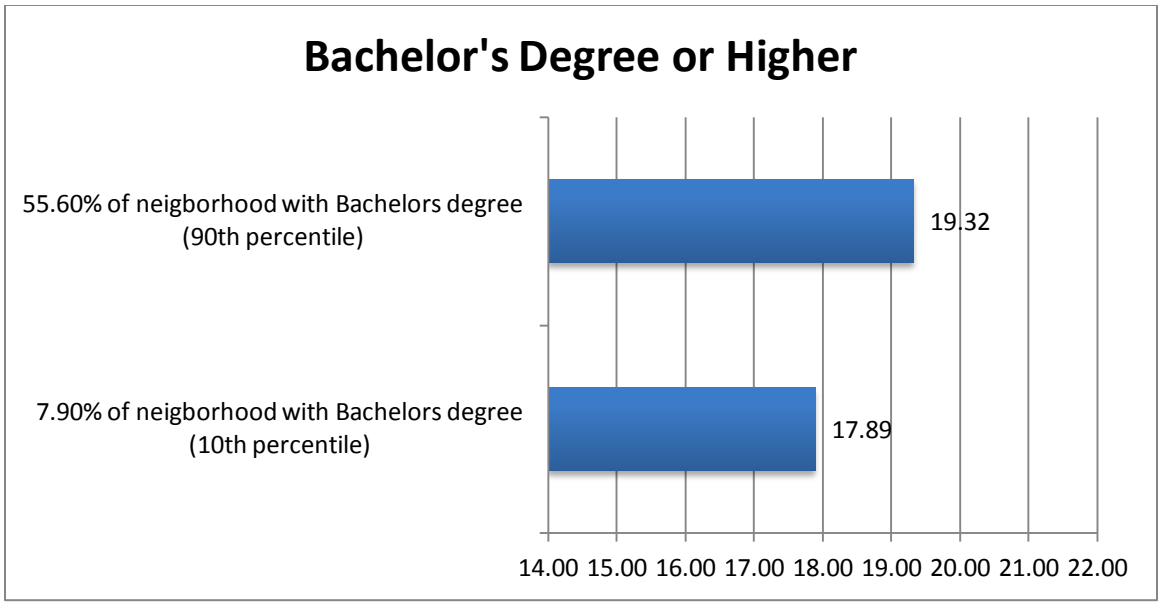

Figure 17. Bachelor's degree or higher

School predictors. Results showed that **minorities**, **failure rate**, **drug incident reports** and **composite ACT/EPAS scores from the previous school year** were all statistically significant predictors of students' performance on the ACT/EPAS test. **Minorities** was a small trend towards significance as a predictor of ACT/EPAS scores and was statistically significant as an interaction effect with the percentage of neighborhood residents with at least a bachelor's degree, which will be discussed later. Results indicated that students in schools with higher minority percentages had higher ACT/EPAS scores (β_8=1.678, $p < 0.10$) than students with lower percentages of minorities. The percentage of minority students was grand mean centered. Figure 18 below shows the predicted rate of minorities main effect on ACT/EPAS scores, holding everything else constant at the grand mean or reference category.

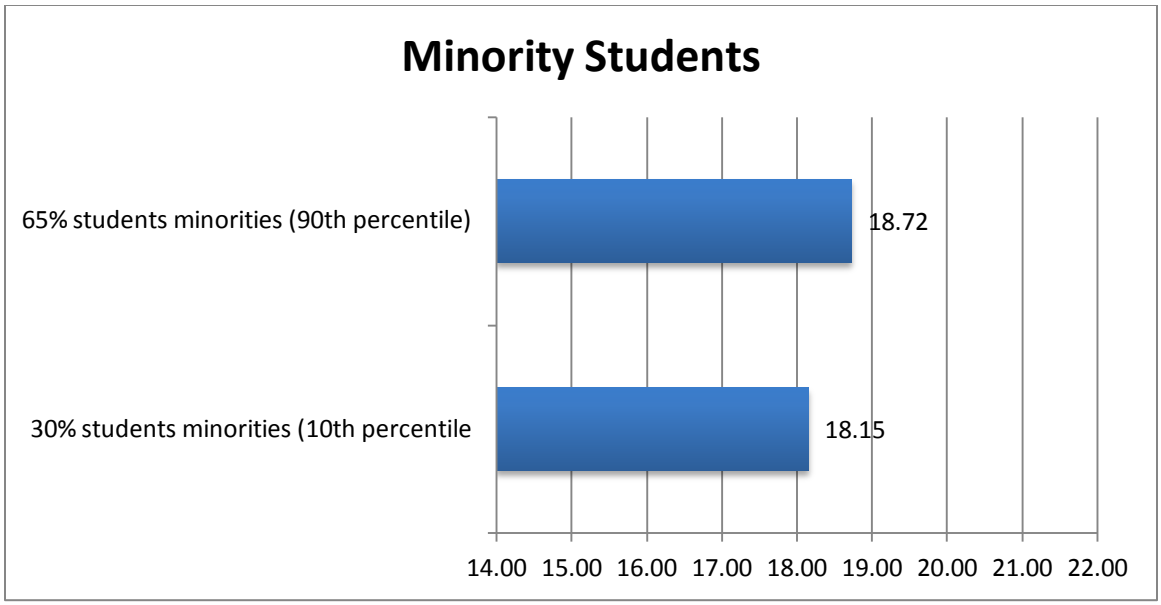

Figure 18. Minority students

The **failure rate**, which indicates schools ability to retain the students whom failed a grade level as a predictor of ACT/EPAS scores was statistically significant. Students attending schools with higher failure rates demonstrated statistically lower ACT/EPAS scores (β_9=-0.090, $p < 0.001$) than students attending schools with lower failure rates. Failure rate was grand mean centered. Figure 19 shows the predicted failure rate main effect on ACT/EPAS scores, holding everything else constant at the grand mean or reference category.

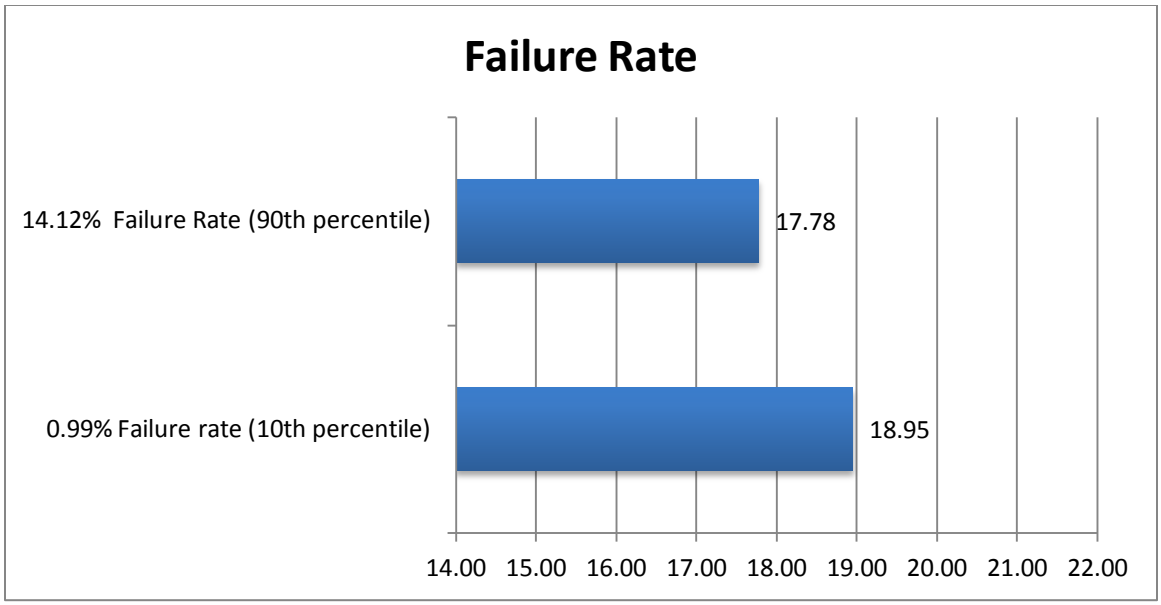

Figure 19. Failure rate

The number of **drug incident reports** as a predictor of ACT/EPAS scores was small but statistically significant. Interestingly, students attending schools with higher reported drug incidents demonstrated statistically higher ACT/EPAS scores (β_{10}=-1.316, $p < 0.01$) than students attending schools with lower reported drug incident reports. Drug incident report was centered on the grand mean. Figure 20 shows the predicted drug incident reports main effect on ACT/EPAS scores, holding everything else constant at the grand mean or reference category.

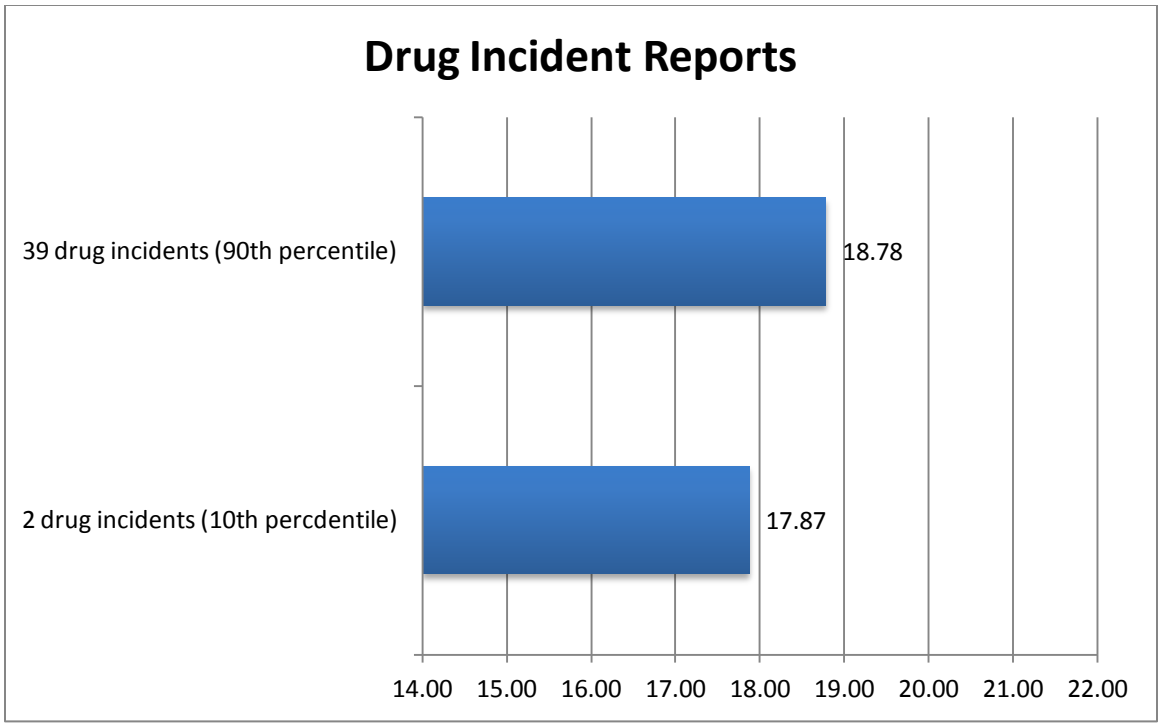

Figure 20. Drug incident reports

The composite score on the **ACT/EPAS from the previous school year** was a statistically significant predictor of student ACT/EPAS score. Students attending schools with higher composite scores on the ACT/EPAS from the previous school year demonstrated statistically higher ACT/EPAS scores (β_{11}=0.586, p < 0.001) than students attending schools with lower composite scores. The composite score on the ACT/EPAS from the previous school year is indicative of the school's educational climate. Composite scores on the ACT/EPAS from the previous year was grand mean centered. Figure 21 shows the predicted composite score on the ACT/EPAS from the previous school year main effect on ACT/EPAS scores holding everything else constant at the grand mean or reference category.

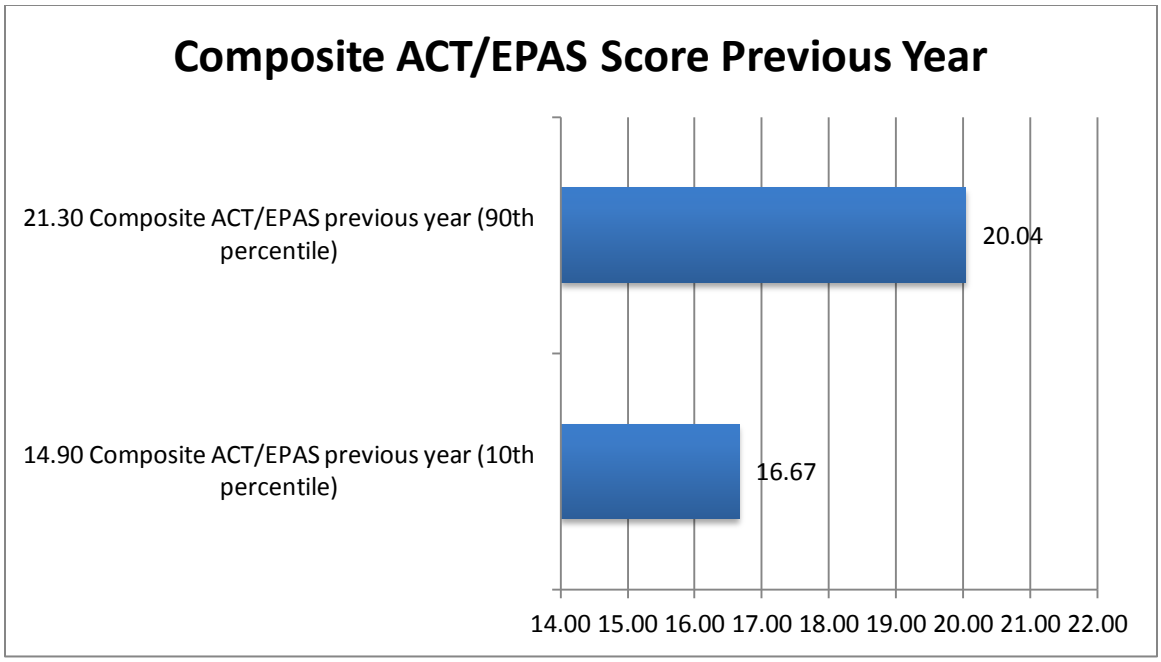

Figure 21. Composite ACT/EPAS score from previous year

Interaction effects. There were five (5) interaction effects that proved to be statistically significant predictors of student performance on the ACT/EPAS test that will be discussed in this section. Additionally there were three (3) interaction effects that showed a trend towards significance.

The interaction effect between **school's composite score on the ACT/EPAS from the previous school year** and **race** as a predictor of students' ACT/EPAS scores was statistically significant. Results showed that the worst performing students were Black students attending low ACT/EPAS performing schools (β_{12}=-0.180, $p < 0.001$). Students classified as Other do the worst when attending low performing schools and their best in high performing schools (β_{13}=0.271, $p < 0.01$). The best performing students were White students

attending high ACT/EPAS performing schools. Figure 22 displays a graph of the interaction effect of school composite score on the ACT/EPAS from the previous year and race.

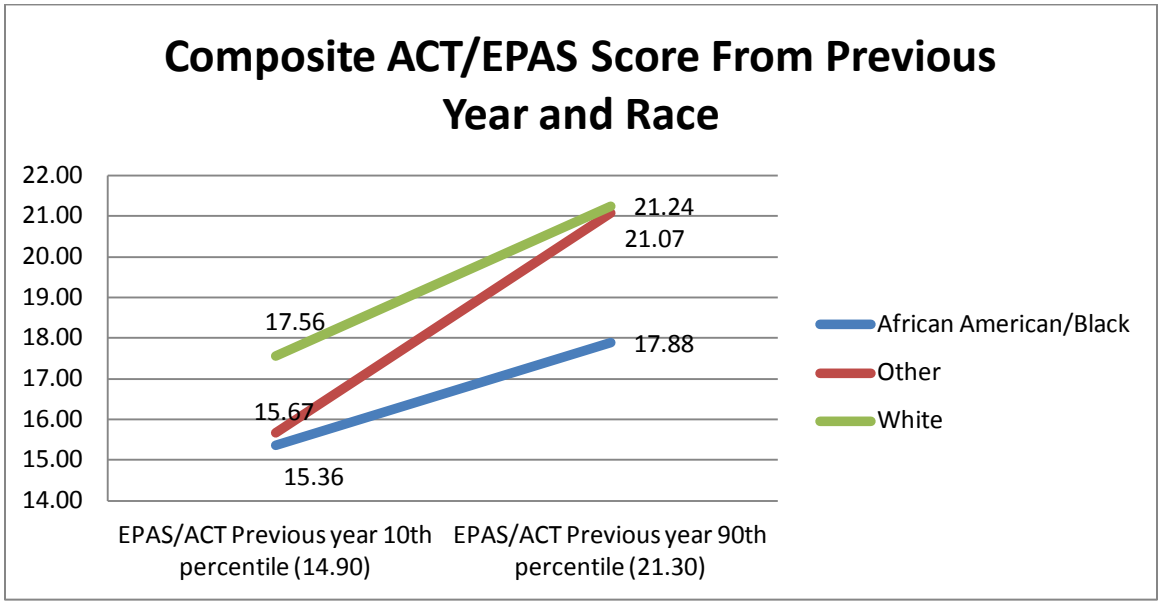

Figure 22. Composite ACT/EPAS from previous year and race

The interaction effect between **schools' composite ACT/EPAS scores from the previous school year** and the **number of different high schools attended** as a predictor was statistically significant on students ACT/EPAS scores. In a low performing school, have attended more than one (1) high school did not have a big impact on their ACT/EPAS scores (β_{14}=-.273, $p < 0.05$), as compared to students who have attended only 1 high school. However, in a high performing school, students who had moved are at a disadvantaged and had a lower ACT/EPAS score, than those who attended only 1 high school. Figure 23 displays a graph of the interaction effects between school's composite

ACT/EPAS scores from the previous year on students' ACT/EPAS scores and the number of high schools attended.

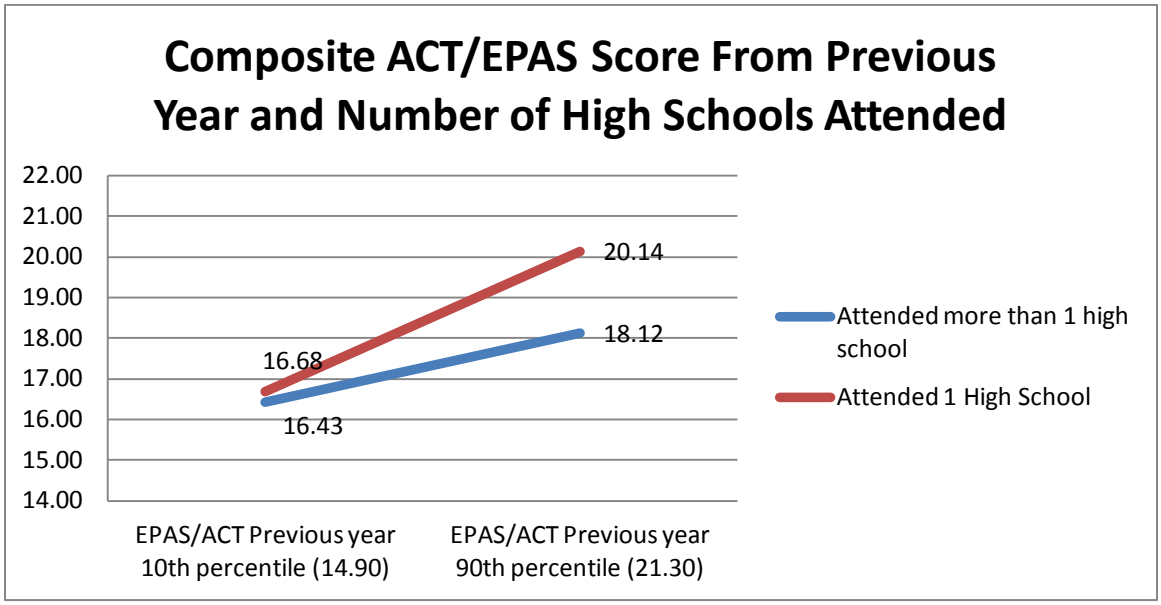

Figure 23. Composite ACT/EPAS scores from previous year and number of high schools attended

The interaction effect between **composite ACT/EPAS scores from the previous school year** and **drug incident reports** (β_{15}=-0.005, $p < 0.10$) showed a trend toward significance. In a high performance educational environment, there was no real difference in how well students do, irrespective of the amount of drug incidents reported. However, in a low performing educational environment, students did better where there were more drug incidents reported. Figure 24 displays a graph of the interaction effect of drug incident reports and composite ACT/EPAS scores from the previous school year on student achievement on the ACT/EPAS.

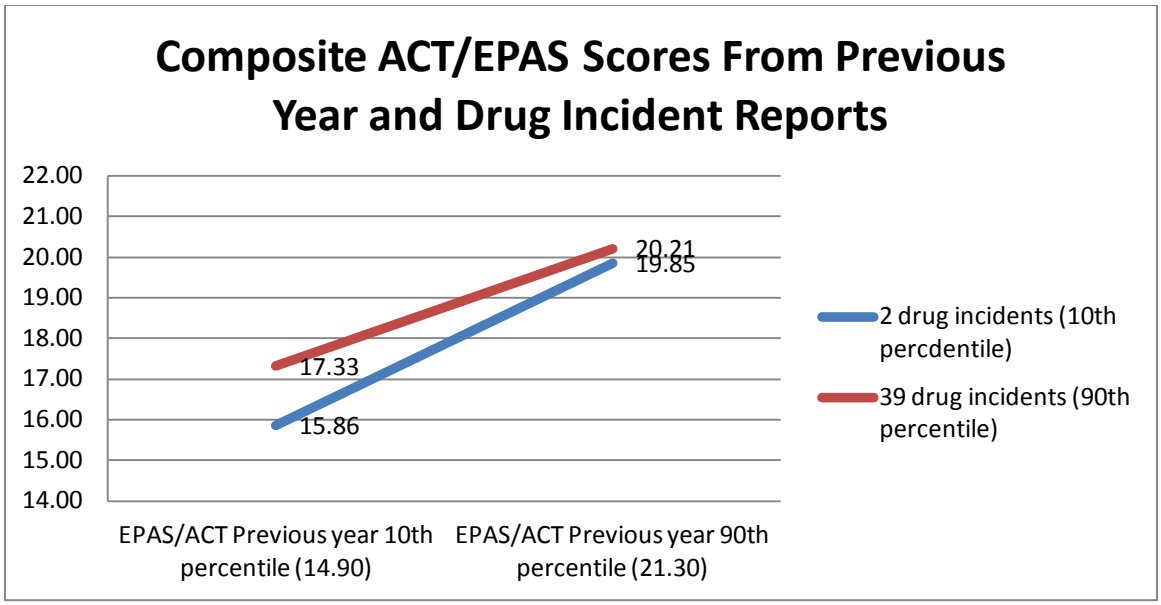

Figure 24. Composite ACT/EPAS scores from previous year and drug incident reports

The interaction effect between the **percentage of neighborhood residents with at least a bachelor's degree** and **race** as a predictor of students' ACT/EPAS scores was a trend towards significance, specifically the Other race (β_{17}=0.028, $p < 0.10$). Students residing in neighborhoods with low percentages of residents with at least a bachelor's degree performed the worst on the ACT/EPAS test. Students whom are Other do better if they are residing in neighborhoods with higher percentages of residents with at least a bachelor's degree. Figure 25 displays a graph of the interaction effect of the percentage of neighborhood residents with at least a bachelor's degree on student achievement on the ACT/EPAS test and race.

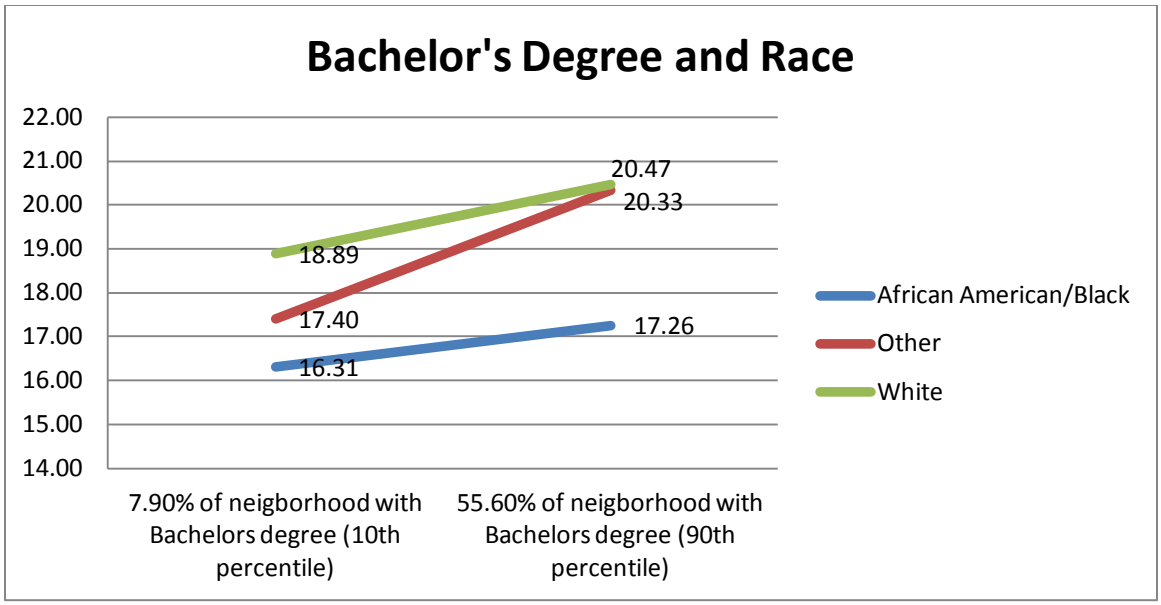

Figure 25. Bachelor's degree or higher and race

The interaction effect between **the percentage of neighborhood residents with at least a bachelor's degree** and **attendance rate** showed that students residing in neighborhoods with higher percentages of residents with bachelor's degrees and with higher attendance rates did better on the ACT/EPAS than students in neighborhoods with lower percentages of residents with a bachelor's degree and with lower attendance rates (β_{18}=-0.021, $p < 0.01$). Results from this interactive effect indicates the characteristics of the worst performing student is a student residing in a neighborhood with low rates of residents with at least a bachelor's degree and low attendance. Characteristics of the best performing student, is a student residing in a neighborhood with higher rates of residents with at least a bachelor's degree and with higher attendance rates. Figure 26 displays a graph of the interaction effect of the percentage of

neighborhood residents with at least a bachelor's degree and attendance rates on ACT/EPAS scores.

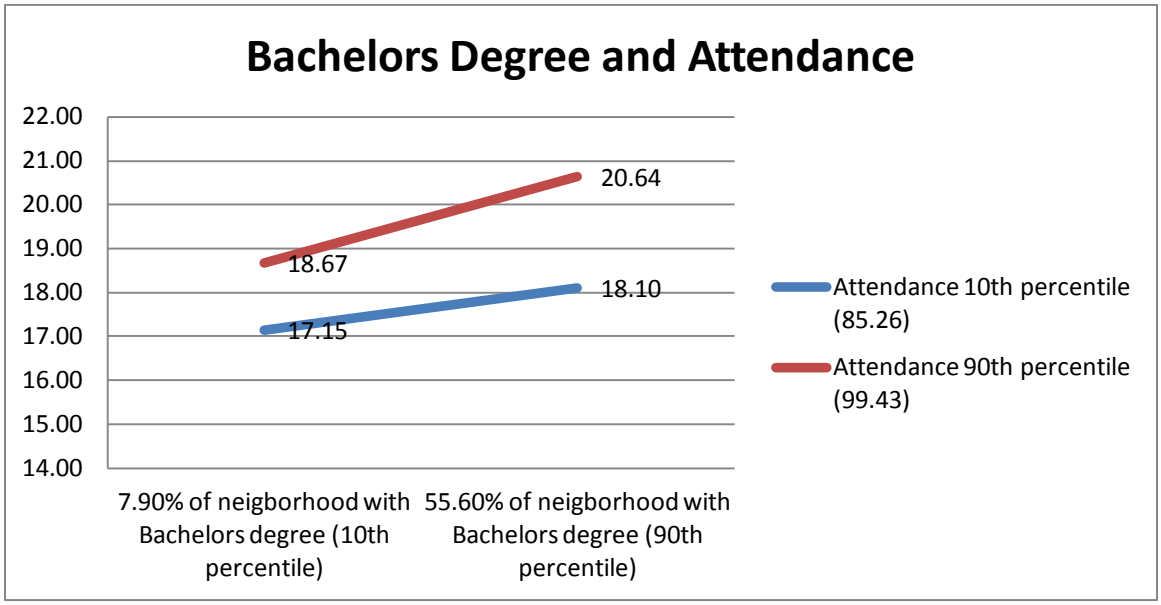

Figure 26. Bachelor's degree or higher and attendance

The interaction effect between the percentage of neighborhood residents with at least a **bachelor's degree** and **minority student** population as a predictor of student achievement on the ACT/EPAS test was statistically significant (β_{19}=-0.080, $p < 0.05$). Results indicate students residing in a neighborhood with lower rates of bachelor's degrees and attending schools with higher percentages of minorities that come from the same background do better. However, the best performing students are students from neighborhoods with higher percentages of neighborhood residents with at least a bachelor's degree. Figure 27 displays a graph of the interaction effect between the percentage of

neighborhood residents with at least a bachelor's degree and minority student population.

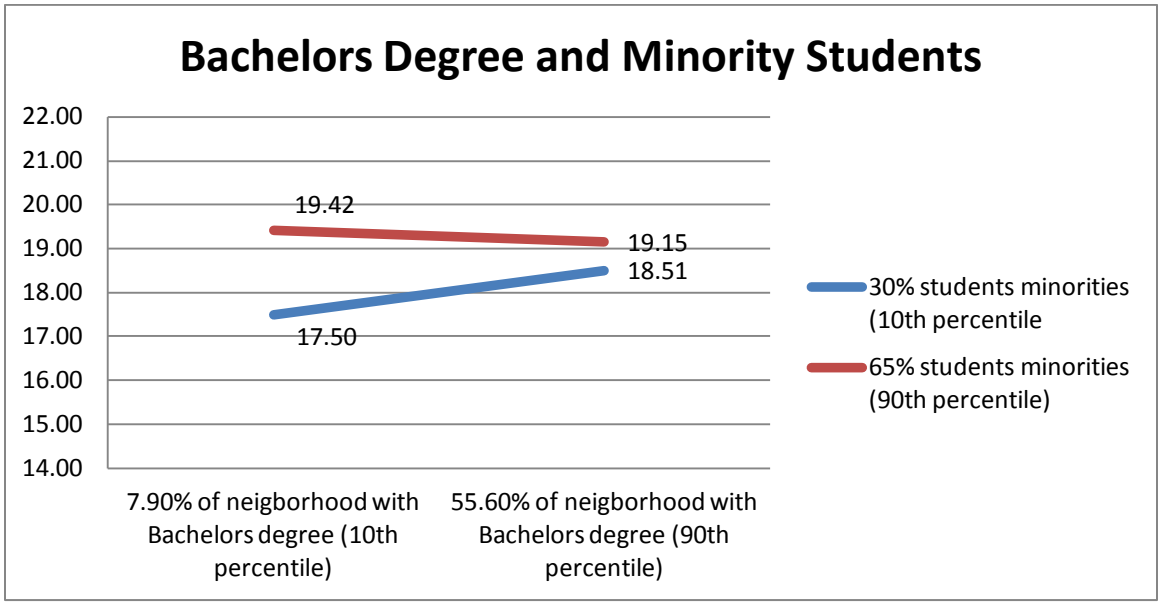

Figure 27. Bachelor's degree or higher and minority students

Summary

A cross-classified multilevel model was estimated using Markov Chain Monte Carlo (MCMC) estimation. Through the building of eight (8) models, the DIC statistic consistently decreased. However, the final model demonstrated the lowest DIC of all indicating good model fit. Overall, there were several predictors and interaction effects that were found to be statistically significant predictors of having lower ACT/EPAS scores. Table 22 is a summary table of the significant predictors as it relates to student achievement on the ACT/EPAS test. These similarities and differences will be discussed in more detail in the next chapter.

Table 22

Summary Table of Significant Predictors of Student Achievement on ACT/EPAS

CONTROL:

Race:
- Whites do better than Blacks and Others.
- Blacks do the worst

Attendance:
- Students with higher attendance rates do better

Free/reduced lunch:
- Students receiving free/reduced lunch do worse than students not receiving free/reduced lunch.

Number of high schools attended:
- Students attending more than one (1) high school did worst.

Neighborhood school:
- Students not attending a neighborhood school do slightly better.

NEIGHBORHOOD PREDICTOR:

Bachelor's degree or higher:
- Students residing in neighborhoods with higher percentages do better

SCHOOL PREDICTOR:

Minority students:
- Students in schools with higher minority percentages did better.

Failure rate:
- Students attending schools with higher failure rates do worse

Drug incident reports:
- Students attending schools with higher drug incident reports do better.

Composite ACT/EPAS score from previous school year:
- Students attending schools with higher composite ACT/EPAS scores do better.

INTERACTION EFFECT:

Composite ACT/EPAS score from previous school year x Race:
- Best performing students are White students attending a high ACT/EPAS performing school.
- Other students do worse in low performing schools and best in high performing schools.

- The worst performing students are Black students attending low ACT/EPAS performing schools.

Composite ACT/EPAS score from previous school year x Number of high schools attended:
- There is not a big impact on the number of high schools attended among students in low performing schools.
- Among students attending higher performing schools, students whom attended more than one (1) high school are at a disadvantaged.

Composite ACT/EPAS score from previous school year x Drug incident reports:
- In a high performing school, there is no real difference in how well students do with the presence of drugs as reported by school administrators.
- In a low performing school, students do better in schools where drug incidents were reported.

Bachelor's degree or higher x Race:
- Students whom are classified as Other do better if they are in a high achievement neighborhood environment.

Bachelor's degree or higher x Attendance:
- Best students are students with high attendance and residing in neighborhoods with high percentages of residents with at least a bachelor's degree.
- Worst performing student are students with low attendance rates and residing in a neighborhood with low rates of residents with bachelor's degrees.

Bachelor's degree or higher x Minority Students:
- Best performing students are students from neighborhoods with high rates of residents with bachelor's degrees.
- Students from low bachelor's degree neighborhoods and attend schools with high percentages of diversity does better than students in school with low minorities and come from the same background.

The next and final chapter will discuss how these results answer both of the hypotheses proposed in this study as well as discuss how these findings related to what has been previously established in the literature. Additionally, the final chapter will discuss the relevance of these findings as it relates to social work practice and policy decisions. Lastly. It will close with a discussion of strengths and weaknesses of this study and offer recommendations for future research.

CHAPTER V: DISCUSSION

"I write books to change the world. Perhaps I can only change one little piece of that world. But if I can empower teachers and good citizens to give these children…the same opportunity we give our own kids, then I'll feel my life has been worth it."

~ Jonathan Kozol

This final chapter will discuss the findings reported in the previous chapter. Additionally, a discussion of implications will also be included. This chapter will conclude with a discussion of the strengths, limitations and recommendations for future research. The analyses and results presented in the previous chapter sought to answer: *Are there any significant relationships between neighborhood characteristics and school characteristics, after controlling for individual characteristics that can help explain achievement disparities for high school students in Jefferson County Public high schools?* This chapter will seek to explain how the accompanying hypotheses were answered based on the analyses conducted in this dissertation.

Research Question

Hypothesis 1: After controlling for individual characteristics, students from neighborhoods with high unemployment -, poverty - and high school dropout

rates, with higher percentages of minority residents, residents with less education, and female headed households as well as lower median household income, will achieve academically worse than students who live in neighborhoods with lower unemployment -, poverty – and high school dropout rates, with lower percentages of minority residents, people without bachelors degrees, and female headed households as well as higher median household income. Based on the results presented in the previous chapter, hypothesis 1 was partially supported with the partiality being explained by the presence of multicollinearity among neighbor predictors. It is important to mention the presence of multicollinearity found among neighborhood predictors because it left the percentage of residents with at least a bachelor's degree as the most viable predictor for data analyses. In support of hypothesis 1, results did show that students residing in neighborhoods with lower percentages of residents with at least a bachelor's degree had lower ACT/EPAS scores than their counterparts.

Hypothesis 2: After controlling for individual characteristics, students from schools with higher percentage of students on free/reduced lunch, minority students, ECE students, ESL students, with less yearly progress goals met, less money spent per student, higher dropout and suspension rates, lower graduation and failure rates, lower advanced placement scores, higher drug and weapon incident reports, and lower PTA membership and composite ACT/EPAS average scores, will achieve academically worse than students from schools with lower percentage of students on free/reduce lunch, minority students, ECE students, ESL students, with more yearly progress goals met, more money spent per

student, lower dropout and suspension rates, higher graduate and failure rates, higher advanced placements cores, lower drug and weapon incident reports, and higher PTA membership and composite ACT/EPAS average scores. Based on the results presented in the previous chapter, hypothesis 2 was partially supported and those statistically significant predictors will be discussed. First there will be a discussion of the statistically significant control variables.

Significant Individual Control Variables

Race, attendance rate, free/reduced lunch, the number of high schools attended and attending a neighborhood school were statistically significant control variables. Results were not surprising and were supported by the literature presented in Chapter 2, which will be highlighted. It is no surprise that **race** was statistically significant. The existing disparities in student achievement and educational attainment is well document and has been coined terms such as, achievement gap, academic achievement gap, and White-Black achievement gap which were discussed in great depth in the first chapter. **Attendance rate** was a statistically significant control variable. Students with higher attendance rates had higher ACT/EPAS scores. Gottfried (2010) credited attendance as an important component of school success, and found that attendance not only has predictive capability on GPA but also on standardized reading and math subject test performance. **Free/reduced lunch** served as a proxy for income and was the principle measure of students' economic status. Consistent with the findings from previous studies using free/reduced lunch as a proxy (Bankston & Caldas, 1996; Lee & Madyun, 2009; Madyun & Lee, 2010), results showed that receiving

free/reduced lunch as a statistically significant predictor of student achievment. The **number of different high schools** a student attended speaks to their stability within their learning environment. Students whom consistently attended the same high school performed higher on the ACT/EPAS test. Owens (2010) found in her investigation a significant relationship of students being in a stable environment on their academic performance. Within recent years, there has been a debate among JCPS parents and students regarding whether students should have the right to attend their **neighborhood schools**, with some arguments reaching as high as the U.S. Supreme Court. Although the geographical convenience of attending a neighborhood school is understood; however, results showed that students attending a neighborhood school had lower ACT/EPAS scores than their counterparts.

Significant Neighborhood Predictors

The **percentage of residents with at least a bachelor's degree** was statistically significant, showing that students residing in neighborhoods with lower rates of neighborhood residents with a bachelor's degree scored lower on the ACT/EPAS score. The percentage of residents with at least a bachelor's degree speaks to many other aspects such as neighborhoods with higher incomes, lower unemployment rates, lower rates of high school dropouts, and higher high school graduates. The composition of neighborhood residents' educational attainment has an influence on students' educational attainment (Owens, 2010). Unfortunately, students residing in neighborhoods with overall lower educational attainment are less likely to have access and exposure to

mentors and role models within their own neighborhoods allowing for formal and informal relationships to be established (Owens, 2010).

Significant School Predictors

Failure rate, drug incidents and composite ACT/EPAS from the previous school year were found to be statistically significant. **Failure rate** and **drug incident reports** speak to the social disorganization of the school environment. Social disorganization theory suggest that students operating in disorganized environments are more likely to not do as well as their counterparts. However, surprisingly this was the reverse for students in schools with higher drug incident reports. Students attending schools with higher drug incidents actually did better. There was no literature found that speaks to this reverse effect of the presence of drugs in schools, leaving the researcher perplexed and unable to provide insight into this finding. However, it is wondered if school administrators handle incidents of drugs differently. For instance, are more schools more proactive in checking for the presence of drugs? Lastly, it is not surprising that schools' **composite ACT/EPAS scores from the previous year** is a statistically significant predictor of student achievement. Schools' composite scores from the previous school year were intentionally used because it provides insight into the schools' educational climate.

Significant Interaction Effects

There were five (5) statistically significant interaction effects and three (3) trends that will be summarized and discussed. **White** students attending **high**

performing schools were the best performing students. **Black** students attending **low performing schools** were the worst performing students. Students in the **Other** race do worse in **low performing schools** and their best in **high performing schools**. The **number of different high schools** a student attended does not matter on students attending **low performing schools**, there is no impact on their ACT/EPAS scores. However, students whom attended more than one high school are at a disadvantage if they attend a high performing school. As discussed in the previous section, the interaction effect between school performance and drug incident reports is a trend towards significance, and results showed there is no impact on student achievement on the ACT/EPAS test when **drug incidents** were reported in **high performing schools**. Students attending low performing schools, actually do better where there are higher incidents of drugs reported in the school than students attending low performing schools were no or low amounts of drugs were reported. The interaction effect between neighborhood **bachelor's degrees** and **race** showed that Black students did worse than all racial categories, which included Whites and Others. Both Black and Other students demonstrated the same trend, showing that both racial groups do better if they reside in more affluent neighborhoods; however, regardless, White students out performed all students on the ACT/EPAS test. Interesting was the trend among students classified as Other displayed. Students whom are Other, residing in a neighborhood with lower percentages of bachelor's degrees performed similar to Black students. However, if these students are residing in more affluent neighborhoods with higher percentages of bachelor's

degrees, these students perform similar to White students. The percentage of bachelor's degrees in a neighborhood is correlated with: unemployment, poverty, female-headed households and income. **Attendance** has a better effect if you live in a neighborhood with more **bachelor's degrees**; students whom had higher attendance rates and higher rates of residents with bachelor's degrees in their neighborhood scored statistically significantly higher on the ACT/EPAS test. The results from the trend in the interaction effect between bachelor's degrees and minority student population showed that students living in neighborhoods with lower rates of residents with a **bachelor's degree** did better if they were attending a school with more **minorities**, higher percentages of diversity than the same type of students attending schools with lower rates of minorities.

Implications

Implications from the results indicates there are policy and structural changes that could be made by the school district and local government that can assist in closing the achievement gap. The composition of neighborhood residents' educational attainment was shown to have an influence on individual student academic achievement, as students residing in neighborhoods with higher percentages of residents with at least a bachelor's degree had a positive effect on a student's individual academic achievement. Although students from all racial groups suffer from residing in less affluent neighborhoods, Black students suffer greatly. The implication of having lower percentages of residents with at least a bachelor's degree not only has bearing on high school students' achievement while in high school; it is also an influence on their overall

educational attainment trajectory. Owens (2010) found that the percentage of residents with a bachelor's degree or higher influences young adults earning a bachelor's degree. Interpreting these results suggest a need to have institutional or structural changes to neighborhoods. Currently, there is a polarization between Louisville, KY neighborhoods with the lowest percent of residents with at least a bachelor's degree being 5.2 percent to the highest being 65.4 percent, which is a significant range gap. Mixed-income neighborhoods could help alleviate this gap by providing disadvantaged students the necessary exposure needed to individuals with higher educational attainment. The same phenomenon of exposure has bearing within the JCPS high schools. Like neighborhoods, there is a polarization between JCPS high schools, with the highest performing school (73% students scoring above 21 on the ACT) at the extreme opposite spectrum of the lowest performing school (1.6% students scoring above 21 on the ACT). Results indicated that individual students do better in schools with higher percentages of students doing well on the ACT; therefore, rather than disadvantaged students suffering in heavily concentrated lower-performance schools it will serve them best to be integrated in schools with students with a mixture of academic abilities. There is a common theme among lower performing schools, which include higher amounts of money spent per student and higher rates of students receiving free/reduced lunch, and they all being majority minority students enrolled. The more money spent yielded results of lower individual student achievement, which suggest that funding is not a fix to the achievement gap but it requires policy and structural changes, which can begin

with examining the student assignment plan. Results have shown there is a relationship between quality of neighborhood and quality of school and this is an element that should be explored extensively by the school district as it relates to student assignment plans. Although results had shown that minority students from less affluent neighborhoods do better in schools with more minorities, it is important to ensure diversity within all schools. The life development benefits that come from being in diverse environments should not be compromised, however it will take efforts of school administrators and teachers to ensure that the school environment as a whole and within each classroom is inclusive. Having a diverse environment means nothing if those in authoritative positions, teachers and school administrators are not fostering inclusivity. Perhaps, this element of inclusivity explains why Black and White students from less affluent neighborhoods perform better in schools with more minorities. It is difficult to thrive in an environment where you are made to feel as an outsider. Professional development training on cultural competency and inclusivity throughout the school year should be provided to teachers and school administrators to assist in their efforts. Additionally diversity extends beyond the obvious, race and the student assignment plan could include other elements of diversity such as socioeconomic status. Attending schools with students from higher socioeconomic backgrounds may expose less-advantaged students to norms about achievement or educational attainment (Owens, 2010); however, concentrated attention must be placed on making these students feel included and respected within the school's culture. Rather than placing disadvantaged

students in schools with high proportions of other disadvantaged students, a more concentrated focus by the school district could be placed on providing them opportunities to attend schools that are not only racially diverse but socioeconomically diverse.

Conclusion

Strengths of the Study

A significant strength of this study is the use of a cross-classified multilevel model. While the use of multilevel modeling is quit common in educational attainment and student achievement research, the use of cross-classified modeling is not. The use of a cross-classified model, allowing for both neighborhood and school predictors to be examined simultaneously set this study apart from other studies on educational disparities.

Limitations of the Study

Threats and limitations related to the design used in this should be acknowledged. The use of existing data limited the variables used to those in which were available using secondary data sources. There were neighborhood and school predictors of interest to the researcher that were not available through secondary data sources, such as school climate. From the student's perspective knowing the school climate might have provided insight into how minorities feel in predominately White school atmospheres. Results indicated that minority students performed better on the ACT/EPAS test while attending minority

majority schools and this is regardless of the overall school's academic performance. Unfortunately there was no way to explore this phenomenon.

Another limitation was the inability to use crime as a neighborhood predictor variable due to neighborhood crime rate not being available by way of zip code. Crime rate is an important predictor in student achievement. Research suggests that living in high **crime rate** neighborhoods is associated with poor academic performance and behaviors of students (Nash, 2002). Although the mechanism through which the effects of neighborhood crime operate are not clearly understood; it is possible that living in a high crime neighborhood gives adolescents the belief that the world is unsafe, unpredictable, and beyond the control of the individual (Nash, 2002). Researchers Lee and Madyun (2009) investigated the impact neighborhood disadvantage has on the Black-White achievement gap. Out of 51 neighborhoods under investigation they labeled 35 of these neighborhoods as *low crime and low poverty* and 16 as *high crime and high poverty* based on crime statistics and poverty rates. Not surprisingly, results from this study indicated that students residing in the low crime and low poverty neighborhoods showed higher academic achievements in math and reading than the students residing in the high crime and high poverty neighborhoods (Lee & Maydun, 2009).

Future Research

It is recommended that future research be conducted on exploring why minority students from lower socioeconomic backgrounds do better in minority

concentrated schools than high performing schools with majority White students. It is important to have insight into what are the dynamics that are hindering these students achievement in what would be considered a more ideal learning environment by educational standards.

Summary

There are no quick fixes to eradicating the disparities that exist in student achievement. Understanding the disparities that exist in student achievement is complex and should be treated as such, requiring only the use of higher level statistical models such as cross-classified multilevel modeling. Ecological systems theory indicates that human behavior is complex. Students are influencing their environments (neighborhood and schools), and they are influenced by these same environments, suggesting a holistic approach is needed. There cannot be a serious conversation about improving student achievement among disadvantaged students whether that be race or socioeconomic status without a serious conversation about the neighborhoods and schools these students inhabit. You cannot address the school environment without addressing neighborhood environment; hence the statistically significant interaction effects found in this study showing the two environments working in tandem. There is much to be done and to be explored in improving student achievement and educational attainment among the disadvantaged; however, if this dissertation aid in the most minuscule way, then as Jonathan Kozol stated, it "…has been worth it." It has been worth the five years spent on furthering the research on disparities in student achievement.

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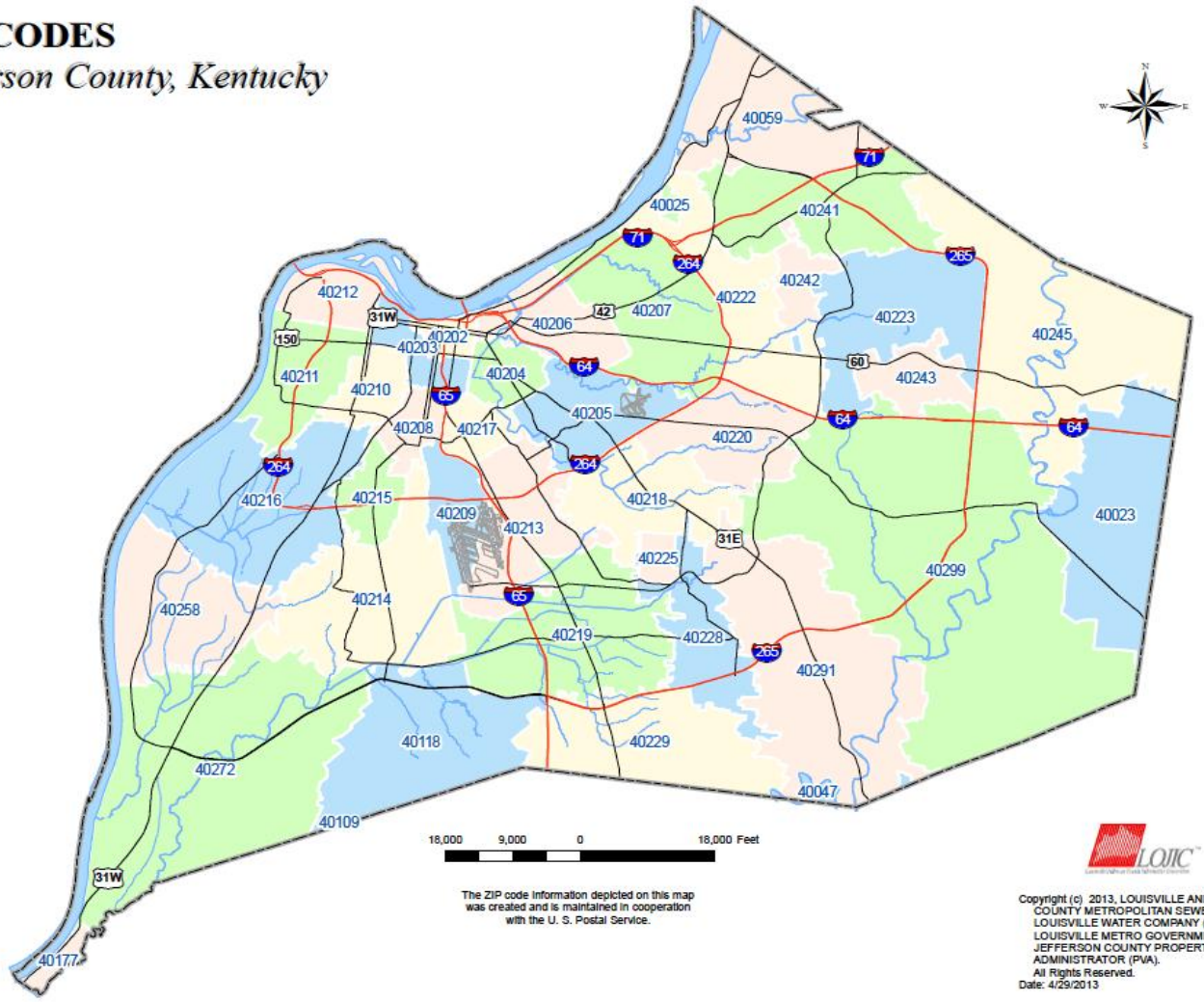
ZIP CODES

Jefferson County, Kentucky



The ZIP code information depicted on this map was created and is maintained in cooperation with the U. S. Postal Service.

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RESEARCH AND TEACHING INTERESTS

Research interests include examining the role students' neighborhood, school and family environments have on student development and academic achievement, specifically how the intersection of these environmental characteristics influences student outcomes. Additionally, interested in researching and teaching the connection between disparities in educational attainment and the isms (classism, racism, heterosexism, sexism, etc.) and other social justice related issues. Other teaching interests include teaching topics of oppression, social justice and cultural competencies.

EDUCATION

University of Louisville **2008-Present**
Kent School of Social Work, *Doctor of Philosophy, All But Dissertation* *May 2013*
Dissertation Title: Contextual Effects on Student Academic Achievement: A Multilevel Analysis
Chair: Anna Faul, Ph.D.

University of Louisville
2001-2003 Kent School of Social Work, *Masters of Science in Social Work*

University of Louisville
1996-2000 College of Arts and Sciences, *Bachelor of Arts in Psychology*
Concentration: Social Sciences
Minor: Pan African Studies

TEACHING EXPERIENCE

SW 426-01: Introduction to Social Work Research **Spring 2009**
University of Louisville, Kent School of Social Work, Bachelors Program (BSW)

SW 766-01: Doctoral Preparation **Summer 2009**
University of Louisville, Kent School of Social Work, Doctoral Program (PhD)

SW 603-77: Human Diversity **Summer 2009**
University of Louisville, Kent School of Social Work, Masters Program (MSSW)

SW 603-77: Human Diversity **Summer 2010**
University of Louisville, Kent School of Social Work, Masters Program (MSSW)

SW 603-77: Human Diversity **Summer 2011**
University of Louisville, Kent School of Social Work, Masters Program (MSSW)

SW 603-02: Human Diversity **Fall 2011**
University of Louisville, Kent School of Social Work, Masters Program (MSSW)

SW 603-77: Human Diversity **Summer 2012**
University of Louisville, Kent School of Social Work, Masters Program (MSSW)

SW 603-02: Human Diversity **Fall 2012**
University of Louisville, Kent School of Social Work, Masters Program (MSSW)

SW 603-50: Human Diversity **(Online Course Developer)** **Fall 2012**
University of Louisville, Kent School of Social Work, Masters Program (MSSW)
Developed this inaugural online course

SW 603-50: Social Justice Practice (Online) **Summer 2013**
University of Louisville, Kent School of Social Work, Masters Program (MSSW)

RESEARCH EXPERIENCE

Independent Study **January 2009 - April 2009**
Louisville, KY
University of Louisville, Kent School of Social Work
Title: Exploring Students' Anxiety Towards Research Through Online Focus Group Discussions: A Qualitative Study

- The purpose of this study was to investigate ways in which research instructors can reduce research anxiety among students, more specifically BSW students. Through online focus group discussions, I explored this issue in more detail and with the help from the students was able to identify potential strategies on how research should be taught to help minimize students' anxiety.

Program Evaluation **August 2008 – April 2009**
Louisville, KY
University of Louisville, Kent School of Social Work
Title: ElderServe's TeleCare Services: A Program Evaluation

- This program evaluation looked at program effectiveness of the TeleCare Reassuring Phone Services by examining the agency's processes. TeleCare is a

Monday-Friday telephone service where volunteers call elderly adults to make sure that they are well and are not in need of emergency assistance. The TeleCare program promotes independent living of elderly adults within their own homes. The goal of this program evaluation was to evaluate the strengths and weaknesses in the agency as well as to determine whether procedures are followed in an accurate and consistent manner. A posttest- only research design was used to measure the effectiveness of TeleCare. Data was collected by telephone using a survey developed specifically for TeleCare clients and their emergency contact/family member on file. Data was analyzed using Statistical Package for Social Science (SPSS).

Program Evaluator **June 2005 – July 2005**
Louisville, KY
Louisville SummerBridge Program

- Louisville SummerBridge is a summer program for middle school aged students. This program is an academic and extra-curricular enrichment program. In addition to evaluating the effectiveness of the program students were asked to complete a survey examining their attitudes towards academic achievement and whether they believed they were capable of attending college. I administered pre and post-tests to the program participants. Data was analyzed using SPSS. The Louisville SummerBridge Program Director was presented with a written report on the effectiveness of the program and on the participants' attitudes towards education and attending college.

Graduate Student **August 2002 – April 2003**
Louisville, KY
University of Louisville, Kent School of Social Work
Turning It Around (TIA)

- The Turning It Around (TIA) Program is designed to help increase child support payments from non-custodial parents. The target audience for this program is delinquent non-custodial parents. Participation in this program is voluntary. I used a pre-experimental static group design to compare whether graduates of the TIA program paid more consistent child support payments than parents also labeled as delinquent whom did not participate in the program. There was a sample of 200 participants, consisting of 100 TIA graduates and 100 non-TIA participants. A chart file review was used to collect data.

PROFESSIONAL EXPERIENCE

Event Planner **2009-Present**
Louisville, KY
University of Louisville, Kent School of Social Work

- Coordinates the planning and implementation of Kent School of Social Work, MSSW Orientations (Oncampus and Online)
- Coordinates the planning and implementation of Kent School of Social Work, Graduation Party and Award Ceremony
- Kent School Liaison for the University wide commencement ceremony

Director, Continuing Education **2006-Present**
Louisville, KY
University of Louisville, Kent School of Social Work

- Overseer of the Continuing Education Department
- Coordinate all continuing education workshops and trainings
- Manage daily operations
- Hire instructors for workshops and trainings
- Work with the Kentucky Board of Social Work for board approval of workshops to offer Continuing Education Unit (CEU) hours for social workers' license renewal
- Coordinates student enrollment in Kent School of Social Work, online Prerequisite Courses
- Manage the online Prerequisite Courses: Human Biology, Research Methodology, and Statistics

Coordinator, Initiative for Nursing Diversity Excellence (INDE) Project **2003-2006**
Louisville, KY
University of Louisville, School of Nursing

- The Project Coordinator was responsible for planning and coordination of all project programs, activities and the collection of tracking outcome data.
- Managed the daily operations of the Initiative to Nursing Diversity Excellence (INDE) Project
- Coordinated and implemented all project programs
- Recruited African American students for University of Louisville, School of Nursing
- Created a successful tutor/mentor program for African American nursing students
- Oversaw retention activities, mentoring, tutoring and recognized student organization
- Hired, trained and managed project staff
- Administered various program evaluation scales
- Provided academic resources and support to African American nursing students

Graduate Research Assistant **2003**
Louisville, KY
University of Louisville, Kent School of Social Work

- Worked as assistant to Bibhutti Sar, PhD on the Credit to Learn Project
- Reviewed literature and wrote literature reviews
- Constructed codebooks for data analysis
- Organized and maintained student records, developed and updated spreadsheets

Graduate Practicum Student **2002-2003**
Louisville, KY
Jefferson County Family Court

- Worked as assistant to Family Court Support Workers and Judges during daily court hearings
- Worked as assistant to Jefferson County Foster Care Review Board Director with recruiting board volunteers and coordinating volunteer training sessions
- Performed a program evaluation on the Turning It Around (TIA) Program. Conducted formal research study utilizing a pre-experimental static group design, chart file review with a sample of 200 participants.

- Conducted policy analysis on Administrative Office of the Courts' policy and procedures for Title VI and interpreters

Senior Therapeutic Aide
2001-2002
Louisville, KY
Seven Counties Services, Inc.

- Performed therapeutic intervention sessions with students at Waller Environmental Elementary School
- Performed family therapeutic intervention sessions with clients (students) and their custodial parents
- Collaborated in interdisciplinary teams to construct treatment plans

Graduate Practicum Student **2001-2002**
Louisville, KY
University of Louisville Family Support Center

- Worked on an interdisciplinary team through the STAR Medical Team. This interdisciplinary team consisted of: a medical resident, nurse practitioner students, and a master level social work student
    - Collaborated with the team to construct patient care plans
    - Made home visits with the patients and administered FEICS and RES scales
- Performed contract work with Jefferson County Head Start Program
    - Conducted classroom observations on students referred by the Head Start Teacher for displaying negative classroom behaviors
    - Developed alternative intervention plans for teachers to use while working with the student
    - Performed classroom intervention with referred students
    - Worked as a liaison between the parent and teacher and facilitated parent/teacher conferences

International Shipping Representative **1999-2001**
Louisville, KY
United Parcel Services

- Liaison between shippers and country officials
- Worked with both shipper and Customs and Border Protection to resolve shipment holds
- Certified to create Certificate of Origin shipping document for shipments originating in the United States

Student Work-Study Assistant **1996-1999**
Louisville, KY
University of Louisville, College of Arts & Sciences Advising Center

- Scheduled and coordinated advising appointments
- Assisted students with class scheduling and major selection during walk-in advising
- Maintained student records and constructed degree checks and audits
- Coordinated and prepared drop/add petitions on a weekly basis

PUBLICATIONS

Peer-Reviewed

Moore, S., Wallace, S., Schack, G., Thomas, S., Lewis, L., Wilson, L., Miller, S., & D'Antoni, J.

Inclusive teaching circles: Mechanisms for creating welcoming classrooms. *Journal of the Scholarship of Teaching and Learning, 10*(1), January 2010, pp. 14-27.

AWARDS

Certificate of Completion — June 2012
Delphi U, University of Louisville, Delphi Center for Teaching and Learning

Team (Selected to Compete; Competition April 9, 2010) — March 2010
DC Public School System Urban Education Redesign Challenge

Certificate of Appreciation — November 2009
Office of the Superintendent, Jefferson County Public Schools

Certificate of Completion — April 2009
Graduate Teaching Academy, University of Louisville, Delphi Center for Teaching and Learning

Selected by Ruth Huber, Director of Doctoral Program to teach Doctoral Preparation 2008
University of Louisville, Kent School of Social Work

Certificate of Recognition — 2008
Council on Social Work Education

Jefferson County School District Champion for Children Award — 2003-2011

Martin Luther King Scholar — 1999

PROFESSIONAL EDUCATION, TRAINING AND CONFERENCE

Sloan-C 18th Annual International Conference on Online Learning — October 2012
The Sloan Consortium

Delphi U — June 2012
University of Louisville, Delphi Center for Teaching and Learning

Part-Time Faculty Institute — 2010-2011
University of Louisville, Delphi Center for Teaching and Learning

Health, Education, and Welfare Conference: Measuring Outcomes across Systems June 2009
Chapin Hill at the University of Chicago Chapin, Urban Institute

Rubrics- They're Easy as 1-2-3 — April 21, 2009
University of Louisville, Delphi Center for Teaching and Learning

Test Development and Item Analysis March 12, 2009
University of Louisville, Delphi Center for Teaching and Learning

Designing Activities, Assignments, and Projects February 5, 2009
University of Louisville, Delphi Center for Teaching and Learning

Classroom Response Systems: Innovations and Best Practices Conference
November 15, 2008
University of Louisville, Delphi Center for Teaching and Learning

Stimulating Active Learning in the Classroom November 11, 2008
University of Louisville, Delphi Center for Teaching and Learning

Lunch and Learn Program: Tegrity System November 10, 2008
University of Louisville, Delphi Center for Teaching and Learning

Motivating Students October 28, 2008
University of Louisville, Delphi Center for Teaching and Learning

Student Learning Styles & Generational Differences September 18, 2008
University of Louisville, Delphi Center for Teaching and Learning

UNIVERSITY INVOLVEMENT

Advisor May 2008-2011
Xi Chapter, Delta Sigma Theta Sorority, Inc.

Inclusive Teaching Circle August 2006-April 2007
College of Arts & Sciences Office of International, Diversity, and Outreach Programs

Member
Black Faculty and Staff Association (BFSA) 2003-Present