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Using Geographic Information Systems to Analyze the Effects of Residential Location on Student Academic Success

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USING GEOGRAPHIC INFORMATION SYSTEMS TO ANALYZE THE EFFECT OF RESIDENTIAL LOCATION ON STUDENT ACADEMIC SUCCESS

by

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ABSTRACT

Purpose: This study aims to assess the impact of social disorganization indicators (i.e., employment, median-household income, owner-occupied housing, crime, poverty and minority percentage) on academic performance (i.e., GPA) for 6th and 7th-grade students attending seven K-8 designated Orange County Public Schools (OCPS) in central Florida. **Methods**: A hot spot cluster analysis was used to identify areas where high and low GPA clustering occurs based on the individual block level GPA data obtained from OCPS. Visual map comparison of cluster results and social disorganization indicators were used to understand if high GPA cluster outcomes occur in areas of social disorganization. Moreover, OLS regression was used to identify which social disorganization variables are statistically significant with GPA outcomes. The ArcGIS online platform was used to conduct the cluster analysis and compare the cluster results to each independent variable. **Results:** Cluster analysis at the block level revealed that low GPA outcomes (2.14-2.61) cluster in areas where social disorganization is present, while high GPA outcomes (3.09-3.89) cluster in predominantly white wealthy neighborhoods. OLS regression results revealed that poverty has a negative relationship with GPA where for every unit increase in poverty, there is a .66 decrease in GPA outcomes. Additionally, a positive relationship between employment and GPA was found where for every unit increase in employment there is a 2.79 increase in GPA outcomes. **Conclusion:** Political and service intervention are needed to mitigate the impact poverty, income, owner-occupied housing, crime, and employment has on student academic performance. Consequently, policies need to address the social condition concerns experienced by minority students residing in areas of concentrated poverty. Social service programs should begin utilizing geographical tools to better understand areas requiring the most

service and tailor interventions based on which social disorganization indicators are most concentrated. The results of this study contribute to the discourse on ways to mitigate the effects associated with external school factors as it pertains to academic success for 6th and 7th-graders. Results are intended to inform educators, social service agencies, and policymakers. This study aspires to add to the discourse on ways to break down barriers that limit student participation in academia.

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CHAPTER ONE: INTRODUCTION

History

Disparities within educational institutions have plagued American society since before the 1900s (Levin et al., 2012; Palmer et al., 2013; Taylor, 2006). Although many black and brown people were theoretically free, the lack of equality and equity limited access to resources, directly impacting the ability for schools occupied by black and brown youths to compete academically with their white counterparts (Dreier, Mollenkopf, & Swanstrom, 2014; Levin et al., 2012; Taylor, 2006). Such inequalities and inequities have led to dramatic disparities within primary and secondary educational institutions across racial and economic lines, which are still evident today (American Psychological Association, Presidential Task Force on Educational Disparities, 2012).

In 1964 overwhelming pressure to address disparities throughout the country forced the United States to push initiatives to racially diversify its publicly funded educational institutions and places of employment throughout the nation (United States Government Accountability Office, 2016). Policies such as the Civil Rights Act of 1964 and executive order No. 11246, Affirmative Action, issued by Lyndon B. Johnson in 1964, and others were created (Crosby & Clayton, 2001). These policies attempted to enforce public school desegregation and encourage inclusion; however, the enforcement of these new policies received heavy pushback from dissatisfied organizations and institutions, in addition to white citizens and students who decided to fight policies such as affirmative action through Supreme Court litigations (Palmer et al., 2013).

As a response, the government, through the use of tools such as social regulation, tax expenditures, grants, and vouchers, attempted to enforce public school desegregation; however, policy implementation and governmental push tactics did very little to rectify the issue due to high levels of racist ideology present throughout the United States at the time (Levin et al., 2012). Moreover, inconsistencies regarding the implementation and definition of many of these new policies helped fuel increased opposition to diversity in educational institutions, which has led to gaps in policy execution and overall outcomes (Crosby & Clayton, 2001; Smith & Larimer, 2017). Moreover, issues regarding how such policies were written helped fuel confusion and misinformation as to how these policies should be implemented. For instance, the privileged white challenged affirmative action through Supreme Court litigations regarding its constitutionality on multiple occasions. This was primarily due to inconsistencies regarding how race should be used to diversify colleges and universities; there is no clear definition of diversity (Palmer, Wood, & Spencer, 2013). Instead, it is ambiguous, which forced organizations and institutions to develop their own definitions, which undoubtedly increased the chances for error and erroneous implementation. Unintentionally, Affirmative Action, which was designed with inclusion in mind, failed to meet an acceptable consensus of diversifying without infringing on white elitism. Furthermore, systemic wicked problems (e.g., racism, capitalism, residential segregation) made it more complicated for these policies to redistribute equality and equity due to how well they were enmeshed across racial lines, which severely impeded the process of public-school desegregation and inclusion (Levin et al., 2012).

Disparities in Public School Education

The nation's children are its future workers, citizens, and leaders. Although a national superpower, the United States public school system, compared to at least 21 countries, ranks 22nd in the world in high school graduation rates (OECD, 2012). Much of the literature attributes this to inequalities present in the United States public school system, resulting in students K-8 being underprepared for high school and secondary education (Culpepper et al., 2015; Taylor, 2006). Students affected by inequality and inequity often struggle to maintain academic success as defined by their school or institution due to factors present within and outside of school, which decreases their ability to concentrate and perform well academically (APA, 2012; Bogin & Nguyen-Hoang, 2014; Boumans & Dorant, 2018; Chapman & Donnor, 2015; Culpepper et al., 2015; Dreier, Mollenkopf, & Swanstrom, 2014; Ford & Airhihenbuwa, 2010; Sánchez-Jankowski, 1999; Taylor, 2006; Wilson, 2016).

Unfortunately, black and brown individuals are part of a disadvantaged and oppressed group of people whose economic and social issues are exacerbated by ecological factors forced on them by policy decisions and implementation by the white majority. These socio-economic factors continue to be the contributing variables in an overwhelming majority of black and brown people, despite the rising times (Krieg, 2011; Levin et al., 2012; Palmer et al., 2013). Even so, a robust educational base continues to be the primary tool by which people become empowered (Palmer et al., 2013). It is also the primary pathway in which individuals make substantial contributions to the economy and influence policy change (Culpepper et al., 2015). However, many black and brown individuals within the United States are deprived of this opportunity due to educational inequality and inequity, which inhibits the ability of many from taking part in the

system designed to guide the nation's future (Bogin & Nguyen-Hoang, 2014; Boumans & Dorant, 2018; Chapman & Donnor, 2015; Culpepper et al., 2015).

Examining state, national and local data reveals many persistent and troubling trends, which may be directly influenced by racism (Frankenberg et al., 2003; Palmer et al., 2013; Royce, 2018). These trends manifest as gaps rooted in multigenerational patterns of racist ideology linked to hiring, homeownership, financial lending, and second-rate educational systems that undeniably place minority families in economically and politically disadvantaged positions compared to their white counterparts (Taylor, 2006; Zorlu, 2013). Although perceived to be a complex but evident phenomenon, race continues to be a poorly understood construct with ill-defined categories that overlap with ethnicity, culture, identity, and class (Taylor, 2006). One's racial status in society has led to societal stratification, neighborhood segregation, and the continuation of racist ideology, which propagates unequal distribution of financial wealth and resources between the majority and minority groups (Lichter, Parisi, & Taquino, 2012; Quillian, 2014).

Unsurprisingly, the paucity of equality and equity is often evident before black and brown children even begin school and often becomes more prominent after a child enters kindergarten (Taylor, 2006). According to much of the literature, disparities between black and brown youths and white students can be observed when assessing grades, graduation rates, college admission, completion rates, and overall student academic progress and success (Bland, 2014; Bogin & Nguyen-Hoang, 2014; Krieg, 2011). Several studies have suggested that these disparities are societal and developed through perceived stigma (Bogin & Nguyen-Hoang, 2014)

that normalize the ideology that one race is superior while marginalizing other races (Bland, 2014).

Although it is widely known that black and brown communities often reside in larger urban areas, riddled with social disorganization (i.e., the absence of social control) and increased exposure to environmental injustices, income segregation, and concentrated poverty (Quillian, 2014), policies and practices have not been developed to mitigate these issues. Instead, the continuation of the unequal distribution of resources and the absence of socio-economic support contribute to the cycle of poverty and disenfranchisement of marginalized groups. Economic segregation, coupled with racial segregation and income inequality, has pushed low-income blacks into neighborhood clusters that feature disadvantages along several dimensions spanning from joblessness and reduced opportunities for educational attainment to insufficient services for mental and medical health treatment (Wilson, 2016). Even more concerning is the increased saturation of these neighborhoods with over-policing, which often leads to increased arrest and crime rates (Taylor, 2006) and may directly contribute to the current economically deprived cycle being faced by many black and brown people.

Sampson (2012) put it best as he described communities where such conditions exist as the engine that gives rise to what we now know as concentrated poverty. According to Sampson, *concentrated poverty* is defined as the spatial density of socio-economic deprivation, more specifically; geographic areas with extreme or high poverty, where 40% or more of the population is living below the federal poverty threshold (Frankenberg, Lee, & Orfield, 2003; Mucedola, 2017; United States Government Accountability Office, 2016). Additionally, as social stratification increases, the economic gap becomes more evident, where the rich increasingly live

with other rich people and the poor live with other poor people (Dreier, Mollenkopf, & Swanstrom, 2014). Not surprising is the effect of poverty on education within disadvantaged communities, as limited resources lead to inadequate school resources. For instance, public school funding is directly proportionate to the neighborhood's ability to contribute time and finances to improve a school's infrastructure (Frankenberg, Lee, & Orfield, 2003; Frisch, 2017). The perpetual societal construct that allows for inequality and inequity such as that described above directly affects a public school's abilities to cultivate academic success, utilize innovative resources, and compete for sufficient funding needed to hire qualified teachers (Biddle & Berliner, 2002; Frisch, 2017; Holmes & Horvitz, 1994). Therefore, a deeper analysis is needed to understand and identify factors contributing to inequality and inequity across educational institutions within the United States (Krieg, 2011; Levin, et al., 2012; Palmer, Wood, & Spencer, 2013).

Areas identified as suffering from concentrated poverty often experience increased and pro-longed joblessness, and a reduction in non-poor families, making it challenging to sustain basic public educational needs and achieve adequate levels of neighborhood social organization (Sampson, 2012; Wilson, 2016). Moreover, in high poverty neighborhoods, single parents experience challenges attempting to establish financial stability, or in some cases, are absent from a child's life altogether, leading to early parentification of the child(ren) (Bäckman, 2017; Boumans & Dorant, 2018; Driscoll, 2014; Freeman, & Simonsen, 2015). *Early parentification* is defined as a child(ren) taking on the roles and responsibilities reserved for adults caused by the distortion of boundaries within the family subsystem (Boumans & Dorant, 2018). Early parentification can have substantial ramifications for how well a child performs academically,

primarily because children who take on these roles have difficulties with physical welfare and emotional and psychological distress, which can severely impede a child's ability to function while in school (Barnett &Parker, 1998; Khafi et al., 2014; Stein et al., 2007).

Concentrated poverty and social disorganization further reduce the number of financial resources circulating throughout the community; the effect on the community is often negative, with direct impacts on the educational institutions within its zone (Cabus & Witte, 2016). With severely limited economic funds and resources, the resulting outcome for the community often includes decreases in funding for educational institutions to put towards hiring good teachers, hiring enough teachers, and purchasing textbooks and supplies (Archambault et al., 2017; Cabus & Witte, 2016; Taylor, 2006). Also, decreases in community upkeep leading to what Sampson (2012) describes as "broken windows" contributes to ecological failure where an uptick in crime is often observed. The inequality and inequity described only partially contribute to the disproportionate disadvantage black and brown youths in communities around the country face on a day-to-day basis. Studies have shown that "recipients of high-quality early childhood education (i.e., consisting of a holistic, nurturing, consistent, and stimulating curriculum) exhibit lower rates of grade retention, higher levels of academic achievement, fewer special education services, and a stronger commitment to complete school" (APA, 2012, p. 3). Without the ability to sustain basic institutions from a financial standpoint, the consequential effect is a dramatic reduction in the educational outcomes for students within that community, eventually leading to lower economic outcomes for its overall residential population and, in many cases, the continuation of the cycle of poverty (Taylor, 2006). In order to understand how to address these issues faced by marginalized populations, we first need to understand the impact these external

factors have on students' ability to perform academically as they attempt to break the socially imposed poverty cycle.

This study aims to assess the impact of social disorganization indicators (i.e., employment, median-household income, owner-occupied housing, crime, poverty and minority percentage) on academic performance (i.e., GPA) for 6th and 7th-grade students attending seven K-8 designated Orange County Public Schools (OCPS) in central Florida. The proposed research questions are:

1. Is academic success randomly distributed across space or are they spatially autocorrelated and cluster in certain areas?
2. If they cluster, does academic success occur in areas of social disorganization?
3. How do economic and social conditions at the census block group level impact academic success for 6^{th} and 7^{th}-grade students?

CHAPTER TWO: LITERATURE REVIEW

Relevant Research

Residential segregation results from income, educational, and economic inequality exacerbated by racist ideology and resource inequity (Quillian, 2014; Taylor, 2006; Wilson, 2016). To understand these injustices, a deeper understanding of the factors contributing to residential segregation, such as socio-economic status (SES), occupation, school boundaries, and government involvement, is needed (Joyner and Marsh, 2011). Joyner and Marsh came to this conclusion as they aimed to assess disparities associated with academic success. Their study assessed the impact of poverty on education, acknowledging that high poverty rates have negative consequences on student achievement and academic growth (Cabus & Witte, 2016; Joyner & Marsh, 2011). According to their study, schools that are segregated by race are also segregated by poverty level and SES, where "the level of racial and economic integration in a particular school is a function of attendance zone boundaries" (p. 1). This type of forced stratification has been determined to be the leading cause behind economic and environmental injustices contributing to the clustering of communities into areas of concentrated poverty (Dreier, Mollenkopf, & Swanstrom, 2014; Mucedola, 2017; Sampson, 2012).

Their study was conducted in Wayne County, North Carolina, due to its highly segregated communities and disproportionate academic success rates. GIS was the primary method used to present the data because it allowed for a visual representation of the disparities within the communities through the utilization of map layers. The maps created helped display racial and economic imbalances within attendance zones and school performance across racial lines. This methodology allowed Joyner and Marsh to evaluate the racial and economic balance

within these zones, which led to the realization that there are "three distinct school systems masquerading as one: one rich and white, one balanced both racially and economically, and one poor and predominantly minority" (p. 9). These findings helped to serve as a means to reinforce the realities associated with the impact of segregation, further suggesting that the dominant factor impacting academic success is residential segregation. Moreover, these findings provided Joyner and Marsh with a compelling argument that fueled the claim that integration has many benefits such as cross-racial understanding, improved critical thinking skills, less prejudice, enhanced life opportunities, and improved academic success. Undoubtedly, using GIS and map overlays allowed for a more compelling argument for integrated schools in segregated communities by highlighting the impact of residential segregation through visual representation.

The issue of residential segregation often coincides with discussions about environmental injustice and the assessment of environmental risk factors such as violent crimes, neighborhood income, and healthcare access. *Environmental injustice* is defined as the “disproportionate exposure of communities of color and the poor (or other vulnerable groups) to pollution and its concomitant effects on health” (Maantay, 2002, p. 161). In a 2019 study that examined the relationship between high levels of segregation, poverty, and asthma rates, Harris (2019) found that asthma affects children in urban communities at an alarming rate and is the most recognized chronic childhood disease in minority and poor communities. Moreover, asthmas impact is often undiagnosed since asthma can present itself as cold-like symptoms that "disrupts children's sleep and inhibits their early cognitive development, social adjustment, learning, attention, memory, concentration, and ability to participate" (p. 93). Due to this phenomenon, there are significant impacts on children and their education when asthma goes undiagnosed (Harris, 2019).

To assess the impact of environmental injustice around asthma, Harris (2019) used GIS mapping overlays of St. Louis, Missouri, that emphasized factors such as minority percentage, household income, and childhood asthma rates as part of a cluster analysis. Cluster analysis is part of Hot Spot Analysis available within ArcGIS 10.4.1, which allows for creating a choropleth map that demonstrates statistically significant clustering of designated factors. Harris was able to use this feature and cross-reference the GIS map results with asthma rates, which allowed her to identify areas of high asthma that overlapped with areas of increased environmental injustice. These results contributed to the realization that youth in St. Louis likely experience higher disparities in health, education, and life opportunity due to living in an area with greater environmental risk (Harris, 2019).

More specifically, areas where children had high asthma rates also had higher levels of violent crime compared to areas with less crime. Therefore, areas with a high crime rate had greater potential as a contributor to high asthma rates among children in urban neighborhoods. This phenomenon is represented through the visual rendition created with ArcGIS, which helps to establish violence itself as a high-risk factor while visually presenting the impact of violence on stress and health outcomes (Harris, 2019). Moreover, a significant connection was found between the impact of environmental factors and student academic success, suggesting that students residing within areas of environmental injustice tend to struggle more with achieving levels of academic success as compared to those not residing in areas of environmental injustice. Based on the study's findings, students living in urban areas are more susceptible to experiencing academic decline or difficulties leading to decreased attendance and overall academic success (Harris, 2019).

Among scholars, it is widely accepted that social stratification is determined by several factors: "income, education, occupation, social class, gender and race/ethnicity" (Dogru et al., 2019, p. 2). However, the extent to which social stratification impacts communities often requires additional research to understand whether there are trends specific to certain regions and populations. Dogru and colleagues (2019) aimed to explore this further through the use of GIS as they examined the social determinants of children's health-related to their location on the European side of Istanbul, Turkey, which holds one of the world's most populated cities. The specific districts within the city being study included Bakırköy and Esenler, which represent two different SES areas, one with higher SES and the other lower SES, respectively. These districts were chosen primarily because the researchers understood that several factors (behavioral and biological factors, psychosocial circumstances, and the health system) led to inequalities in children's health outcomes, which they labeled as "structural determinants," also known as social stratification.

According to Dogru and colleagues, these factors vary among different social groups; therefore, the overall behaviors apparent in different social groups also vary, impacting life conditions and health differences based on SES. These differences, in turn, have a profound impact on overall health as environmental risks (water pollution, indoor and outdoor pollution, inadequate health care, and hygiene) disproportionately threaten those in economically disadvantaged communities (Dogru et al., 2019). Moreover, because children's financial status and the residential location is determined by their family’s ability to provide economic stability, it is no surprise that more impoverished children have a higher likelihood of exposure to violent and tumultuous conditions both in and outside the home, directly increasing their probability of

developing health-related issues. As previously mentioned, the literature suggests that social stratification helps determine residential location, and residential location directly impacts overall health and well-being, all of which can have profound implications for a child's development and academic success. Dogru and colleagues describe this as "geography determining health outcomes," which they have determined is present across all countries.

In addition to identifying a correlation between areas of poverty, SES, and health outcomes, Dogru and colleagues (2019) used a four-stage method in which they (1) processed the GIS data, (2) examined the social determinants of children's health, (3) completed a textured analysis of the districts using vector data, and (4) presented the evaluation of children's health status in terms of the social determinants and district texture. This method combined geometric data in vector and raster formats so that geographic locations (parks, building footprints, road centerlines, administrative boundaries, and cadastral blocks) could be included to illustrate further how GIS can be used to provide a deeper understanding of disparities in a given area. Essentially, their study used GIS to illustrate the area's topography and provide a visual representation of how these landmarks can affect health outcomes when looking at high SES areas compared to low SES areas.

Dogru and colleagues (2019) concluded that children living in the area of Bakırköy had higher living standards than children in Esenler, where the population's socio-economic status was poor. The results of this study are beneficial as it assists with understanding the geographical impacts of social stratification, such as the use of recreational space, location, and income, which can help determine health impacts on children by identifying potential risk factors in their communities. Furthermore, according to Dogru et al. (2019), understanding how poor health can

impede a student's concentration or development is essential when understanding factors that impact academic performance.

Lockwood et al. (2018) also examined the impact of SES on health and well-being through the use of GIS in metropolitan Adelaide, South Australia. Although the real estate market varies geographically, market price purchasing behavior often determines the value and location desirability and not the other way around. Lockwood and colleagues' goal were to illustrate that the more traditional methods associated with capturing SES (measuring income, education, and occupation) missed a valuable component of property wealth, which has implications for overall SES. To understand impacts on health and well-being, it is crucial to understand that "SES associated with property wealth is broader than traditional measures and includes the environmental quality (i.e., density, accessibility, vegetation cover and aesthetics) of the individual property being purchased" (Lockwood et al., 2018. p. 152). Although linking SES to a location is still a developing field, Lockwood and colleagues believed they would be able to do this using GIS. This limitation is well recognized by the researchers. As such, they address situations in which locational factors such as proximity to employment, occupation, amenities, and healthcare often influence residential housing price, the type of neighborhood occupants, the condition of the neighborhood, and the services provided within the neighborhood. Understanding how SES is determined has profound implications for understanding how it influences social outcomes and impacts health and well-being.

Lockwood and colleagues used map overlays and raster formats generated using ArcGIS, which showed that SES drastically determined which geographical area someone is likely to live in or able to live in. Moreover, the study also showed that "the concept of where you live was

more important than what you live in" (Lockwood et al., 2018, p.159). This is valuable information as we aim to understand the significance of residential property wealth and how it impacts the basic building blocks of societal health and well-being. Although it would appear that SES impacts housing choices, the use of GIS assisted in making the connection visually clear. In sum, Lockwood and colleagues (2018) were able to use residential location to help understand the role property wealth plays outside the traditional factors used to measure SES allowing for a more robust understanding of these factors and how they can influence population distribution, which is highly dependent on geographic location.

In another study, Neckerman et al. (2009) sought to examine how disparities in neighborhood aesthetic or safety-related characteristics affect walkability, health, and physical activity among urban residents in poor and non-poor areas of New York City. *Walkability* is defined as the ease of walking in areas related to mixed land use, street connectivity, and access to public transit. The purpose of this study was to help understand why "residents of low-income urban neighborhoods, despite living in what are, by conventional standards, highly walkable neighborhoods, have high rates of chronic disease related to lack of physical activity" (p. 265). Their study focused on assessing the disparities around aesthetic or safety-related characteristics and the impact these characteristics have on whether a neighborhood is walkable or not. They created a walkability index which included five components, (1) population density, (2) unique intersection density, (3) the minimum distance along with the street network to the nearest subway stop, (4) a measure of the balance among five types of land use - residential, office, retail, education, and entertainment, and (5) the ratio of retail building floor area to retail land area for 38 census tracts across four boroughs. The walkability index helped to ensure that for

every non-poor neighborhood, there was a poor neighborhood with an equal walkability score. The study utilized a combination of field observations and GIS in measurements on safety, aesthetics, transportation infrastructure, walking, and bike paths, and trails for all census tracts. GIS helped to bring visual context to the issues around poor and non-poor neighborhoods, all of which are determined by an individual's SES, as previously stated.

The study indicated that non-poor neighborhoods scored better on the majority of indicators associated with aesthetics, safety, pedestrian convenience and amenities, and commercial sidewalk activity compared to more impoverished neighborhoods. Moreover, people were less likely to feel comfortable walking in poor neighborhoods than non-poor neighborhoods, regardless of population density or land use mix, which can be attributed to feelings of safety and neighborhood aesthetics indicative of what Sampson (2012) described as social disorganization. According to Sampson, communities that exhibit social disorganization are often communities with high poverty levels, weak social ties, rapid population turnover, and heterogeneity. This often means that the community has factors that make the area unappealing or undesirable for leisure walking. Following the analysis, the researchers concluded that neighborhood conditions differed significantly between poor and non-poor neighborhoods with equal walkability. This study helped to show that non-poor neighborhoods are better maintained and often have more financial and physical investment, reducing the possibility of social disorganization. In comparison, poor neighborhoods were less inviting as they pertained to walkability with less financial investment and aesthetic appeal. The impact of SES on health, residential location, and ecological factors become increasingly important as we continue to discuss impacts on student academic success and development at the micro-level.

Stewart et al. (2013) believed the connection between student and environment was essential to student learning and sought to investigate any links between socio-economic and ethnically diverse neighborhoods and the use and presence of school gardens in Santa Clara County, California. There is significant support suggesting that children and adults who participate in school gardening have increased mental health, social development, creativity, and relationship development, which can be beneficial characteristics for more ethnically diverse and economically stressed communities. Moreover, school gardens encourage work and play that foster a new age of learning that requires students to be multi-proficient in literature, team building, and real-world situations. These benefits have considerable implications in reducing childhood obesity and environmental degradation by educating the next generation to be health aware and environmentally conscious (Stewart et al., 2013).

Increasing a child's access to recreational spaces directly increases the likelihood that that child will be healthier and healthier children perform better academically, which can lead to better overall life outcomes (Dogru et al., 2019; Harris, 2019; Lockwood et al., 2018; Stewart et al., 2013). Although school gardens have been shown to have significant benefits for social and academic development in children, they are not as readily available to children in heterogeneous communities. Instead, the majority of school gardens exist in wealthier homogeneous white neighborhoods, despite their affordability, further depriving students in ethnically diverse communities of the health and educational benefits associated with vested outdoor activities. A fundamental understanding of "nature-deficit disorder," which suggests that many behavioral problems result from decreased time outdoors, helps put these findings into perspective. The researchers belabor the value and importance of re-connecting students to the external

environment and encouraging community and political investment in school horticulture as an essential component to improving the health and academic success of the children within the community. This study identified a disparity in the access to elementary school gardens where privileged wealthier and less diverse neighborhoods were more likely to have school gardens than poorer more diverse neighborhoods. Moreover, well-funded and well-supported school gardens were also found to be more prevalent in wealthy less diverse neighborhoods.

According to much of the literature (Cabus & Witte, 2016; Dreier, Mollenkopf, & Swanstrom, 2014; Joyner & Marsh, 2011; Lichter, Parisi, & Taquino, 2012; Mucedola, 2017; Quillian, 2014; Sampson, 2012; Taylor, 2006), areas with high poverty rates tend to be areas with lower rates of academic achievement and therefore, lower overall academic growth. This trend disproportionately affects communities of color compared to majority white communities (Etchin et al., 2019; Orrock & Clark, 2015). Besides, children and families in poorer communities tend to have higher rates of adverse health outcomes such as asthma, which can be exacerbated by environmental factors such as air pollution and crime (Capella et al., 2017; Harris, 2019). Moreover, Sampson (2012) suggests that poorer communities tend to experience lower levels of social control, making it more challenging to advocate for environmental improvements. As social control is diminished, social disorganization inevitably becomes commonplace, further diminishing the perception of the community and inevitably dictating the type of resources allocated to the community in terms of industrial resources and economic improvements (Sampson, 2012). Altogether, communities with higher levels of social disorganization are often communities of color, with higher levels of crime, weak social ties, a reduction in the use of recreational space, poorer health outcomes, lower SES, lower levels of

employment, and a high level of residential segregation (Dogru et al., 2019; Harris, 2019; Joyner & Marsh, 2011; Lockwood et al., 2018; Neckerman et al., 2009; Sampson, 2012; Stewart et al., 2013).

Recreational spaces also directly impact a child's physical and, ultimately, a child's mental health with lasting lifetime effects (Stewart et al., 2013). Areas with limited recreation space and activities such as school gardens, parks, and walkable neighborhoods often have the potential to negatively impact a child's mental health and ability to succeed academically. These ecological factors exacerbated by environmental injustice such as violent crimes, air and water pollution make it increasingly difficult for children in these neighborhoods to find progressive pathways that lead to successful futures (Chapman & Donnor, 2015; Ford & Airhihenbuwa, 2010; Sampson, 2012; Taylor, 2006). Statistically, children in communities of color are more likely to live in poorer communities, with high heterogeneity and higher exposure to violent crimes, and are also more likely to experience disproportionate rates of exposure to recreational spaces, along with income and resource inequality that contributes to lower levels of academic and health outcomes (Boumans & Dorant, 2018; Culpepper, Hernandez-Gantes & Blank, 2015; Dreier, Mollenkopf, & Swanstrom, 2014: Lichter, Parisi, & Taquino, 2012; Quillian, 2014; Sampson, 2012; Taylor, 2006). As such, it is essential to acknowledge that not only is this population vulnerable, but it also requires greater assistance to overcome these barriers and increase the overall quality of life.

According to Sharkey (2016), education is still the number one-way individuals can achieve economic stability. Therefore, when communities lack adequate educational institutions, the likelihood of the children in that community achieving economic stability dramatically

decreases; this is more so evident in homes with absentee fathers and neighborhoods with high crime or gang violence (Orrock & Clark, 2015). The need to address external school factors that impact educational outcomes becomes increasingly necessary to reduce socio-economic inequality, neighborhood segregation and improve conditions for marginalized groups.

This dissertation proposes a critical analysis of the following: homeownership, crime, types of crime, employment, neighborhood family income, community minority percentage, SES, race and ethnicity, poverty levels, and neighborhood population density and their impact on overall student academic performance. The literature supports the use of the variables mentioned above in further understanding their impact on a student's ability to succeed academically; however, the literature has not examined all of these components as it pertains to the block groups and block level for individual school zones. This data is intended to help guide educator response regarding best ways to manage students having academic difficulties due to these factors.

Although we know that these variables play a significant role in student achievement individually, we have yet to identify specific ways to mitigate the impacts fully. Understanding the direct and indirect impact social disorganization has on a child, and their educational outcomes may also have significant implications for educators and mitigation practices. Furthermore, a more robust understanding can assist educators with better classroom and academic management to encourage schoolwork completion and graduation. Bridging this gap is essential to trigger a more empathetic and effective approach to assisting today's students in overcoming and managing external school factors and their role in student academic outcomes. Additionally, this study intends to help in the advancement of policy and practice changes

focused on strengthening advocacy efforts that positively impact populations affected by social and economic conditions outside of a school's control. Improving a child's academic outcome becomes increasingly important when considering quality of life and adulthood employment opportunity, all of which, if improved, can end the perpetual cycle of poverty dictated through socio-economic barriers. Moreover, addressing these factors can promote deeper investment in overall equity redistribution and school funding options aimed at more significant community development.

The incorporation of GIS will do more than restate the literature; instead, it will provide a robust visual representation of the data in which each variable can be easily identified based on its density or coverage area on a map. This innovative methodology helps to visually identify possible associations and assist service providers in individualizing possible treatment and intervention modalities, which allow for a more robust and precise treatment plan geared towards students experiencing academic challenges. Furthermore, GIS will assist with identifying areas where these factors cluster to understand relationships between the variables mentioned above better. ArcGIS can assist social workers, social service agencies, educators, and policymakers in identifying more accurately, external school factors directly or indirectly impacting the population of children residing within a school's catchment community compared to adjacent communities. Moreover, utilizing GIS as a methodology can guide policy formation for communities negatively impacted while also providing a robust visual representation of the social issue allowing invested parties to pinpoint areas of need and develop broader implementation for programs/services development.

Theoretical Framework

Critical Race Theory

The first theory that will be used to guide this study is critical race theory (CRT). To understand the factors impacting academic success, it is essential to examine the phenomena contributing to the existence of those factors. CRT, birthed in the 1980s, was a direct response to the inability of civil rights legislation to produce meaningful racial reform (Taylor, 2006). At its core, CRT connects the history of race and racism in the United States through an explanatory framework that addresses historically ingrained ideological forms of racism (subjugation, debasement, and disenfranchisement) drawn from the analysis of prominent legal cases (Chapman & Donnor, 2015; Christian et al., 2019; Sandles, 2020; Taylor, 2006). Undoubtedly, CRT not only assists in the critical assessment of 'race' as a construct by exposing the concept of whiteness and its contribution to white supremacy as an ideology but equally as important, it brings attention to the reality of race and racism as contributing forces in the creation of inequality and inequity (Coxshall, 2020). As it pertains to education, CRT has and continues to see growth as an interpretive tool used to challenge racism and racialized policies within educational organizations and institutions to bring about reform (Amiot et al., 2020). As such, we must acknowledge race before we can take steps to eradicate racism (Howard & Navarro, 2016).

Researchers (Chapman & Donnor, 2015; Christian et al., 2019; Ford & Airhihenbuwa, 2010; Matthews, 2020; Taylor, 2006) suggest that CRT has five overall tenets: (1) racism is embedded and a defining characteristic of society, (2) racism shields dominant groups from recognizing their privilege as a means to retain power, (3) analysis of racism must be interdisciplinary to enact change, (4) transformative social justice eliminates oppression, and (5)

racism has a contemporary basis in which systemic experiences of oppression and injustice impact lives. However, in education, six tenets have been identified regarding social justice and combating racism. "They are (1) the permanence of racism; (2) whiteness as property; (3) the importance of counternarratives and counterstories; (4) the critique of liberalism; (5) importance of interest convergence; and 6) intersectionality" (Amiot et al., 2020, p. 201). Furthermore, CRT postulates that racial inequality emerges from the economic, legal, and social differences that the white majority create to maintain their elite interest in labor markets and politics. A historical example of this tactic is redlining, which is "the refusal of lenders to make mortgage loans in certain areas regardless of the creditworthiness of the individual loan applicant," which was used in 1934 by the white majority, through bank ownership, to refuse loans to black families (Holmes & Horvitz, 1994, p. 81). Additionally, banks also restricted access to funds for transportation infrastructure to isolate racially and ethnically diverse people in areas of concentrated poverty (Harris, 2019; Sternberg, 2018; Sampson, 2012). Many of these poverty-stricken areas were often targeted by the white majority and considered prime locations for the placement of unwanted features like garbage dumps or processing plants, which continue to contribute to increased health disparities (e.g., asthma) in racially diverse communities (Capella et al., 2017; Wharton et al., 2020).

For many marginalized groups, deeply segregated communities, economic insecurity, concentrated poverty, and environmental and educational inequity derived from a racialized socio-economic system designed to maintain white superiority (Amiot et al., 2020; Christian et al., 2019; Coxshall, 2020; Sandles, 2020; Washington, 2020; Rankin-Wright et al., 2019). These conditions have led many minority children residing in communities of color and poverty to

develop cognitive and psychological difficulties that manifest in low academic performance and life expectancy outcomes (Chapman & Donnor, 2015; Dreier, Mollenkopf, & Swanstrom, 2014; Ford & Airhihenbuwa, 2010; Lichter, Parisi, & Taquino, 2012; Quillian, 2014; Taylor, 2006; Zorlu, 2013). CRT helps to facilitate broad pragmatic intervention that challenges many of these discriminatory racialized processes by providing a platform that helps identify parts within the system that marginalizes individuals and groups while simultaneously providing an advantage to others (Rankin-Wright et al., 2019). Establishing a comprehensive understanding of CRT helps establish a foundation for the clear identification of factors contributing to inequality and inequity, which impact academic success in this study. Only by identifying these factors can we begin to address the disproportionate distribution of resources that are vital to promote success and disrupt the racially divided system currently in place. Thus, the theory seeks to clarify how such situations become solidified in human culture, ultimately providing a gateway to mitigating much of these issues through an anti-racial lens.

Critical race theory offers researchers and policymakers a race-conscious approach to understanding structural racism and its relationship to inequality and inequity as a means to finding solutions that can lead to more significant social justice reform (Chapman & Donnor, 2015; Taylor, 2006). Utilizing prominent legal bases, CRT allows scholars the opportunity to interrogate policies and practices to uncover the overt and covert ways in which racist ideologies, institutions, and structures create and maintain racial inequality and inequity (Taylor, 2006). Specifically, there is an emphasis on examining and understanding the socio-cultural forces, which shape how we, as a collective, perceive, experience, and respond to racism. For instance, *Brown vs. Board of Education* (1954), which challenged the notion of "separate but

equal," allowed scholars to show the persistence of racism in the United States (Christine et al., 2019). In most cases, CRT encourages scholars to demonstrate two critical components that lead to inequality: (1) how racism continues to be a pervasive component throughout dominant society, and (2) ways in which racist ideology is problematically denying individuals many of the freedoms they are otherwise promised according to the United States constitution (Chapman & Donnor, 2015; Ford & Airhihenbuwa, 2010; Taylor, 2006).

As it pertains to educational institutions, CRT supports the use of variables such as income, residential location, race, and access to health and recreational facilities as a measurement in assessing impacts on academic success. Moreover, incorporating a solution-based approach with CRT allows for a deeper conceptualization and understanding of the impact of racism on student academic success. For example, in a collective effort to reduce disparities in educational attainment, income, and socio-economic status, scholars who ascribed to a CRT framework helped redefine racism as a greater systemic issue rather than the acts of individuals (Taylor, 2006). This is primarily due to a collective of research documenting entrenched racial inequalities in education and social and political structures, where avenues for oppression rather than empowerment were created from policies (said to be) geared towards justice (Chapman & Donnor, 2015). According to Ford and Airhihenbuwa (2010), these systemic issues are why it is important to ask questions such as, "how does racialization contribute to the problem at hand?" to avoid the continued marginalization of diversified groups by the white majority (p. 1391). More importantly, it is important to understand how factors such as homeownership, access to recreation space, crime, race, socio-economic status, ethnicity, access to public transportation,

and environmental injustices (e.g., pollution levels air and water quality) can impact a child's academic trajectory.

To conclude, CRT is essential in understanding the phenomenon present in this study; additionally, a comprehensive understanding provides the framework to begin the dismantling of racial barriers that continue to play an integral role in determining the distribution of financial resources, information, information and SES. Critical race theory assists the current study by helping to frame the context of this dissertation in a race-specific language in which connections can be made between the factors mentioned above and their impact on student success. Understanding the interrelatedness of the factors mentioned and the forces encouraging the perpetuation of those factors will help bridge the gap between systemically racist policies and practices, of which residual effects are still being felt, and the cycle of poverty that permeates throughout black and brown communities.

Social Disorganization Theory

For this study, social disorganization is conceptualized as the absence of effective social control resulting in the absence of civic capacity and functional collaboration between and within social groups present within the community, notwithstanding similar ideas and attitudes regarding how the community should be governed, protected, or developed (Sampson, 2012; Shaw & McKay, 1942). "Social disorganization theory includes demographic diversity, population density, and urbanization, as well as concentrated disadvantage, family disruption, and residential mobility as potential influences for criminal activity" (Ciobanu, 2019, p. 16). Although social disorganization theory (SDT) is predominantly used in criminal justice to link crime rates to neighborhood ecological factors, it can also help understand the impact of social

and economic conditions within communities. This is because a prime tenet of SDT suggests that location matters (Browning, 2002; Sampson, 2012). Meaning, location helps to determine outcomes. For instance, consider concentrated poverty, according to much of the literature (Bland, 2014; Bogin & Nguyen-Hoang, 2014; Browning, 2002; Culpepper, Hernandez-Gantes & Blank, 2015; Dogru et al., 2019; Dreir, Mollenkopf & Swanstrom, 2014; Lockwood et al., 2018; Neckerman et al., 2009; Sternberg, 2008; Taylor, 2006; Wharton et al., 2020) areas of concentrated poverty are often in urban communities, and are often segregated. Thus, these are often the communities that develop social disorganization.

Communities identified as socially disorganized do not have the ability to realize the common values residents hold, which eventually contributes to the breakdown of effective social control, ultimately resulting in conflicting social attitudes and a lack of functional integration (Ciobanu, 2019, Sampson, 2012). There are four assumptions associated with social disorganization theory that helps to explain its inclusion in this study. The first is the understanding that the act of delinquency is due to a collapse of institutional, community-based control, in which community members are viewed as naturally responding to the conditions of the disorganized environment, (2) the dissolvement of community-based institutions is due to rapid changes to the community usually composing of industrialization and urbanization, (3) competition and dominance are direct implicating factors in the dissolution of community-based institutional control, and (4) areas experiencing social disorganization lead to the development of criminal activity which often replaces conventional ones (Sampson, 2012; Shaw & McKay, 1942; Wong, 2002). According to Sampson (2012), social disorganization refers to public behaviors and physical markers that appear threatening to individuals and communities. For

instance, public behavior would include unappealing acts witnessed by those within the community, while physical markers would refer to dirty or unkept streets, homes and buildings, and drug or gang activity, which are often poverty indicators. Moreover, social disorganization theory postulates that a person's residential location is a substantial factor shaping the likelihood that a person will become involved in illegal activities or suffer from poor health, all of which directly impact academic success (Shaw & McKay, 1942; Wong, 2002).

Communities considered areas of social disorganization are also communities of concentrated poverty (Ciobanu, 2019; Sampson, 2012). These communities often encompass impoverished neighborhoods that do not have the resources necessary to effectively sustain basic community institutions such as churches, community organizations, public schools, and traditional family structures (Browning, 2002). Therefore, those who reside in communities of concentrated poverty have an increased likelihood of repeating the cycle of poverty due to reduced available opportunities (e.g., jobs, education, housing) (Ghose & Welcenbach, 2018; Walsh et al., 2014). As previously mentioned, decreased opportunities result in reduced cohesion within a community leading to the breakdown of civic capacity. Moreover, poverty contributes to high heterogeneity and residential instability, resulting in weakened community relationships and limited capacity to develop stable relationships (Browning, 2002; Sampson, 2012). Analyzing the impact of these factors on childhood development and academic success can further assist with understanding how to mitigate the adverse effects associated with the residential location for black and brown youths.

Conceptual Framework

Structural Racism

According to Taylor (2006) and much of the literature, the distribution of inequality and inequity for black and brown students is often evident prior to them starting school and often gets more prominent when entering kindergarten. Therefore, several concepts are relevant to understand the impact of external school factors on minority student academic success. The first concept is structural racism, which has led to societal stratification, more specifically, racist ideologies propagating unequal distribution of resources between the majority and the minority (Taylor, 2006). The structural component describes how laws, policies, and social capital is governed. Coupled with racism, it becomes easier to understand the systemic imbalances directly built into a government that unfairly favors the white majority over the black and brown minority. Systemic issues cultivated in racist ideology assisted in the formulation of trends in inequality and inequity rooted in multigenerational patterns of racialized hiring, homeownership, financial lending, and second-rate educational systems (Bland, 2014; Bogin & Nguyen-Hoang, 2014; Culpepper, Hernandez-Gantes & Blank, 2015; Dreir, Mollenkopf & Swanstrom, 2014; Taylor, 2006). These factors all impact how much resources and which resources are provided to communities, which undeniably place black and brown families in an economically and politically disadvantaged position compared to whites. The concept of structural racism assists with developing the framework for conceptualizing the impact of external factors on minority student academic success. Coupled with systems theory, which postulates that a person's development is affected by everything in their surrounding environment (Chapman & Donnor, 2015), it helps to understand how a child's ability to develop normal cognitive and academic

learning is directly predicated on factors outside of the school environment. For the reasons described above, it becomes increasingly important to understand and identify factors that hinder academic success, especially in communities of color.

Racialized Capitalism

The second concept that will be addressed is that of racialized capitalism. Although the idea of capitalism in and of itself does not constitute a negative impact on black and brown children's academic success, the racialization of capitalism in America and around the world creates roadblocks excluding and including specific persons that can access capitalist benefits (Chapman & Donnor, 2015). Much like what was described previously, racist ideologies have permeated throughout every division in the United States. Therefore, financial opportunities that should be available to all are often siphoned off to the white majority. One such example is that of racialized hiring. *Racialized hiring* is defined as hiring based on an applicant's race rather than their qualifications (Crosby & Clayton, 2001). This particular concept leads to what we now know as interest-convergence.

According to Chapman & Donnor (2015), "interest convergence occurs because the elite status of white students as CEOs and leaders of the industry remains unchallenged in the job and career markets, while students of color use their skills to work for these elite whites to obtain financial security" (p. 148). Often, positions offered to minorities are lower in salary and status, making it increasingly difficult to obtain financial security using the current capitalistic design. Even though capitalism was designed with the intention of offering every able body the opportunity to lift themselves up by their bootstraps, racism and racist tendencies dominate the playing field and morphed it into a way of maintaining power and privilege for the white elite

rather than providing a financial opportunity for all (Chapman & Donnor, 2015). Ideologies such as this gave rise to what we now know as socioeconomic status, defined as the stratification of people into categories of the advantaged and disadvantage (Quillian, 2014). Challenge's black and brown people face daily become more apparent when considering the concepts mentioned above and influencing factors, all of which can have lasting effects on the country's K-8 black and brown student population as it pertains to academic success. Moreover, according to the literature, quality educational access is directly linked to income and residential location. Therefore, if financial constraints inhibit a family's ability to provide adequate care for their children while forcing them into poor communities with little resources to ensure student academic success, it is more likely that the student will have difficulties achieving academic success due to the limited resources of the educational institution and the community the student resides (Taylor, 2006; Wilson, 2016; Zorlu, 2013). For these reasons, racialized capitalism is an important concept to understand and consider when attempting to understand the impact of external school factors on children's academic success.

Residential Segregation

The final concept that will be addressed in this study is that of residential segregation, defined as race-based segregation into neighborhoods and communities caused by income inequality and concentrated poverty (Sampson, 2012). Segregation by racialization is directly influenced by social stratification based on socioeconomic status, which gives rise to the oppressive marginalization of black and brown groups **(**Ford & Airhihenbuwa, 2010; Quillian, 2014; Wilson, 2016). There is considerable social inequality between neighborhoods and communities, especially in terms of socioeconomic status and racial/ethnic segregation

(Sampson, 2012; Zorlu, 2013). Since an educational institution's resources and overall standing is directly influenced by the capacity of the neighborhood to contribute both time and finances, any increase in the neighborhood's segregation increases disparities within that neighborhood, adversely affecting educational institutions within those neighborhoods (Wilson, 2016). This construct suggests that students within one neighborhood or community may experience very different external school factors impacting academic success. Therefore, it is important to understand dominant factors within communities to effectively determine which factors are having the most significant effect on a student's ability to achieve academic success as defined by their community school.

The Current Study

Orange county public schools (OCPS) were chosen as the target population for this study primarily due to the researcher's familiarity with the area and previous research completed at one of the OCPS locations over the past two years. In the spring of 2018, this researcher began working on an initiative in the Parramore, Orlando area to help identify the impact of the following variables: access to healthcare, pollution, transportation access, and education, among others. Under the supervision of Dr. Robyn Stevenson, I was tasked with establishing and building relationships with city officials and those within the community to understand their concerns regarding the variables mentioned above and what actions could be implemented to mitigate any negative impact on the community. With the leadership of Dr. Stevenson, this researcher was able to develop meaningful connections with members of the community and representatives of the city of Orlando as part of a collaborative effort to understand the issues most concerning to Parramore, Orlando's residents.

Following extensive work in the Parramore, Orlando area in 2018, it became apparent that multiple variables were of concern to the residents. Information gathered suggested a broader focus on health and education would be needed, which lead to a collaboration between the research team and OCPS Academic Center of Excellence (ACE). The most recent study completed at OCPS ACE was engineered and managed by Dr. Kim Anderson, which focused on incorporating school gardens to promote student well-being. As a lead member in this study, establishing relationships with school faculty and community garden personnel was essential as it allowed for a more collaborative approach to execute the desired study metrics as it pertains to the impact on student lives.

This experience assisted in the formation of additional bonds with students and community members, further fueling the need for the current study. Through interactions with students and teachers, it became apparent that the community played a significant role in student grades and teacher responses. Moreover, teachers expressed that they were vaguely aware of the external school factors impacting student academic outcomes such as food insecurity, early parentification, domestic violence, poverty, socioeconomic status, etc. As it stands, it is common knowledge that students experience external school hardship influenced by external school factors; however, systems theory postulates that these factors do not exist independently of one another, and therefore, students' ecological experiences inevitably impact how well they do academically. Knowledge obtained from the OCPS ACE garden study assisted in highlighting many of the ecological factors and their impact on class assignments and homework, which students reported were often missed due to absentee parents or student health issues, and in more severe cases, trauma induced by the environment in which the student lived. These stories helped bring attention to the multiple external factors that students in neighborhoods like Parramore, Orlando, deal with daily. The information obtained during the work with the OCPS ACE gardens was the catalyst that guides the need for this dissertation study.

Concerns regarding educator responses and student resiliency fueled the desire to understand and identify external school factors that directly and indirectly impact a student's ability to meet school academic success standards and map these factors for easy visualization by non-academics. The desire to assist educators in understanding the impact and encourage more empathetic approaches with the students they teach has also helped guide this study's primary focus. Moreover, as additional knowledge is obtained, it becomes apparent that OCPS ACE in

Parramore, Orlando is not unique regarding location, population served, or student academic outcomes. Therefore, social disorganization theory adds to the generalizability of study results to promote broader use of GIS methodology in future studies relating to ecological factors and academic outcomes at Title 1 schools. Additionally, social disorganization theory is not specific to Parramore, Orlando, and its usefulness in understanding the impact of ecological factors on communities' can be replicated in future studies as a means to assist educators, policymakers, and social service agencies in identifying the level of impact environmental factors have on urban communities, allowing for a tailored approach to increasing overall student academic success.

Study Purpose

This study intends to identify economic and social factors that impact students' academic success as defined by their overall grade point average (GPA) for 6th and 7th graders attending a Title 1 school in an urban community. In addition, this study seeks to encourage the use of GIS hierarchical regression as a methodology to identify the degree to which ecological factors impact academic success. This study aims to encourage dialogue regarding interventions that can more successfully mitigate the economic and social factors contributing to difficulties in achieving academic success for young people. Lastly, this study seeks to help determine whether students residing in areas of high social disorganization show any statistical significance regarding their ability to perform well academically as defined by OCPS benchmarks.

Sixth and seventh grade was chosen for the analysis because, according to Erikson (1968), children between the ages of 7 and 14 (elementary school) are in the latency stage. Within this stage, children face the task of industry vs. inferiority, meaning children begin the

process of comparing themselves with their peers as a means to understand where they measure up. Through this process, children either develop a sense of pride and accomplishment regarding daily life tasks and schoolwork, or they develop feelings of inadequacy and inferiority from a perception that they do not measure up to their peers (Erikson, 1968). Additionally, this developmental age range is highly susceptible to ecological impacts (e.g., events happening to and around them) that can derail their academic focus (Swap, 1974). During this stage, feelings of incompetence and inferiority can be exacerbated by factors such as racism, sexism, and other forms of discrimination, placing a strain on a child's developmental psyche, consequently convincing the child to do less in terms of success, which can easily manifest into low academic performance (Erikson, 1968; Galindo & Sonnenschein, 2015; Sharkey, 2016).

Understanding Systems Theory

A fundamental understanding of systems theory is necessary in order to understand the scope of this study. This is because systems theory helps to understand better the impact of a child's interaction with their surroundings and how aspects of their surroundings can largely affect their biological, physical, and cognitive development. Through this lens, systems theory allows us to directly link residential location to neighborhood ecological characteristics such as: (1) back and forth interactions within the microsystem, which typically involve personal relationships with family members, neighbors, classmates, teachers and caregivers, (2) broader interactions with the mesosystem, which encompasses different microsystems such as school, church, and other families, (3) the exosystem, pertains to the connections that exist between two or more settings such as work and the community, which indirectly impacts a child's development through direct effects on systems closely connected to the child and can have

temporary or long term effects, (4) the macrosystem, referring to socioeconomic status, ethnicity, wealth and poverty, which represents the largest and most distant collection of people and places that still exercise significant influence on the individual, including the individual's cultural patterns and values, lastly (5) the chronosystem, which includes any change in family structure, residence location, parent's employment status, in addition to immense society changes such as economic cycles and wars, in other words, events and transitions throughout a child's life (Bridgen, 2017; Germain, 1978; Orrock & Clark, 2015; Sampson, 2012). The previous description supports the assumption that no system exists alone and that every system interacts and reacts with another, therefore directly and indirectly changing through continuous interactions. As it pertains to this study, the systems outside of a child's school (e.g., home environment, community, neighborhood, family) have both direct and indirect impacts on the microsystem (e.g., the child) that can either have a positive (better grades) or negative (poor grades) outcome on that child's academic success and overall quality of life.

Having a theoretical understanding of how external factors can impact this group is especially important when discussing black and brown children and their ability to do well academically and maintain a positive self-image that promotes healthy behaviors. Research has shown that black and brown residents make up the majority of the population in impoverished neighborhoods, which has been linked to adverse effects on health, employment opportunities, housing options, and education (Biddle & Berliner, 2002; Holmes & Horvitz, 1994; Quillian, 2014). Moreover, public schools in wealthy neighborhoods compared to public schools in impoverished ones have been linked to significant differences in academic performance (Biddle & Berliner, 2002; Mucedola, 2017). According to Erikson (1968), children who develop a sense

of inferiority can develop low self-esteem and inappropriate social behaviors, experience isolation, mental health problems, and difficulty sharing, and resort to aggressive behaviors (i.e., teasing and bullying). In neighborhoods where funding and resources are scarce, external school factors such as crime, disparities with health and mental health, recreational space, pollution, and transportation are apparent and can severely hinder a child's ability to maintain academic focus as well as make healthy life decisions (Bäckman, 2017; Culpepper, Hernandez-Gantes & Blank, 2015; Dreier, Mollenkopf, & Swanstrom, 2014; Wilson, 2016). This explanation makes it increasingly necessary to grasp an understanding of Erikson's developmental theory and how the aforementioned external school factors can impact a child's ability to achieve academic success during 6th and 7th grade and set a positive trajectory for future academic success.

CHAPTER THREE: METHODOLOGY

Research Design

The proposed research questions aim to identify economic and social factors that impact students' academic success as defined by their GPA. The use of ArcMap and ArcGIS Online also assists with presenting study results in a visual way, in which student GPA both on the block level and block group level can be visually illustrated on a map to assess relationships, if any, with the independent variables of crime, median household income, employment percentage, poverty percentage, minority percentage, and homeownership at the block group level..

Research Questions:

1. Is academic success randomly distributed across space or are they spatially autocorrelated and cluster in certain areas?
2. If they cluster, does academic success occur in areas of social disorganization?
3. How do economic and social conditions at the census block group level impact academic success for 6th and 7th-grade students?

Hypotheses

Spatially, the locations of lower GPA are likely to be clustered instead of spaced evenly across block groups with a strong association between socially disorganized areas and lower GPA. The advantage of looking at GPA spatially will allow stakeholders to make empirically sound decisions on where to allocate resources for students at a heightened risk of academic failure and recommend programs to impact environmental and social conditions in the social ecology of students.

H_1: Academic success will cluster in areas of low social disorganization.

H_{01}: Academic success will not cluster in areas of low social disorganization.

Hypotheses: Social Disorganization and Systems Theories

While this study is exploratory in nature, certain patterns may be anticipated. Social Disorganization Theory postulates a link between crime rates and neighborhood ecological characteristics, suggesting that location matters which is believed to be the case for this study (Sampson, 2012). Additionally, Systems Theory indicates that macro systems impact microsystems.

H_2: areas with lower levels of employment are expected to contain lower levels of academic success.

H_{02}: areas with lower levels of employment are not expected to contain lower levels of academic success.

H_3: areas with lower levels of income are expected to contain lower levels of academic success.

H_{03}: areas with lower levels of income are not expected to contain lower levels of academic success.

H_4: areas with lower levels of owner-occupied housing are expected to contain lower levels of academic success.

H_{04}: areas with lower levels of owner-occupied housing are not expected to contain lower levels of academic success.

H_5: areas with higher poverty levels are expected to contain lower levels of academic success.

H_{05}: areas with higher poverty levels are not expected to contain lower levels of academic success.

H_6: areas with higher levels of crime (personal crime, drug arrests) are expected to contain lower levels of academic success.

H_{06}: areas with higher levels of crime (personal crime, drug arrests) are not expected to contain lower levels of academic success.

H_7: areas with higher minority presence are expected to contain lower levels of academic success.

H_{07}: areas with higher minority presence are not expected to contain lower levels of academic success.

H_8: poverty and income are expected to be the most influential predictors of academic success.

H_{08}: poverty and income will not be the most influential predictors of academic success.

Feasibility

The current proposed study is feasible for several reasons. First, the data required for the quantitative analysis is accessible through the OCPS by email request. This researcher has informed the Orange County Public School system through email contacts in November of 2019. This researcher was informed that once the appropriate forms are completed, access to the

requested data on GPA will be granted for research purposes. Similarly, data on health, crime, transportation, environmental injustice, income, and other pertinent variables are also available through collaborations with the Polis Institute, a non-profit organization that studies neighborhood distress. Moreover, much of the proposed research has previously been discussed with managing bodies at OCPS and the POLIS institute. Initially, GPA data was requested for students in 5th and 6th grade that attend designated K-8 OCPS; however, the research department explained that GPA data did not exist for students in 5th grade and recommended that the study included 6th and 7th grade GPA instead. The data received did not have the student's geographical location IDs attached; therefore, a new request was made in late April 2021. The dataset with correct geographical IDs and student GPA outcomes was received in late May 2021. This was due to OCPS interdepartmental complications requiring the GIS and research department to create a spreadsheet representative of the requested data.

Before implementing the study, IRB approval was requested. It was then granted on August 10, 2020. Additionally, the OCPS Application to Conduct Research Notice of Approval was granted on October 14, 2020. The current study meets all ethical standards. All information will be safely stored in locked locations to ensure data safety and study confidentiality.

Data Collection and Analysis

This study contributes to the current body of knowledge on factors impacting student GPA outcomes through the use of theoretical frameworks and theoretical approaches such as critical race and social disorganization. Additionally, this study utilizes non-spatial and spatial data provided by Orange County Public Schools in the greater Orlando area, Orlando Police Department, and US Census Bureau's American Community Surveys (ACS). This study is unique because it uses spatial analysis to understand the distribution of GPA outcomes across school catchment zones based on block levels and block groups. The current study uses 6th and 7th grade GPA outcomes, crime, poverty, owner-occupied housing, employment, income, and minority population, which includes African American, American Indian or Alaskan Native, Asian, Native Hawaiian or other Pacific Islander and multiracial, from the years 2018-2020.

Data Collection

The data in this study was collected from several sources: the US Census Bureau's American Community Survey (ACS), Environmental Systems Research Institute, Orange County Public Schools, and the Orlando Police Department. Incidents from the Orlando Police Department do not reflect unreported crimes. GPA, demographic, and geographical data were obtained from Orange County Public Schools research department with the assistance of their geographic information systems (GIS) department. School zone shapefiles were also requested. A shapefile is "a simple, nontopological format for storing the geometric location and attribute information of geographic features. Geographic features in a shapefile can be represented by points, lines, or polygons (areas). The workspace containing shapefiles may also . . . store additional attributes that can be joined to a shapefile's features" (ESRI, 2020, para 1). Geographic

information in the dataset provided were coded as a GEOIDs. A GEOID is a numeric code "that uniquely identify all administrative/legal and statistical geographic areas for which the Census Bureau tabulates data" (Bureau, 2020, para. 1). The data request from OCPS proved difficult to obtain because no records were kept that displayed student information such as GPA and GEOIDs. Moreover, the delivery of the dataset was delayed because it required two departments to work collaboratively on linking student GPA and demographics to GEOIDs. Poverty indicators were obtained from the US Census Bureau's American Community Survey (https://www.census.gov/programs-surveys/acs/). All other social disorganization indicators were obtained from the Environmental Systems Research Institute, Inc.

Measures

The dependent variable in this study for OLS regression is 6th and 7th-grade students' cumulative GPA at the block group level. According to the Orange County Public School department, students under grade level 6 do not have a GPA recorded. This is because GPA recording begins at grade level 6. Data for all seven K-8 designated OCPS districts were requested and obtained: Arbor Ridge School, Audubon Park School, Blankner School, Lake Como School, OCPS Academic Center for Excellence (OCPS ACE), Wedgefield, and Windy Ridge School. Only seven schools are labeled K-8 by OCPS. Although the geographical identification numbers (GEOID) data requested detailed block group data, the GEOIDs received represented block-level data. Block-level data is more specific location data, which includes 15 numeric counts that identify the state, county, census tract, and block group, followed by the block level. See Table 1. The data requested included students' GPA, grade level, race, ethnicity, gender, enrolled school, and block level. GPA is represented numerically. All identifiable

information was omitted from the dataset. Before obtaining the dataset, students' names were replaced with STUDYID numbers for anonymity.

Table 1. Example of GEOID Structure

Area Type	GEOID Structure	Number of Digits	Ex. Geographic Area	Ex. GEOID
State	State	2	Florida	12
County	State + County	2+3=5	Orange County, FL	12095
Census Tract	State+County+Tract	2+3+6=11	Census tract 102 in Orange County, FL	12095010200
Block Group	State+County+Tract+Block Group	2+3+6+1=12	Block Group 1 in Census tract 102 in Orange County FL	120950102001
Block Level	State+County+Tract+Block	2+3+6+4=15	Block 1006 in Census Tract 102 in Orange County FL	120950102001006

A total of 1,363 data points representing students in 6th and 7th-grade were collected. Students were identified by STUDYIDs. GPA and GEOIDs accompanied most of the STUDYID. While reviewing the data, several columns depicting GPA were available, GPA per quarter, GPA per semester, and GPAYTD, which represents the overall GPA recorded since beginning the 6th grade. As such, GPAYTD was retained because it represents the overall GPA. All other GPA indicators were removed. STUDYID's that were not associated with a GPAYTD numerical value were also removed. A total of 28 data points were removed. The remaining STUDYIDs linked to a GPAYTD numeric value were retained. Unfortunately, not all STUDYID's were associated with a GEOID. Those that were not associated with a GEOID were removed. A total of 277 data points were removed and 1,058 students were included in analysis

(n=1,058). Furthermore, GEOIDs provided represented individual student data at the block level. Student block level data is representative of where a student lives within a given block group and each block group is located within a schools catchment zone. Although individual block level data is beneficial in understanding where in a block group a student is located, students who share the same block level GEOID can impact the hot spot cluster analysis results. This is because ArcGIS works based on the provided location data or GEOID. Therefore, no two data points can share the same GEOID. In a situation where such an event occurs, only one data point can be used to represent the GEOID location. For example, if 15 students share the same block-level GEOID and have varying GPAYTD outcomes, only one student and their GPAYTD outcome would be used to represent the GEOID location. This can be problematic because it can affect the results when attempting to run a cluster analysis. To address this issue, averages were created for block-level GEOIDs. Meaning, if several students shared the same block-level GEOID, the average of their GPAYTDs would be the new representation for the block level. This approach retains the overall observations while allowing ArcGIS to analyze the data.

In addition to affecting the cluster analysis, block-level data also poses a threat to OLS regression. This is because the independent variables in the study amount to 69 observations based on block groups, while the dependent variable has a total of 1,058 observations based on the block level. Ensuring that the dependent and independent variables have the same number of observations requires converting student block-level data to block group data. Therefore, block group GEOIDs were created from individual block levels by averaging the GPAYTD outcomes. This approach reduces the total number of GPAYTD observations to 69, matching that of the independent variables. The resulting dataset contained GEOID at both the block level and block

group level. It also contained students' GPAYTD, grade, and enrolled school. This file was uploaded into ArcGIS 10.8 and joined with the seven Orange County Public Schools catchment zone shapefiles. A new shapefile containing the joined attribute data was created and retained as an independent map layer.

The GIS specialist at the Polis Institute(https://polisinstitute.org), a non-profit community-engaged research organization, assisted in data collection on the independent variables of crime, median household income, owner-occupied housing, employment, and minority percentage. Each variable dataset was joined to the seven school zone shapefiles and saved as independent shapefiles representing each independent variable. This allowed each variable to be used independently or collectively as map layers for the analysis.

Cluster Analysis

In order to answer the first (1) research question regarding if academic success is randomly distributed across space or if it is spatially autocorrelated and clusters in certain areas, a hot spot cluster analysis was used to analyze the block level GPAYTD outcomes in ArcGIS online. Getis Ord G was used to create a hot spot cluster map layer in ArcGIS Online. A hot spot cluster map layer was created from the analysis which allowed for the visualization of high (hot spot) and low (cold spot) GPAYTD values. A hot spot cluster analysis allowed for a visual representation and comparison of areas where GPAYTD cluster and identifying areas associated with the social disorganization indicators. A hot spot cluster analysis works by looking at data points within the context of neighboring features. Meaning, rather than considering all high-value data points significant, it compares each data point to neighboring data points in a given distance. A data point is statistically significant when it has a high value and is surrounded by

other data points with high values. A localized sum of the data points and neighboring data points is then created and proportionally compared to the overall data points. A significant z-score is generated if the local sum varies from the expected local sum and is not the result of chance (ESRI, n.d.). To answer the second (2) research question, if they cluster, does academic success occur in areas of lower social disorganization, social disorganization indicators, employment, income, crime, home-ownership, minority population, and poverty, map layers were created using publicly available data from the Environmental Systems Research Institute, Inc, and the U.S. Census Bureau American Community Survey. The cluster analysis map is then added as a layer to each independent variable layer and visually compared to assess if areas of social disorganization also have clustering of high GPAYTD outcomes.

Statistical analysis (OLS regression)

For this study, univariate, bivariate, and multivariate analyses were conducted. The univariate analysis includes the dependent and independent variables descriptive statistics for all seven Orange County Public Schools across block groups. A hot spot cluster analysis allowed for a visual representation and comparison of areas where GPAYTD cluster and identifying areas associated with the social disorganization indicators. Stata/IC 15.1 was used to conduct the bivariate and multivariate OLS regression analysis to address Research question 3. The dataset meets all of the following OLS assumptions (1) the assumption of linearity, (2) homoscedasticity, (3) independence, (4) normality of errors, (5) no multicollinearity, and (6) the error terms are normally distributed. OLS regression was used because there was limited access to ArcGIS Pro to conduct a geographically weighted regression (GWR). The dependent variable is student GPA outcomes at the block group level. The independent variables include poverty

percentage, owner-occupied housing, employment percentage, median household income, and minority percentage at the block group level.

CHAPTER FOUR: FINDINGS

Descriptive Statistics

Descriptive statistics results for the dependent and independent variables are displayed in Table 2. There were a total of 69 block groups with data points for minority percentage across all 7 K-8 OCPS. The minimum percentage of minorities across block groups is 8%, and the maximum is 99.6%, with an average of 40.9% across block groups (*SD* = .25). There were a total of 69 block group data points for median household income. The minimum median household income was $10,897, and the maximum was $180,849, with an average of $68,268.14 across block groups (*SD* = 31,464). There were a total of 69 block groups with data points depicting the percentage of owner-occupied housing. The minimum percent of owner-occupied housing is 0, and the maximum is 92.9%, with an average of 43.7% across block groups (*SD* = .26). There were a total of 69 block group data points depicting the employed population percentage. The minimum percent of employed persons is 74.6%, and the maximum is 97%, with an average of 91.7% of the population across block groups being employed (*SD* = .045). Meaning, the majority of the population is employed across block groups. There were a total of 69 block group data points reporting poverty. The minimum percent of poverty reported is 0, and the maximum is 94.9%, with an average of 15.6% across block groups (*SD* = .18). Meaning, most residents in the seven school catchment zones are above the poverty threshold.

There were a total of 1,058 block-level data points for student GPAYTD across all catchment zones. For students who shared the same block-level GEOID, an average was created, resulting in the creation of the label BLGPAYTD. The BLGPAYTD is the average GPA outcome for each block level in the dataset. The minimum BLGPAYTD reported is 0.81, and the

maximum is 4.0, with an average BLGPAYTD of 3.01 across school zones (*SD* = .63). Another label was also created from the individual block level dataset of 1,058 to conduct the regression analysis. For this conversion, an average was created based on all student GPAYTD outcomes that match the same block group GEOID. There were a total of 69 block groups created from block-level data. This was then labeled BGGPAYTD. The minimum BGGPAYTD was 2.14, and the maximum was 3.81, with an average of 3.02 across all block groups (*SD* = .45). Utilizing the block group data helps to provide a clear overview of BGGPAYTD distribution across block groups. It also allows for more accurate comparisons between the dependent variable and independent variables.

Table 2. Descriptive Statistics for Dependent and Independent Variables Across Block Groups

	N	**Mean**	**SD**	**Min**	**Max**
Minority %	69	.4089145	.2520802	.0809	.9955
MHH_Income	69	68268.14	31464	10897	180849
OO_Housing	69	.4373159	.2608679	0.0059	0.9293
Employed	69	.9172319	.0448576	0.7458	0.9709
Poverty	69	.1560188	.1774707	0	0.9492
BGGPAYTD	69	3.015124	.4454366	2.149771	3.8159
BLGPAYTD	1,058	3.013388	.627245	.8056	4

Figures 1 and 2 represent the block group GPAYTD distribution. It is a collective of three map layers, the census blocks for Orange County Public Schools, the school zone identifier, which provides a label for each school catchment zone, and the GPAYTD distribution by block group. Each purple circle is a depiction of the average block group GPAYTD outcomes. The

varying sizes of each dot represent the variations in block group GPAYTD outcomes. As the dots increase in size, so does the GPAYTD range for the block group. The map legend shows the range each dot represents. The largest dot represents block group GPAYTD outcomes between 3.47 and 3.89. The second largest represents outcomes between 3.09 and 3.47. The third represents outcomes between 2.61 and 3.09, and the smallest dot represents outcomes from 2.14 to 2.61. The gray shaded areas of the map represent GPAYTD data that was not obtained from Orange County Public Schools and cannot be measured in this study. Figure 2 shows the illustration of all seven schools observed in the study combined with GPAYTD distribution by block group.

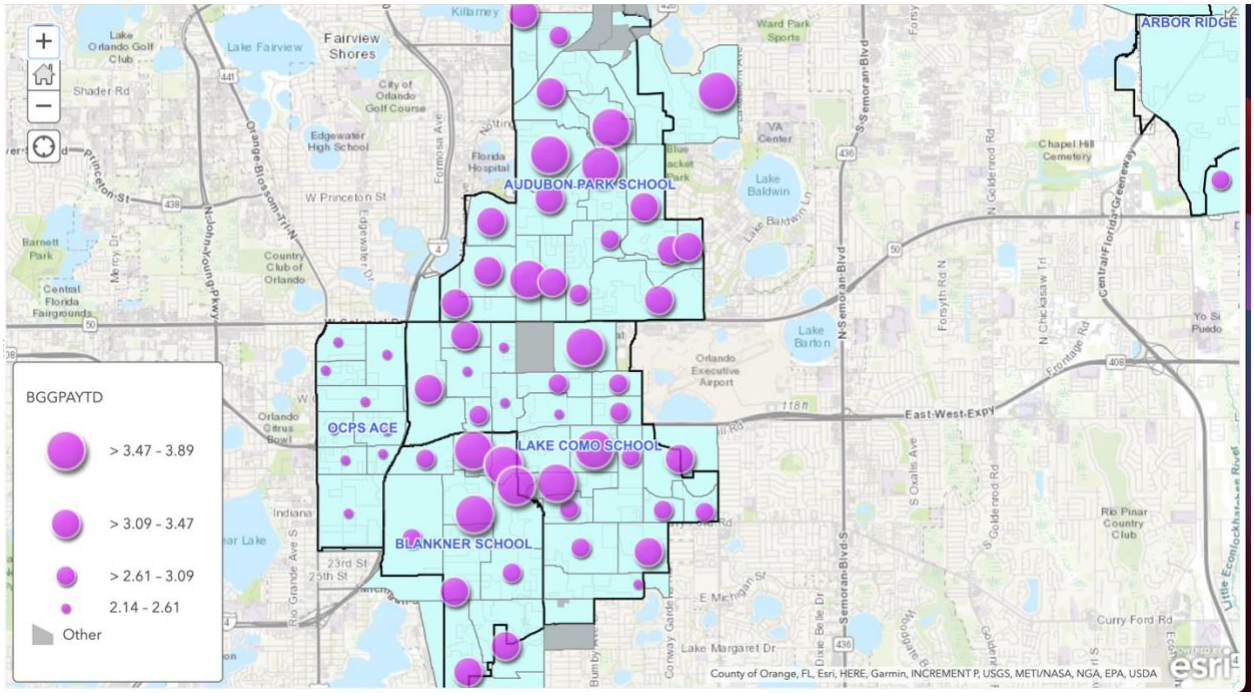

Figure 1. GPAYTD Block Group Central Distribution Zones

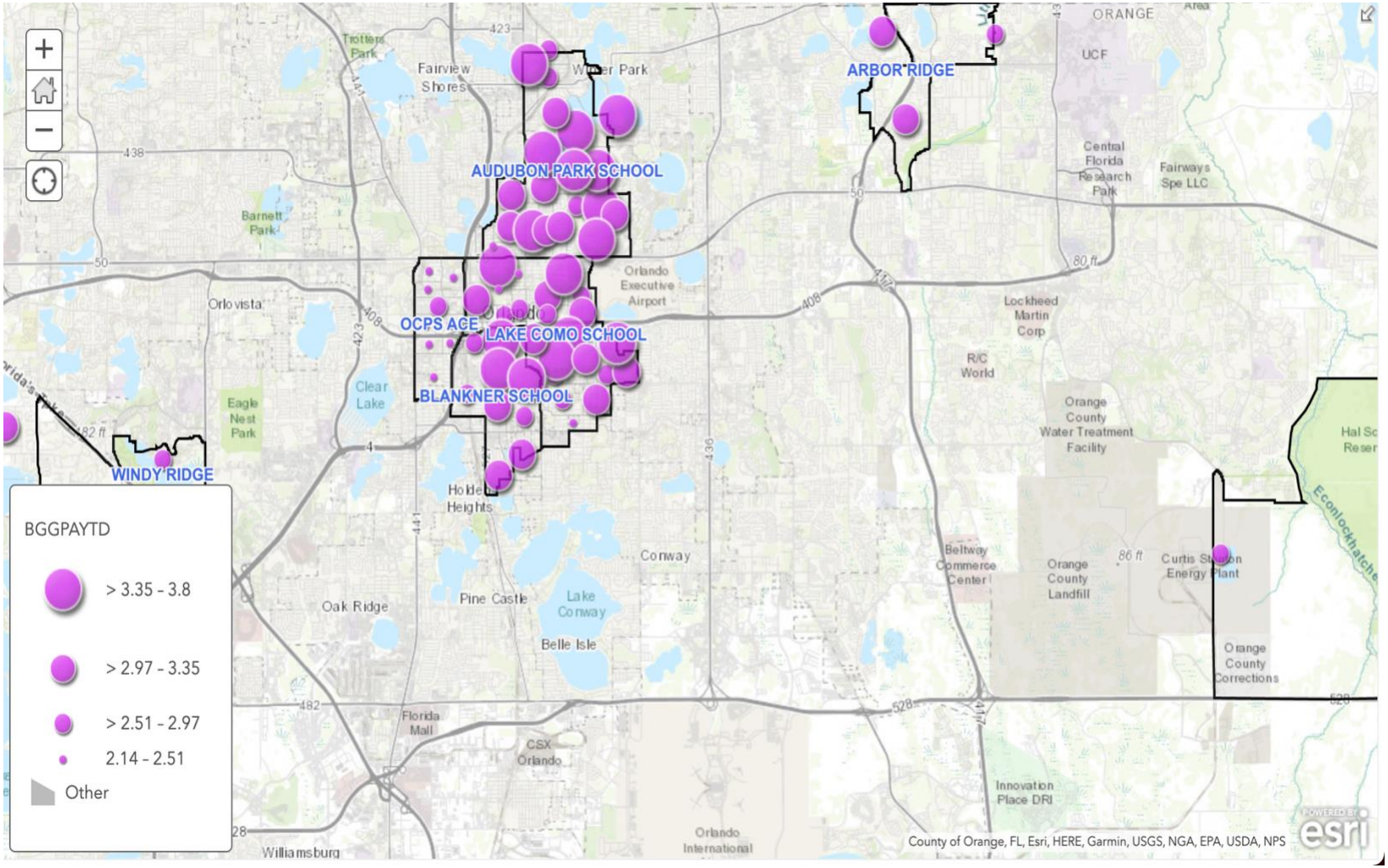

Figure 2. GPAYTD Block Group Distribution

Hot Spot Cluster Analysis $\{z = (x-\mu)/\sigma\}$

For the first research question posed (1) whether academic success is randomly distributed across space or are they spatially autocorrelated and cluster in certain areas? A hot spot cluster analysis was used with the block-level data to identify areas where GPAYTD outcomes may cluster. In doing this, the hot spot cluster analysis uses *z* score interpretations to determine hot and cold spots for GPAYTD distribution. See Table 3. According to the output, there were a total of 416 valid input features and one (1) outlier location. This outlier location is not used to compute the optimal fixed distance band. The optimal fixed distance band was based on peak clustering identified at 5882.6583 US feet. A total of 245 output features were deemed statistically significant after correction for multiple testing and spatial dependence. These outputs were used to create the hot spot cluster map. See Figure 3. The hot spot cluster analysis *z* score outputs and their relationship to confidence levels for hot spot GPAYTD values can be viewed in Table 3. Additionally, a p-value between .001 and .05 is assigned to each significant GPAYTD outcome retained based on confidence. At 99% ($p \leq .001$), at 95% ($p \leq .01$), at 90% ($p \leq .05$).

Table 3. Hot Spot Cluster Analysis Output.

	Cold Spot 99%	**Cold Spot 90%**	**Not Significant**	**Hot Spot 90%**	**Hot Spot 95%**	**Hot Spot 99%**
Neighborhoods	104	93	109	115	120	94
GPA Range	.88 to 3.90	1.62 to 3.33	.88 to 4.0	1.30 to 4.0	1.0 to 4.0	1.74 to 4.0
Z Score range	-9.08 to -4.03	-2.14 to 1.90	-1.85 to 1.86	1.90 to 2.22	2.24 to 2.83	2.93 to 6.69

Hot and cold cluster color orientation will remain consistent throughout all map illustrations. Red output features represent hot spots where high GPAYTD values cluster. Blue output features represent cold spots where low GPAYTD values cluster. The gradients of red and blue represent the confidence level and statistical significance of the values in the cluster. The majority of low GPAYTD outcomes cluster within the OCPS ACE catchment zone. Minor clustering of low GPAYTD outcomes can be observed in Lake Como and Blankner. Additionally, clustering of high GPAYTD outcomes can be observed in Audubon Parks catchment zone and the central zone of Blankner school. Although GPAYTD outcomes from 7 schools was included in the analysis, clustering only occurs in four school zones.

Table 4 provides the descriptive statistics for the cluster analysis. The minimum GPAYTD used in the analysis is 0.88 and the maximum is 4, with an average of 2.99 identified by the analysis (*SD* = 0.70). Significant p-values for cold and hot spots range from 0.00 to 0.05 for each BLGPAYTD used to create the hot spots. Values that exceed 0.05 were considered not significant.

Table 4. Hot Spot Cluster Analysis Descriptive

GPAYTD Descriptive:	
N	416
Min	0.8824
Max	4
Mean	2.9805
Std. Dev.	0.6968

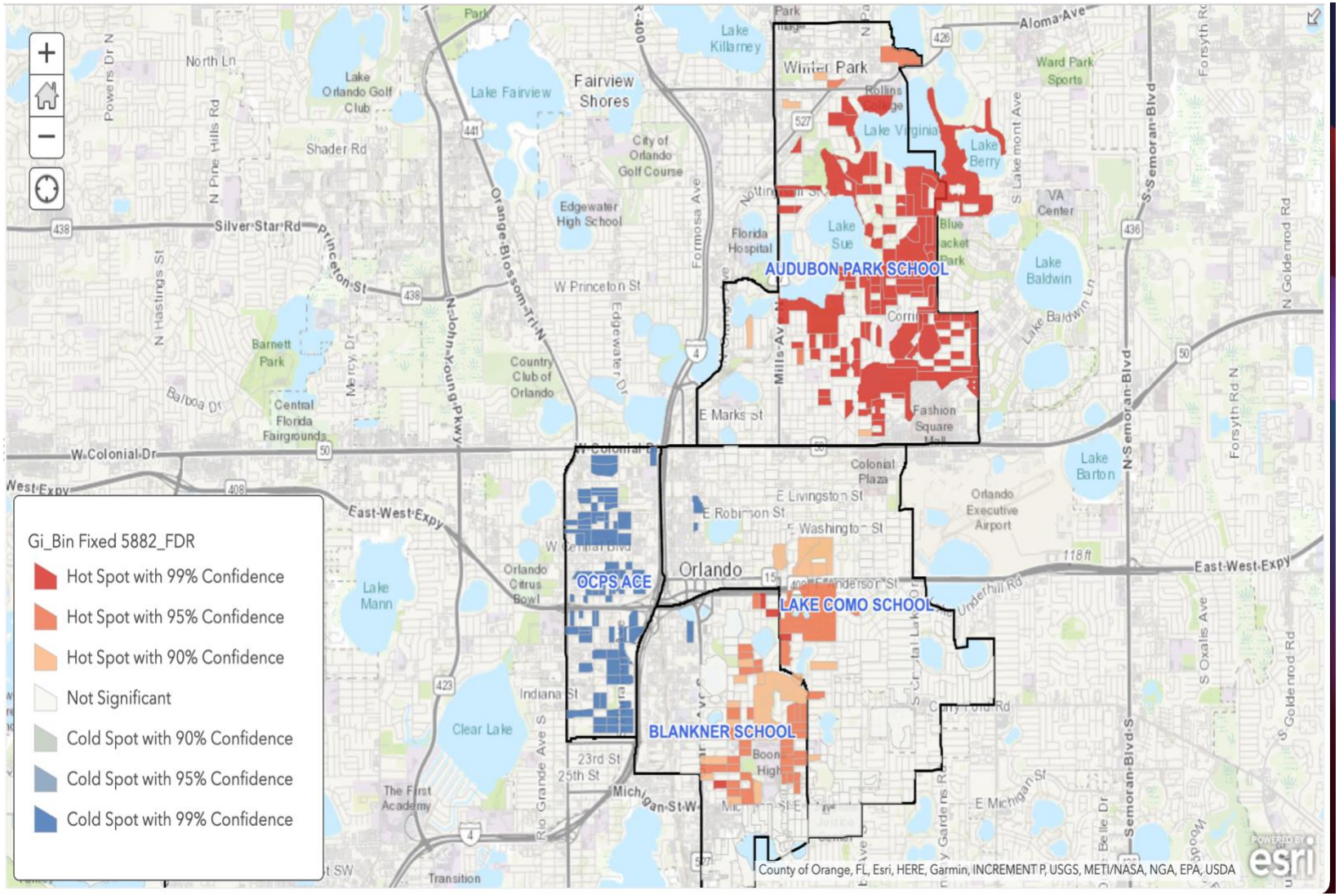

Figure 3. Hot Spot Cluster Analysis.

Social Disorganization Indicators

In order to answer the second research question (2), if they cluster, does academic success occur in areas of lower social disorganization? The cluster analysis performed is used as a comparison map layer with the social disorganization indicators of employment, income, crime, home-ownership, minority population, and poverty. Each indicator also has a map layer that shows its distribution across block groups. The hot spot cluster analysis results are compared to each social disorganization indicator to assess whether clustering of high GPAYTD outcomes occurs in areas of social disorganization.

Employed Civilian Population and GPAYTD Clustering

Figure 4 illustrates the percentage of employed individuals by block group for each school zone and its relationship to GPAYTD clustering outcomes. Classification of employment is based on determined distance from the mean, which in this case is 91.9%. Based on the map's illustration, lower employment levels are presented in pink and light pink, while higher employment levels are presented as green and light green. According to the color gradient, most of the OCPS ACE catchment zone employment levels range from 74.5% to 83.7%. However, one block group within the zone has employment levels that range from 94% to 97%. The clustering of low GPAYTD outcomes (blue) is also located in the OCPS ACE school zone throughout all block groups. Despite one block group having higher employment levels, clustering of low GPAYTD outcomes is still evident.

The Audubon Park school zone shows employment levels ranging from 90.4% to 97% throughout all block groups. Clustering of high GPAYTD outcomes can also be observed in the Audubon Park catchment zones where employment is highest. Additional clustering of high

GPAYTD outcomes can also be observed in the Blankner catchment zone. However, differences in the observed level of confidence can be seen. According to the analysis, the clustering in this area is statistically significant ranging from $p \leq .01$ and $p \leq .05$ compared to Audubon Park $p \leq .001$. Moreover, differences in employment can be observed. While Audubon Parks residents' employment levels are between 94% and 97%, Blankners' employment levels are slightly lower, ranging from 90.4% to 94%. According to the analysis, there appears to be a relationship between employment levels and GPAYTD outcomes. Areas where employment is lowest also have low GPAYTD clustering. As employment increases, so does GPAYTD clustering outcomes.

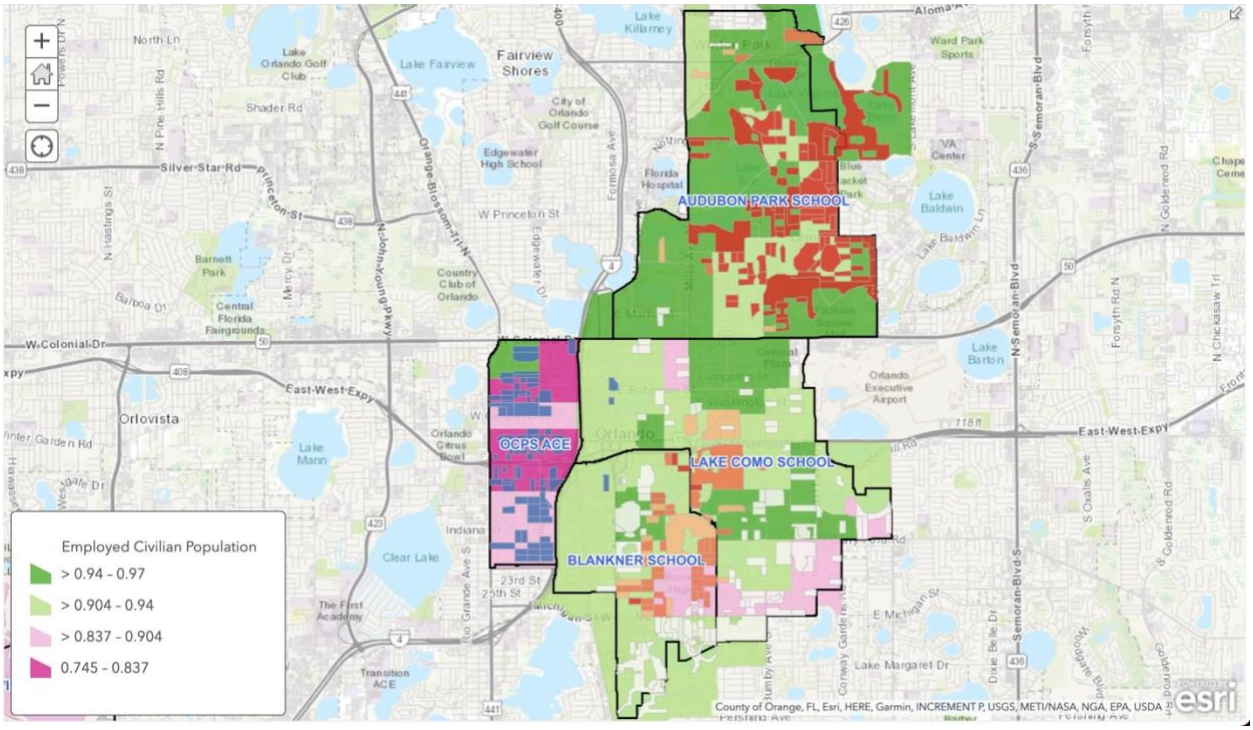

Figure 4. Employment Levels and GPAYTD Clustering

Median Household Income and GPAYTD Clustering

Block group median household income levels were gathered for each school's catchment zone. Figure 5 illustrates the GPAYTD clustering map layer and median household income layer. Classification of median household income is determined by the distributed distance from the mean, which in this case is $69,342. The map legend illustrates how median household income is presented. Blue represents the highest income range from $111,487 to $180,849, teal represents income levels between $75,000 and $111,487, grey indicates income ranging from $45,428 to $75,000, and white is the lowest level of income ranging from $10897 to $45,428. Upon initial viewing, apparent differences in income can be observed. For example, much of the area covered on the map has a median household income above $45,428; however, the OCPS ACE catchment area differs dramatically from the rest of the catchment zones, where income ranges from $10,897 to $45,428.

In areas where clustering of high GPAYTD outcomes is visible, the highest household income margins are also observed, range from $75,000 to $180,849. For example, Audubon Park and the central area of Blankner and Lake Como all illustrate clustering of high GPAYTD outcomes and high median household income. Audubon Park has the highest GPAYTD clustering with 99% confidence ($p \leq .001$) in addition to some of the highest-earning block groups. Blankner and Lake Como both share the same cluster of high GPAYTD outcomes with 90%-95% confidence ($p \leq .01$) and ($p \leq .05$). When visually comparing Audubon Park, Blankner and Lake Come to OCPS ACE, an association between income and GPAYTD outcomes is observed.

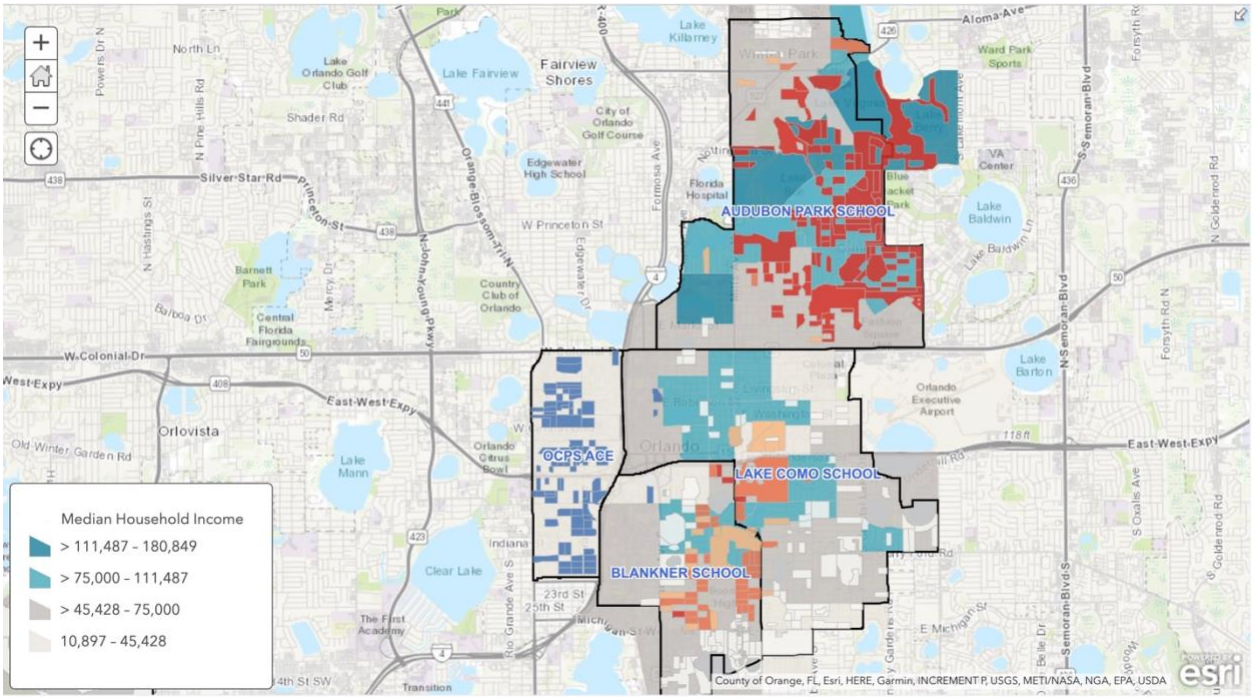

Figure 5. Median Household Income and GPAYTD Clustering.

Owner Occupied Housing and GPAYTD Clustering

Figure 6 illustrates the relationship between owner-occupied housing and GPAYTD hot spot clustering results. Five classification classes were created to better understand owner-occupied housing distribution across block groups in areas where low and high GPAYTD clustering occurs. Classification for owner-occupied housing is determined by the distributed distance from the mean, which in this case is 43%. According to the map illustration, block groups with the highest distribution of owner-occupied housing are dark gray, these groups have between 72.9% and 92% owner-occupied housing distribution. The second highest owner-occupied housing distribution marker is shown as light gray. These block groups have between 53% and 72.9% distribution of owner-occupied housing.

When comparing these two distribution levels to hot spots where high GPAYTD outcomes cluster (red), we can see that areas with high owner-occupied housing also have high GPAYTD clustering outcomes, these block groups are located in both the Blanker and Audubon school catchment zones. Moreover, differences in clustering can be observed where Audubon park has high GPA clustering with 99% confidence ($p \leq .001$), and Blankner has high GPAYTD clustering with 90% and 95% confidence ($p \leq .01$) and ($p \leq .05$).

The map also shows three additional levels of owner-occupied housing distribution, green, with a distribution between 33.5% and 53%, light green, which ranges from 17.5% to 33.5%, and the lowest level of distribution, clear green, which ranges from 0% to 17.5%. When compared to the hot spot cluster analysis, we see that there is an association between areas where low GPAYTD clusters (blue) and areas with low levels of owner-occupied housing (clear green). Moreover, the catchment zone where both low GPAYTD clustering occurs with 99% confidence ($p \leq .001$) and low levels of owner-occupied housing are distributed is located in the OCPS ACE catchment zone.

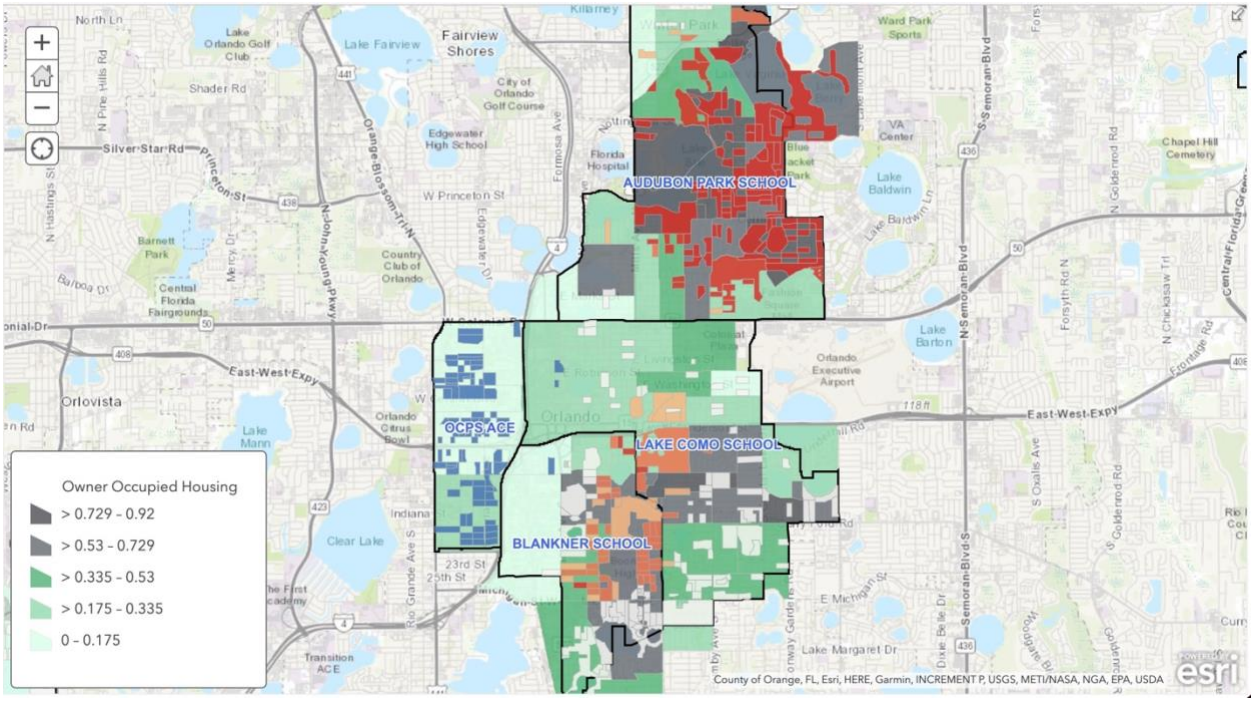

Figure 6. Owner Occupied Housing and GPAYTD Clustering.

Poverty Levels and GPAYTD Clustering

Figure 7 presents the comparison of poverty levels with GPAYTD clustering outcomes. According to the illustration, five ranges of poverty are visible. Classification of poverty levels is determined by the distributed distance from the mean, which in this case is 15%. The highest range, 43% to 95% (dark green), indicates block groups with the highest poverty level. The second-highest poverty level (teal) ranges from 21% to 43%, the next poverty level (light blue) ranges from 11% to 21%, the fourth-lowest level (gray) ranges from 4.2% to 11% poverty, and the final (white) ranges from 0% to 4.2%—the lower the percent, the lower the level of poverty. Conversely, the higher the percent, the higher the level of poverty.

As it relates to the map illustration, most block groups within the catchment zones of Audubon Park, Blankner, and Lake Como have poverty levels ranging from 0% to 18%, suggesting that most of the residents within these block groups do not experience poverty.

Additionally, these block groups are also associated with high GPAYTD cluster outcomes (red). Conversely, the OCPS ACE catchment zone has several observed block groups with poverty levels ranging from 43% to 94%. These areas are also associated with the clustering of low GPAYTD outcomes (blue). Compared to other catchment zones, OCPS ACE has the highest poverty level reporting across block groups. However, one block group outside of the OCPS ACE zone has high poverty levels but differs as it pertains to GPAYTD clustering outcomes. According to the map, this block group is associated with high GPAYTD clustering outcomes within 90% confidence ($p \leq .05$) and is located in the central zone of Lake Como.

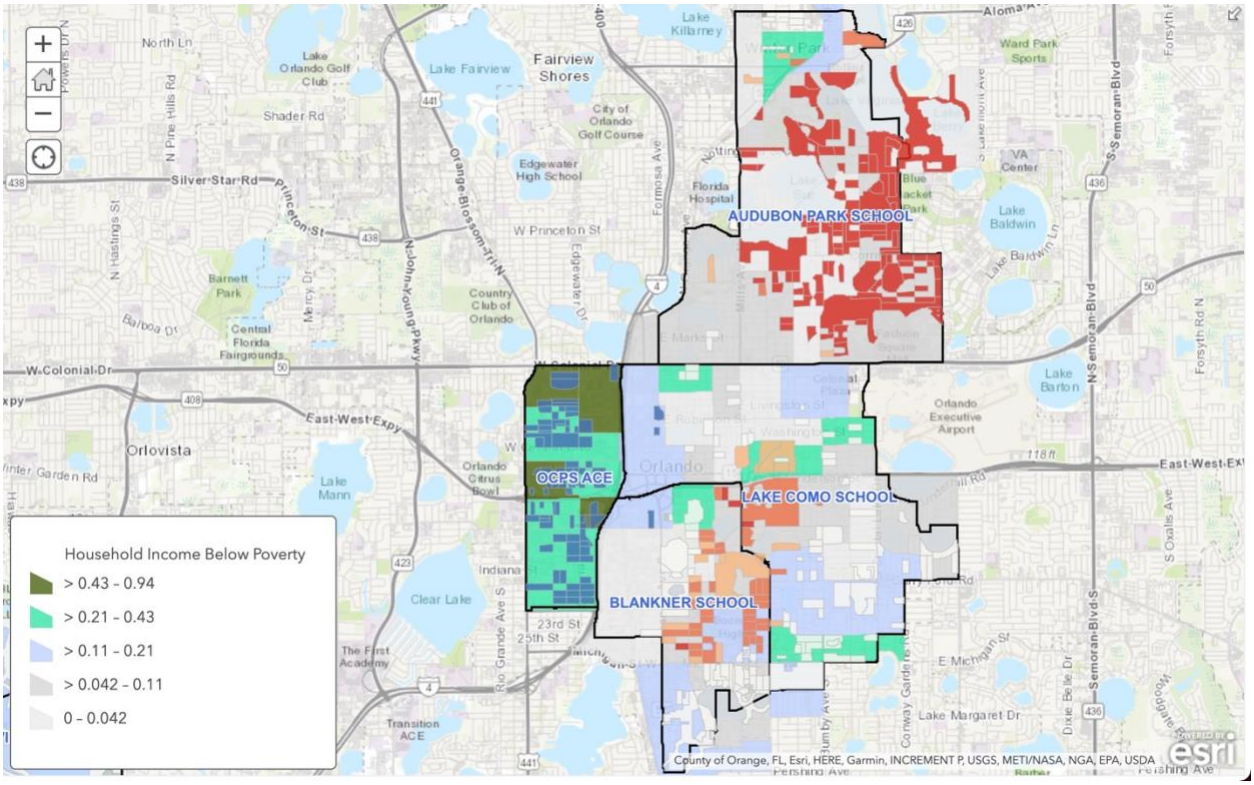

Figure 7. Household Income Below Poverty Threshold and GPAYTD Clustering

Crime and GPAYTD Clustering

Crime data was gathered from the Orlando Police Department database to understand its association with GPAYTD outcomes. (See Figure 8) Using individual crime categories and their location allowed for the creation of a detailed heat map. Areas where few crimes occur, are shown in light blue. Comparatively, areas, where crime occurs more often are shown as bright yellow with variations of orange. According to the map, several areas within the OCPS ACE catchment zone are associated with concentrated crime. However, one area (bright yellow) stands out adjacent to the OCPS ACE catchment zone and is located in the Lake Como catchment zone. Small clusters of low GPAYTD outcomes can be observed outside the area with the highest crime concentration. No crime concentration is observed in areas where high GPAYTD outcomes cluster.

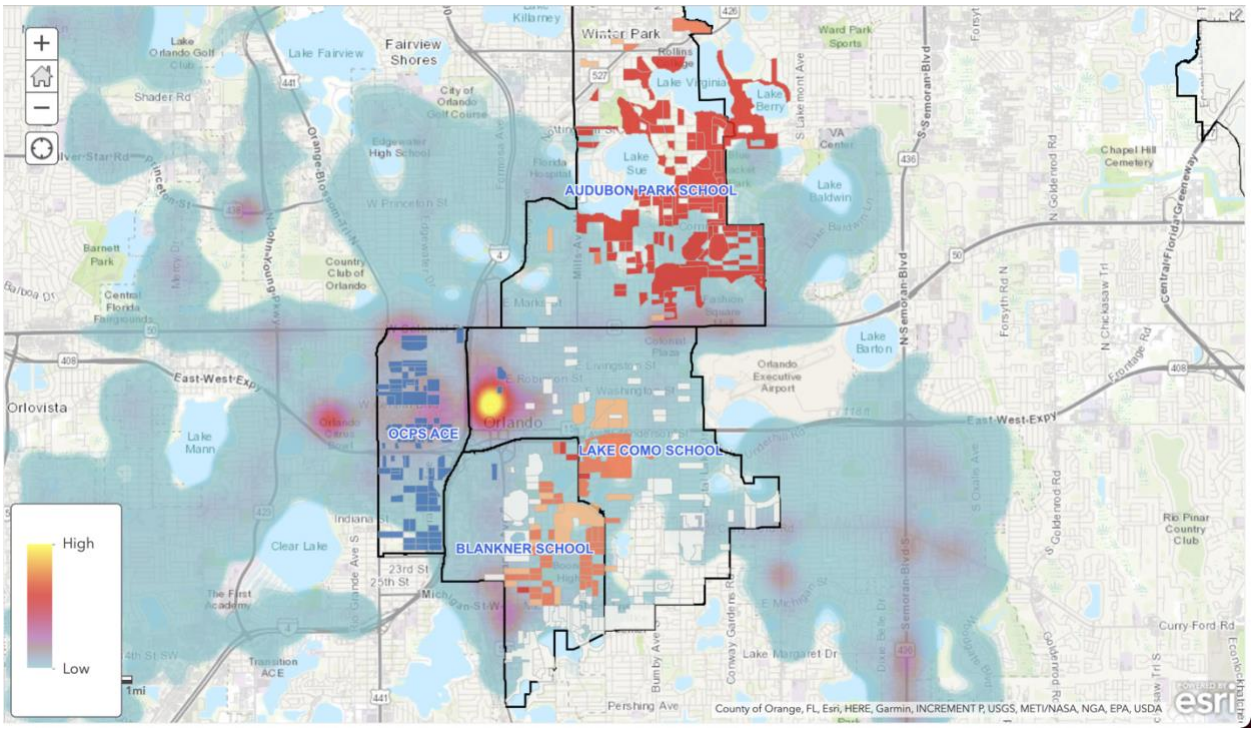

Figure 8. Crime heat map and GPAYTD Clustering

In addition to creating a crime heat map, a crime categories map was also created to understand better the types of crimes occurring in the areas identified as having high crime concentrations. Figure 9 shows the distribution of crime as well as the types of crimes reported. This map differs from all other maps because it uses point data to identify types of crimes. Therefore, each point on the map represents a location where the type of crime occurred. The bright yellow represents crimes associated with theft; the largest category of crimes committed. Based on this information, it is evident that most crimes occurring throughout the catchment zones are crimes categorized as theft. According to the category descriptive information, the highest crime reported is theft (32,722), followed by burglary (5,297), assault (6,707), narcotics (5,568), fraud (4001), vehicle theft (3,436), robbery (1,601), arson (44), homicide (66), and other (94). See Table 5 for crime categories and counts.

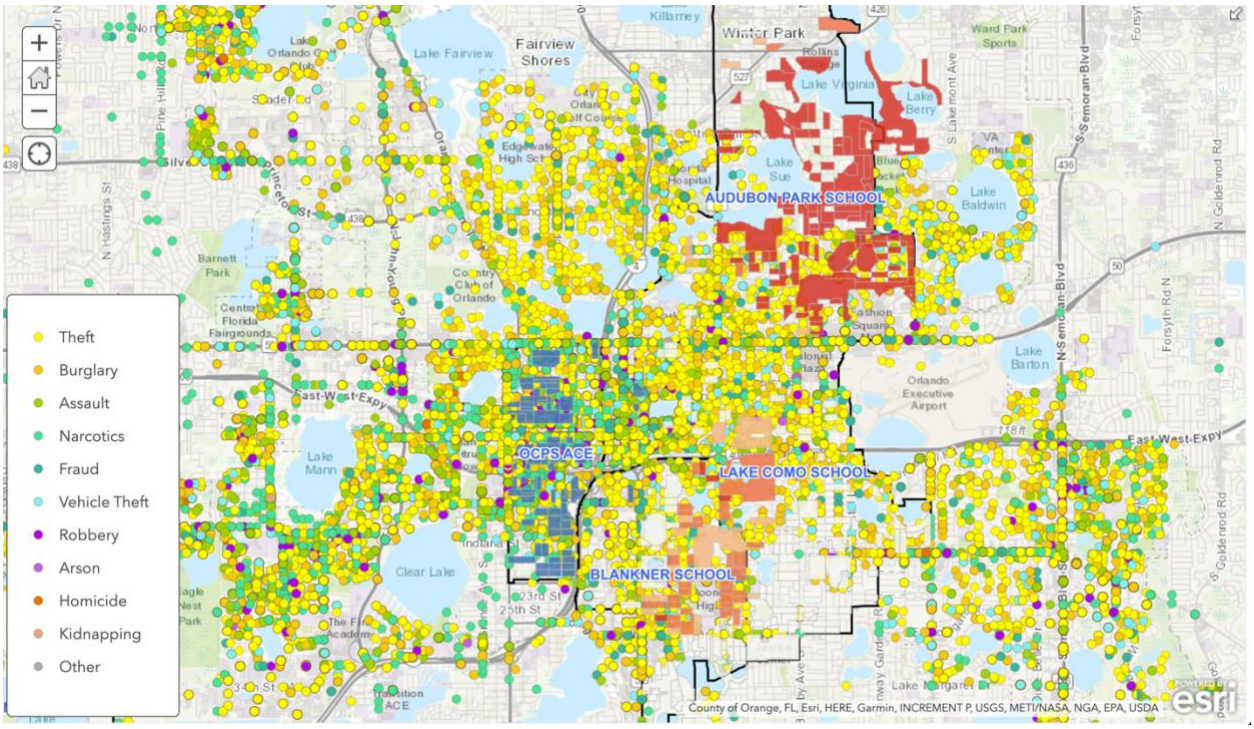

Figure 9. Crime Categories and GPAYTD Clustering

Table 5. Crime Categories and Counts

Crime Categories	Theft	Assault	Narcotics	Burglary	Fraud	Vehicle Theft	Robbery	Homicide	Other
Counts	32722	6707	5568	5297	4001	3436	1601	66	94

To better understand the types of crimes occurring in the OCPS ACE catchment zone, types of crime were clustered from a point layer. Unlike the hot spot cluster analysis used to analyze GPAYTD outcomes, clustering of crime categories is done by clustering point data based on distance. When used interactively, clustering points will vary in size and number of features depending on the distance the clusters are viewed. For example, zooming into the map layer will reduce the number of crime category points within each cluster while simultaneously create additional cluster points of crime categories. Conversely, if you zoon out, the number of points included in the cluster increases, combining the crime category points to create larger points. Based on the crime cluster map illustration, two crime categories cluster within the OCPS ACE catchment zone, narcotics and theft. No other catchment zone contains clustering of more than theft. Moreover, looking at areas where high GPAYTD outcomes cluster, only small clusters of theft could be observed. (See Figure 10).

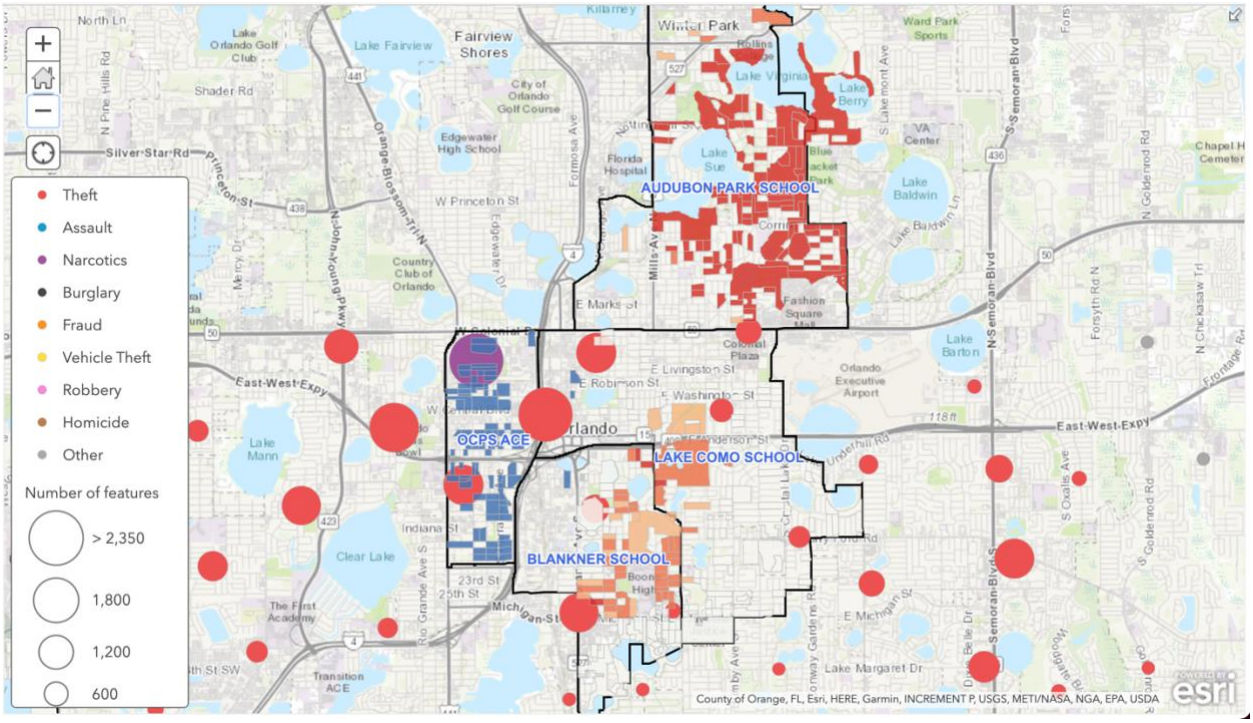

Figure 10. Clustering of Crime Types and GPAYTD Clustering

Minority Percentage and GPAYTD Clustering

The final variable assessed in this study is neighborhood minority percentage. Figure 11 represents the percentage of minorities per block group in each of the 7 K-8 OCPS zones. Minority distribution is broken down into four classification categories based on the distributed distance to the mean of 39%. According to the map illustration, purple represents the highest block group concentration of minorities, which ranges from 73% to 99%, the steel blue depicts minority population ranging from 45% to 73%, the light blue represents 25% to 45% minority population, and white represents 8%-25% minority population across block groups. The highest concentration of minorities is observed in the OCPS ACE catchment area, ranging from 65.9% to 99%. Moreover, low GPAYTD clustering outcomes are also observed in this catchment zone. In

comparison, where high GPAYTD outcomes cluster, Audubon Park and Blankner have low minority representation ranging from 8% to 35%.

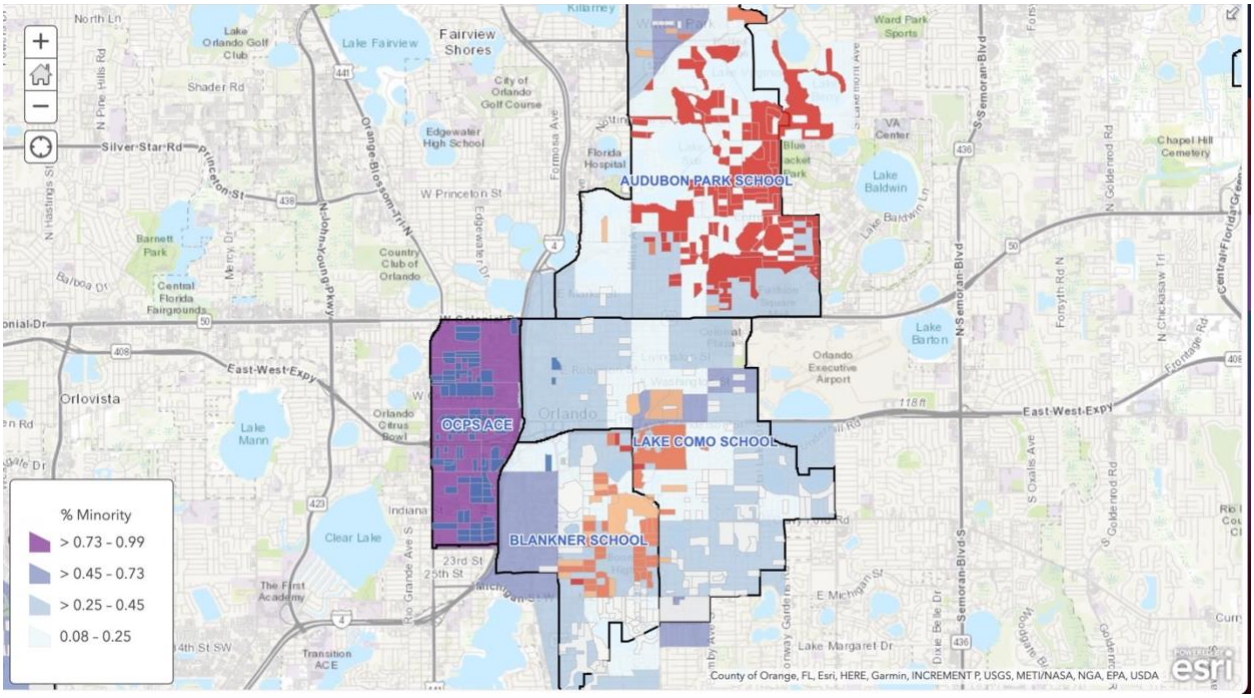

Figure 11. Minority Percentage and GPAYTD Clustering

OLS Regression Findings

To address the third research question, (3) do economic and social conditions at the block group level impact academic success for 6th and 7th-grade students? OLS regression was used to analyze the relationship between GPAYTD outcomes and social disorganization indicators. Several regression analyses comparing the dependent variable to each independent variable were completed. The first regression completed looked at GPAYTD outcomes and all social disorganization indicators. However, no statistical significance was found. The variance inflation factor (VIF) was used to test for the possibility of multicollinearity within the dataset. According to Gomez and colleagues (2016), the VIF should not exceed four (4) or more than half the number of variables present; if so, it would warrant further investigation regarding multicollinearity. VIF results indicated that the Minority variable has a 4.43 diff, indicating multicollinearity within the dataset. See Table 6. The minority variable was then omitted from the regression analysis. Crime could not be used in the regression analysis because the data obtained did not encompass all seven school districts.

Table 6. VIF Output

Variable	VIF	1/VIF
Minority	4.43	0.225638
MHHIncome	2.46	0.406533
Poverty	2.36	0.424163
Employment	2.29	0.436789
OOHousing	2.05	0.486849
Mean VIF	2.72	

Regression Results

A multivariate analysis was conducted using OLS regression due to the continuously coded nature of the dependent variable (See Table 7). The minority variable was omitted from this regression analysis because it had high intercorrelation with the poverty variable. Results indicate a significant relationship between block group GPAYTD outcomes and poverty ($p<$ .05), where for every unit increase in poverty, there is a .66 decrease in GPAYTD outcomes. Meaning, the more poverty present in a given area, the lower the likelihood that students in 6th and 7th grade will perform well academically. Poverty, as a result, negatively impacts student academic outcomes. A statistically significant relationship was also found between GPAYTD outcomes and employment ($p<$ .01), where for every unit increase in employment, there is a 2.79 increase in GPAYTD outcomes. Meaning, areas with high employment levels and students attending 6th and 7th grade are more likely to experiences higher levels of academic success. These regression analyses tell us that the poverty and employment social disorganization indicators are significantly related to academic performance. Moreover, it suggests that academic success does not occur in areas of social disorganization.

In addition to running the regression analysis on GPAYTD, poverty, employment, owner-occupied housing, and median household income, three additional regression analyses were completed to assess whether there is a significant relationship between the dependent and independent variables separately. This was done because an association between owner occupied housing, minority percentage, and income was present in the cluster analysis comparison maps. Tables 8 through 10 shows the regression results for the dependent variable and these three variables. According to the regression completed between GPAYTD and owner-occupied

housing, a statistically significant positive relationship was found, where for every unit increase in owner-occupied housing ($p < .001$), there is a .87 increase in GPAYTD outcomes. Meaning, home-ownership has a direct positive influence on academic outcomes for 6th and 7th graders. Table 9 shows the regression between GPAYTD and median household income. A statistically significant positive relationship was found where for every unit increase in median household income ($p < .001$), there is a 7.80 increase in GPAYTD outcomes. Meaning, the higher the block groups median income, the higher the average GPA for the children living in that block group. Table 10 shows the regression between GPAYTD and minority percentage. A statistically significant negative relationship was found where for every unit increase in minority percentage ($p < .001$), there is a 1.18 decrease in GPAYTD outcomes. Suggesting that as the minority percentage increases within a block group, the expected GPAYTD outcomes for that block group would decrease.

Table 7. OLS Regression Analysis

Source	**SS**		**df**	**MS**	**Number of obs**	**= 69**
					F(4, 63)	= 13.92
Model	**6.27758021**		**4**	1.56939505	Prob > F	= 0.0000
Residual	**7.21455306**		**64**	.112727392	R-squared	= 0.4653
					Adj R-squared	= 0.4319
Total	**13.4921333**		**68**	.198413724	Root MSE	= .33575
AGPAYTD	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Poverty	**-.6633611**	.3086795	-2.15	0.035*	-1.280019	-.046703
Employment	**2.788173**	1.126076	2.48	0.016 **	.5385786	5.037768
OOHousing	**.2830154**	.2165407	1.31	0.196	-.1495744	.7156052
MHHIncome	**1.81e-06**	1.99e-06	0.91	0.366	-2.17e-06	5.79e-06
_cons	**.313567**	1.021449	0.31	0.760	-1.727012	2.354146

Note **p ≤ .01, *p ≤ .05

Table 8. GPAYTD and OOHousing Regress

Source	SS	df	MS	Number of obs	=	69
				F(1, 66)	=	23.64
Model	3.51898661	1	3.51898661	Prob > F	=	0.0000
Residual	9.97314665	67	.148852935	R-squared	=	0.2608
				Adj R-squared	=	0.2498
Total	13.4921333	68	.198413724	Root MSE	=	.38581

GPAYTD	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
OOHousing	.8720345	.179350	4.86	0.000***	.5140486	1.23002
_cons	2.633769	.0911539	28.89	0.000	2.451825	2.815713

Note ***p ≤ .001**p ≤ .01, *p ≤ .05

Table 9. GPAYTD and MHHIncome Regress

Source	SS	df	MS	Number of obs	=	69
				F(1, 66)	=	29.23
Model	4.09865141	1	4.09865141	Prob > F	=	0.0000
Residual	9.39348185	67	. 140201222	R-squared	=	0.3038
				Adj R-squared	=	0.2934
Total	13.4921333	68	. 198413724	Root MSE	=	.37443

GPAYTD	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
MHHIncome	7.80e-06	1.44e-06	5.41	0.000***	4.92e-06	.0000107
_cons	2.482439	.1083427	22.91	0.000	2.266186	2.698692

***p ≤ .001**p ≤ .01, *p ≤ .05

Table 10. GPAYTD and Minority Percentage

Source	SS	df	MS	Number of obs	=	69
				F(1, 67)	=	54.23
Model	6.03540339	1	6.03540339	Prob > F	=	0.0000
Residual	7.45672987	67	.111294476	R-squared	=	0.4473
				Adj R-squared	=	0.4391
Total	13.4921333	68	.198413724	Root MSE	=	.33361

BGGPAYTD	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
Minority	-1.181843	.1604884	-7.36	0.000	-1.50218	.8615073
_cons	3.498397	.0769398	45.47	0.000	3.344824	3.651969

***p ≤ .001**p ≤ .01, *p ≤ .05

CHAPTER FIVE: CONCLUSION

Discussion

This study examined how social disorganization indicators influenced students' academic outcomes at the block level. The identifier for academic outcomes used in this study is K-8 OCPS 6th and 7th graders' overall grade point average (GPAYTD). Block-level GPAYTD outcomes were consolidated based on block-level GEOIDs, which resulted in the retention of 531 unique GEOIDs from 1,058 individual student GPAYTD outcomes. This dataset was categorized as BLGPAYTD. In addition, block-level GPAYTD outcomes were consolidated for a second time based on block group GEOIDs, which resulted in the retention of 69 unique GEOIDs from 1,058 individual student GPAYTD outcomes. This dataset was categorized as BGGPAYTD and was used for the regression analysis. The measures of social disorganization utilized in the study were minority percentage, employment, owner-occupied housing, median household income, and poverty levels. All social disorganization indicators were collected at the block group level. Research questions included:

RQ1: Is academic success randomly distributed across space, or are they spatially autocorrelated and cluster in certain areas?

RQ2: If they cluster, does academic success occur in areas of social disorganization?

RQ3: How do economic and social conditions at the census block level impact academic success for 6th and 7th-grade students?

RQ1 focused on understanding the distribution of academic outcomes across space for the seven K-8 OCPS. Results of the cluster analysis indicated that academic success is not randomly distributed across space; instead, they are spatially autocorrelated and cluster in certain

areas; therefore, the first null hypothesis is rejected. These findings support previous research by adding to the literature, which suggests that academic success is not evenly distributed across space; instead, external school factors play a significant role in student achievement and academic outcomes (Dogru et al., 2019; Joyner & Marsh, 2011; Lockwood et al., 2018; Neckerman et al., 2009; Sampson, 2012; Stewart et al., 2013). Additionally, the results add to the literature by encouraging a deeper analysis into the external school conditions that impact academic success and prevent the random distribution of academic success across space.

RQ2 sought to understand whether academic success occurs in areas of social disorganization, hypotheses 2 through 7 were used. The hot spot cluster analysis results were used to visually identify areas where high and low GPAYTD clustering occurs. These results were then compared to block group data on each social disorganization indicator. Figure 4 (see page 55) shows the comparison between low and high GPAYTD clustering outcomes and employment by block group. Low GPAYTD outcomes were associated with block groups that have lower employment levels. Conversley, high GPAYTD outcomes were associated with block groups that have high employment levels. Therefore, we reject the second null hypothesis. The comparison map of median household income and GPAYTD cluster outcomes shows that low GPAYTD outcomes are associated with lower median household income levels by block group while higher GPAYTD outcomes are observed in block groups with higher median household income levels. Therefore, we reject the third null hypothesis. This is consistent with Joyner & Marsh (2011), which suggests that socio-economic status, which is tied to an individual's income, directly contributes to social stratification and segregation by poverty level, all of which negatively impact student achievement and academic achievement growth.

Concerning owner-occupied housing and GPAYTD outcomes, Figure 6 (see page 57) shows the map comparison of GPAYTD outcomes and areas with high and low owner-occupied housing. According to the map, there is an association between block groups with low GPAYTD outcomes and low owner-occupied housing and higher GPAYTD outcomes and higher levels of owner-occupied housing. Therefore, the fourth null hypothesis is rejected. Furthermore, when comparing areas where high and low GPAYTD outcomes cluster and block groups with high and low poverty levels, an association was found where low GPAYTD outcomes clustered in block groups where high levels of poverty was present; conversely, in block groups where little to no poverty exists, high GPAYTD outcomes clustered. Therefore, the fifth null hypothesis is rejected. However, one block group located within the Lake Como catchment zone was associated with high GPAYTD clustering outcomes within 90% confidence ($p \leq .05$) and had poverty levels between 21% and 43%. The block group also has similar social disorganization indicators of employment, median household income, and owner-occupied housing as several block groups located in the OCPS ACE catchment zone where low GPAYTD clustering outcomes are observed. Despite this, the block group was observed with high GPAYTD clustering. According to much of the literature (Cabus & Witte, 2016; Dreier, Mollenkopf, & Swanstrom, 2014; Joyner & Marsh, 2011; Lichter, Parisi, & Taquino, 2012; Mucedola, 2017; Quillian, 2014; Sampson, 2012; Taylor, 2006), areas with high poverty rates tend to be areas with lower rates of academic achievement and therefore, lower overall academic growth. Although this study has found support for these findings, the block group located in Lake Como challenges these findings since academic success was observed. This phenomenon may be attributed to the increased levels of diversity within the block groups. Based on the minority

percentage map Fig 11 (page 65), these block groups have between 25% and 73% minority representation, suggesting a level of diversity within the community. According to Joyner and Marsh (2011), the higher levels of academic success could be due to higher levels of integration within these block groups. Students within these block groups may be benefitting from cross-racial understanding, improved critical thinking skills, less prejudice, and enhanced life opportunities, which can contribute to improvements in academic success. This phenomenon should be explored in future research.

High levels of crime are often associated with high levels of poverty. When comparing the GPAYTD clustering outcomes with the crime heat map, low GPAYTD outcomes can be observed in areas where crime is most concentrated, while high GPAYTD outcomes can be seen in areas with the less concentrated crime. An association can be made between areas with a high concentration of crime and GPAYTD outcomes. Based on the crime cluster map, two crime categories appear to cluster in the area where low GPAYTD outcomes cluster, narcotics, and theft. Smaller clusters of theft could be observed throughout the Orlando Police Departments' jurisdiction; however, only one area, OCPS ACE, contains two crime category clusters. This area is also the same area where low GPA outcomes cluster. Therefore we reject the sixth null hypothesis since areas with drug arrests and personal crimes also have lower GPAYTD clustering outcomes. These findings support the conclusion drawn by Harris (2019), which suggests that environmental injustice such as crime causes students to struggle more academically because students may be more likely to have low attendance, increased stress, and poor emotional well-being. Figure 11 (see page 65) shows the comparison between GPAYTD clustering outcomes and minority representation by block group. In areas where minority

representation is high, lower GPAYTD clustering outcomes can be observed. However, in areas where minority representation is low, higher GPAYTD outcomes are seen. An association can be made between lower GPAYTD outcomes and higher minority presence. Therefore, the seventh null hypothesis is rejected.

RQ3 examines whether economic and social conditions at the block group level predict academic success. The regression analysis results indicated that two social conditions predict GPAYTD outcomes at the block level. Poverty and employment were both found to be statistically significant in their relationship to academic success. Poverty has a negative relationship with academic success, while employment has a positive relationship with academic success. The employment results were surprising to observe since much of the literature (Cabus & Witte, 2016; Joyner & Marsh, 2011; Quillian, 2014; Taylor, 2006; Wilson, 2016) does not directly emphasize employment as a factor; instead, much of the focus is on socio-economic status, which is determined by income, and is the driving force of social stratification, which divides communities based on income. Therefore, income determines the overall classification of a community. For example, when looking at Figure 4, page 55, we see a block group within the OCPS ACE catchment zone with 94%-97% employment. However, low GPA cluster outcomes can also be observed within the block group. Moreover, the block group's income does not exceed $45,428 and social disorganization indicators suggest that the community is socially disorganized. Although employment can help achieve higher income levels, higher employment levels do not equate to higher income levels. Therefore, we fail to reject null hypothesis eight since poverty and income were not the significant variables in the analysis.

According to the regression analysis, the variables in this study account for 47% of the variance. Several other variables can be included within the study that are expected to capture more of the variance, which this study did not account for. For example, the percentage of students per block group that suffer from health conditions such as asthma and diabetes, the number of households with vehicles (cars, trucks), and the types of employment held by families within each block group could help to further explain the variance in the regression analysis. These additional variables would assist in understanding health impacts on students, employment opportunities available to minoritized populations, and levels of transportation, which can determine whether a family has access to nutritional resources and explain income variation based on employment opportunities.

Critical race theory and social disorganization theory helps to explain why this phenomenon exists and why it disproportionally affects people of color. The product of structural racism forces people of color into communities that experience high levels of social disorganization (Harris, 2019; Joyner & Marsh, 2011; Lockwood et al., 2018; Neckerman et al., 2009). According to the study results, no one factor is responsible for predicting academic outcomes in a given community. Social disorganization factors work together to create an environment of disadvantage, limiting a student's ability to achieve high levels of academic success. Students living in socially disorganized communities cannot ignore the multiple social stressors imposed on them. Without employment opportunities, individuals are unable to obtain sufficient income to support their families. Without sufficient income, families cannot provide nutritional meals for their children; they are also more likely to rent and not own their homes since banking institutions are less likely to provide loans to unemployed or low-income

individuals. Moreover, they are also more likely to live below the poverty threshold ($40,000) and more likely to reside in areas where crime is prevalent (Chapman & Donnor, 2015; Taylor, 2006). Since all of these factors impact academic outcomes, the likelihood that children in communities such as this will achieve high levels of academic success is dramatically reduced due to the high levels of disadvantage. If students who grow into adults cannot achieve high levels of academic success, the possibility of obtaining employment opportunities that would place them above the poverty threshold is dramatically reduced. As a result, a cycle of poverty and disadvantage is perpetuated within minority communities.

Limitations

Several limitations were present during the process of conducting this study, which need to be acknowledged. This study utilized secondary data, and although it is official data from the county, there is no way to consider possible missing data such as underreported income and crime. The data is also restricted spatially by the variables being assessed in this study, median household income, employment, owner-occupied housing, poverty, and minority percentage at the block group level. This becomes an issue as we assess the relationship between student academic performance and social disorganization indicators. Moreover, the crime data used was limited to the Orange County Police Departments' (OPD) patrol district, and not all OCPS schools are located within this district. Three school zones, Arbor Ridge, Windy Ridge, and Wedgefield, were located outside of OPDs jurisdiction resulting in their exclusion in the crime assessment.

Furthermore, there were delays in accessing GPA data from Orange County Public School. The data was requested during the coronavirus pandemic while most institutions were attempting to address the social distancing guidelines. Many individuals were working remotely, which added to delays in the transfer of data between departments. Moreover, the dataset which includes the GEOIDs necessary to match census block level and block group GPA did not exist. The specificity of the data request made it difficult for the OCPS research department and their GIS department to develop a comprehensive way of compiling the requested data. This led to 277 missing GEOIDs as they could not be matched with a specific block group despite having the necessary GPAYTD data point. As a result, the data from those missing groups were omitted from the study. Additionally, 28 data points were omitted as they did not contain GPAYTD data.

This study sought to include student health outcomes on asthma and diabetes for individual student health data by block groups; however, barriers such as HIPAA regulations were encountered, resulting in health-related student data being omitted from the study since student IDs could not be linked to student health outcomes. According to the literature, health-related outcomes are important when discussing student academic performance. A student that suffers from malnutrition is more likely to have difficulties meeting academic standards set by their school. Moreover, students whose families have insufficient resources to maintain a healthy diet may experience delays in cognition and are more likely to sleep in class, therefore reducing their ability to meet academic milestones (Dogru et al., 2019; Harris, 2019; Stewart et al., 2013). Future studies may choose to include health-related data to better understand the impact of heath on academic outcomes.

Lastly, the study sought to assess socioeconomic factors that impact academic outcomes for 6th and 7th graders attending K-8 designated OCPS. Due to this study being place-specific, results should be generalized with caution as they may not be consistent with other areas where social disorganization is present. Future studies may choose to include a larger geographic area encompassing different schools and grades for a better comparison.

Implications

Research

Social disorganization indicators of this study were found to be significant predictors of student academic success, which is consistent with the literature. However, there were some surprising results. According to the regression analysis, block group employment percentage was one of the most impactful predictors of academic success. This was surprising because across block groups, the average employment percentage was 91.7%, the lowest employment percentage across all block groups was 74.5%, and the highest was 97%. Although most residents across block groups, including the hardest impacted area for low academic outcomes, OCPS ACE, were already employed, the analysis suggests that an increase in employment across block groups would significantly improve the distribution of academic success outcomes. This is surprising because although employment is an important factor, income from someone's place of employment has the ability to uplift families out of poverty. According to the analysis, this was not the case. Measures together, the income indicator remains insignificant; however, employment and poverty maintained a significant relationship with GPA outcomes. One would assume that income would be more impactful on GPA outcomes.

Future studies should further investigate block group employment levels to assess whether it is consistent across block groups in other urban areas. Understanding the consistency of this indicator could prove instrumental when assessing the social disorganization indicators associated with disadvantages for academic performance outcomes. Often, for minority populations, an increase in employment does not alleviate the stressors and pressure associated with living in an area of concentrated disadvantage. In many cases, high levels of employment in

a block group does not equate to better-paying jobs. See Figure 4 (page 55). Additionally, future studies should also seek to include a mixed-methods approach to understanding the impact of external school factors on academic success outcomes. For instance, the inclusion of a focus group component would be beneficial in understanding which external school factor(s) families, teachers, and students feel are most impactful when considering student academic outcomes. It would also provide struggling communities a platform to voice concerns and resolutions. Moreover, the inclusion of the student's family system and community in the decision-making process can motivate the community to work towards actively improving its students' academic outcomes. This approach is multifaceted as it can also lead to increased levels of civic capacity and possibly reduce levels of social disorganization.

When considering the applicability of this study in other geographic locations such as Atlanta, GA, findings may be similar; however, some changes can be anticipated in more diverse communities. For instance, if this study is conducted in areas such as Atlanta, GA, we may see higher levels of housing and employment for minority populated communities. It is possible that the employment variable may carry less significance or none at all due to the geographic make-up of Atlanta, GA. Moreover, we may also find lower poverty levels since the cost of living in areas like Atlanta, GA may differ from central Florida. Additionally, in areas like Atlanta, GA minoritized communities may have more civic capacity and engagement, leading to reduced social disorganization. We may, however, still see differences in GPA clustering outcomes where neighborhoods that have higher SES also have higher GPA outcomes, which would align with the literature.

Policy

Several policy implications can be drawn from this study. This study can be used by policymakers to better understand disadvantages within their respective districts. Although much is known about social disorganization and its impact on academic outcomes, this study provides a more robust understanding of which social disorganization indicators impact academic outcomes by block groups. Similar spatial assessment studies can be conducted in areas where social disorganization is observed to understand better which social disorganization indicators are statistically significant in their relationship to academic success. Policies can then be created or modified to target those indicators in their respective communities and block groups to improve academic outcomes. For example, the Every Student Succeeds Act (ESSA) of 2015 was signed into law by President Barack Obama. This law allows states to determine their own definition of progress and how much weight to place on measures of progress such as test scores and graduation rates. This policy can be modified to include spatial analysis of academic success so that better decisions regarding where to place state funds can be made (Darrow, 2016),

In addition to modifying and creating new policies to address academic success outcomes, policymakers should look carefully at the results surrounding this study and establish a systemic approach to addressing systemic racism that causes the stratification of people into the wealthy white majority and the poor minority. Policies should be created that specifically target the hiring policies of companies and organizations to include more diversity within their workforce and comparative pay between white and minoritized employees. This can be done by providing grants and tax expenditures to institutions and organizations that make significant efforts to improve diversity within their workforce. This approach has the ability to improve employment

opportunities for many minoritized individuals, which according to this study results, is one of the most significant indicators of student academic success.

Furthermore, at the state and local level, policies that encourage community partnership schools would also be beneficial in addressing the impacts of social stratification in communities with low socioeconomic status. More community partnership schools mean more community access to medical services, recreational space, and educational services through partnerships with local organizations and institutions. For example, community partnership schools that partner with local farmer's markets would help teach students about horticulture. Moreover, schools that partner with local universities can provide knowledge and support for students on future career options and how to achieve academic goals. Additionally, partnerships with local organizations like the Boys and Girls Club could help students build relationships and strong bonds with others in their community while also providing after-school programs to help working families manage the stressors of a late workday. Lastly, partnerships with health care centers will help families address health-related issues that may otherwise go undiagnosed, therefore, limiting its impact on student academic outcomes.

Social Work Practice

There are a few implications for social work practice that can be drawn from this study. Employment and vocational services should be readily available within areas of social disorganization to allow individuals in the area access to local employment opportunities. The study results can provide guidance regarding which block groups within a school's catchment zone require the most employment assistance services. If employment opportunities become available and there is an increase in academic success, it would suggest that the approach works

and can be applied to similar areas of social disorganization. Moreover, In addition to employment opportunities, financial literacy programs may be beneficial in areas where poverty and low employment levels are highest. According to the study results, high levels of employment did not reduce poverty in several block groups. Rather than focusing on individual students and their families, a community enhancement approach should reduce the effect of social and economic factors on academic outcomes. Furthermore, as we push for equality and equity across racial lines, it is paramount that we find a way to remove race from the conversation around social disorganization.

Moreover, in communities where students are struggling academically, community-based social workers will be more informed on which social disorganization indicators are affecting the community the most as it relates to student academic outcomes. The community social workers can then tailor services to the specific indicators to reduce their impact on academic success. Moreover, social workers can assist socially disorganized communities with establishing some level of civic engagement with the intention of establishing civic capacity. The more civic capacity a community has, the less social disorganization that should be present within the community (Sampson, 2012).

APPENDIX: IRB LETTER

UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

NOT HUMAN RESEARCH DETERMINATION

August 10, 2020

Dear Courtney Wilson:

On 8/10/2020, the IRB reviewed the following protocol:

Type of Review:	Initial Study
Title of Study:	An assessment of ecological factors on 5th and 6th grade academic success: A GIS model.
Investigator:	Courtney Wilson
IRB ID:	STUDY00001971
Funding:	None
Grant ID:	None
Documents Reviewed:	• HRP-251- FORM - Faculty Advisor Scientific-Scholarly Review (1).pdf, Category: Faculty Research Approval; • Not Human Subjects Research Determination Form, Category: IRB Protocol; • Study variables.docx, Category: IRB Protocol;

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.

IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human in which the organization is engaged, please submit a new request to the IRB for a determination. You can create a modification by clicking **Create Modification / CR** within the study.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

UNIVERSITY OF CENTRAL FLORIDA

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

Racine Jacques, Ph.D.
Designated Reviewer

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