

The Effect of Toxic Stress on Brain Development: A Focused Study Of Hispanic Elementary School Children In An Urban Setting

PERSONAL STATEMENT

“To infinity and beyond!” (Toy Story)

There is an infiniteness to the universe - countless sets of explanations for age-old questions - some resolved and some that continue to puzzle present-day researchers.

Astronomists can view telescopic pictures of the formation of the universe from billions of years ago, but here on earth, we are unable to provide equal and sustainable conditions for all humans. We study the birth of the planets, the origin of deadly viruses, and the ancestral genetics of living things, yet what bewildered me was how we could explore the vastness of the past and ignore the circumstances of the present.

Driven by relentless curiosity, I was determined to answer these questions. Everyday I was faced with these issues in my community, low income conditions that impacted family life, and ultimately affected the work of the children. Everyday was a reminder that this global issue could not remain untouched. I then decided to be part of the change.

Initially research was merely a tool to pursue my passion of studying how our environment impacted children coming from first generation, low income families. Since I attend a STEM oriented school, I took advantage of my opportunities and participated in our incredible research program. My prior interests were in psychology and public policy, so diving into a neuroscience focused project was intimidating, yet exhilarating as I was able to control the angle of my research. Uncertain at first, glancing at papers soon turned to indulging in literature and a summer program became a lifelong dream: making a change through behavioral science research. I urge all high school students to make the most of any resources provided because you never know what you will fall in love with. Trying new things, learning about different cultures, and constantly seeking new knowledge is the key to success; it enables you to be in touch with the world and see clearly what your role will soon be in the advancement of it. I am still in the pursuit of answers and forever will be, whether it be through professional research or the meeting and interactions of those around me. That is the beauty of research - it is about constant and unrelenting questions, one's that tap into your curiosity and push you to become more analytical, present, and aware than you have ever been before. My research was not only a scientific deconstruction of Union City, but also served as an opportunity to fundamentally interact with the members of my community. Research became an avenue that allowed me to speak to those around me, represent them, and ultimately uplift them. High school students should be proud of what they have accomplished, but I urge them to always

show unconditional gratitude and love to those that have supported and sustained them. For me, it was my community, family, and friends - all of whom are always in my heart, as I carry them through all my hills and valleys.

In order to reap all the fulfilling benefits from your research, I encourage all high school researchers to ensure their project targets a real world problem and that, as a scientist, you are contributing to the betterment of society. It is imperative that young researchers understand and implement this message, as they are the future of not only the research and development field, but also the architects for pharmacology, climate control, public health, and numerous issues that inherently impact all those around the globe.

As part of my personal mission, I prompt everyone to go out there- seek a great unknown, and find an answer to it; It by no means has to be in any conventional way you may think. We all have the potential to improve the environment around us through any method found fascinating; never let a topic merely interest you, dig deeper and become absorbed in the boundless discoveries that are waiting to be unveiled. Do not let infinity frighten you - do what you love, explore all avenues, strive to change the world - and you will go beyond.

ABSTRACT

The conditions of low-income living and the prevalence of discrimination have been long studied in African Americans; however, the Hispanic community has long been overlooked in this research, despite their parallel struggles with the pessimistic products of poverty. There is a knowledge gap in the study of adverse stimulation associated with incessant deprivation, bias, prejudice, and stereotypes applied to Hispanics/Latinos. This research focuses on how continuous struggles analogous to poverty affect the brain development and cognitive function of Hispanic children from Union City, NJ: the most densely populated city in the United States with the highest hispanic diaspora in the State of New Jersey. Two surveys were developed utilizing the Likert Scale, a derivative of the Everyday Discrimination Scale, and CDC's Developmental Standards to measure the correlation between the reports of parents' challenges and the teacher's observation of the children. Contrary to previous studies on African American preschoolers in similar living conditions, they revealed that the children of Union City were provided with nutritious foods, proper health care, and little exposure to discrimination. After a careful analysis of the government programs and services provided to the constituents of Union City, it could be confidently concluded that these results are due to a unique administration and "close-knit" community. This integration of neurological studies and sociology sets an example for the governments of other low-income communities to implement, refine and improve the children's prospects and reduce developmental issues within their towns.

OVERVIEW

The effects of a family's financial stability on a child have been a prominent topic in psychological and epidemiological research after the boom of the second world war took hold the “American Suburb” grew and it became evident that a number of social and economic challenges adversely impacted numerous American minority communities. There have been past studies investigating the effects of stimulant factors, including discrimination and socioeconomic status, on various ethnic and racial groups, the majority of these samples being on African Americans.



Figure A: Union City Geographical

The project outlined in this paper focuses on how continuous struggles analogous with poverty affects the brain development and cognitive function of Hispanic children from low-income communities. The study group chosen was citizens from Union City, a city in New Jersey, which has a rich history of immigrant populations. It should also be noted that Union City is an urban setting directly across the Hudson River from New York City and has the highest Hispanic population density in the United States. Currently it has the highest Hispanic population in the state of New Jersey. With the largest proportion of the residents identifying as Hispanic/Latino and the majority of whose school-age children come from low-income, non-English speaking homes it was a perfect setting for conducting to understand this population. With a combination of 2 surveys, developed utilizing the Likert Scale, a derivative of The Everyday Discrimination Scale, and CDC developmental standards, a coding system is established to measure the correlation between the reports of the academic level of pre-school and elementary children in Union City. Scores are taken from each survey resulting in numerical data and compared to identify a correlation between the two variables. Additionally, the integration of neurological studies into behavioral science would allow researchers to gain a better understanding of why children in poverty have reduced prospects and a greater rate of developmental issues in a broader sampling of children, which, based on current census data, is more representative of our countries make-up. With better and more substantial knowledge of the biological influence of the reduced and overabundant stimulation

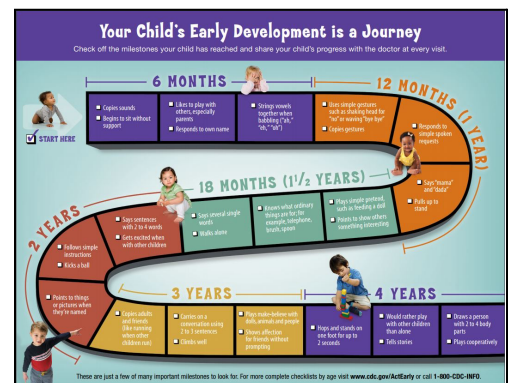


Figure B: CDC Developmental Milestones

associated with low-income living, scientists can identify ways to decrease the negative impacts on children. The results may also address poverty by implementing more effective governmental policies.

Ultimately, the further comprehension researchers gain, the more likely strategies, programs, and procedures will be developed to minimize the adverse outcomes of low-income living.

Toxic Stress

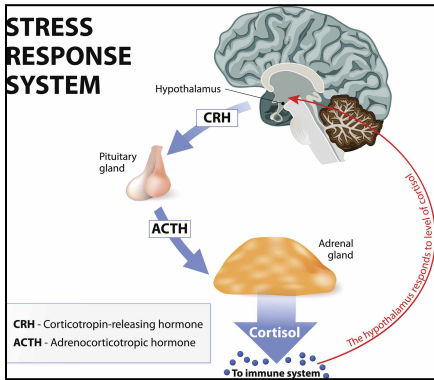
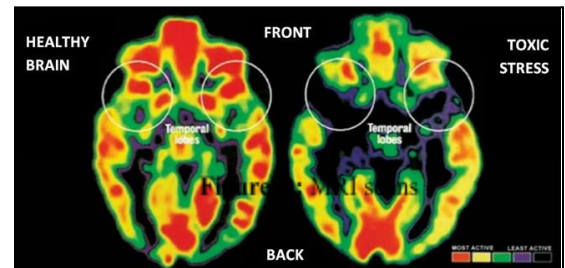


Figure C: Biological Stress Response

Incorporating cognitive neuroscience to explain the reduced prospects of specific socioeconomic demographics introduces toxic stress, defined as prolonged activation of the stress response and cortisol release. The brain’s typical stress response is to release cortisol which allows an individual to become more acutely sensitive to stimulus and enables them to react faster in the case of danger or in order to survive. When presented with a life-threatening situation, this change in awareness is beneficial, yet when an individual’s body must enact this mechanism repeatedly, that is when it becomes toxic stress (Phang, 2017). At a

young and vulnerable age, elementary and pre-school children are more susceptible to being permanently damaged by frequent encounters with toxic stress; when placed in situations that often require a “fight or flight” response, the body’s biological defense to pressure alters and ultimately manifests into health and behavioral complications as they mature. Furthermore, toxic stress at such a young and critical age is associated with decay in neuronal connections

As a result of the constant overstimulation and “revving” of the stress response; as seen in **Figure D**, the temporal lobes, the section of the brain that plays a role in memory, is a victim of severe toxic stress as it contains little activity due to the decrease in synaptic signals compared to that of a normal, healthy brain shown on the right (Parikh, 2017). The incessant need to survive in a low-income environment due to lack of nutritious foods, proper healthcare, and severe discrimination are taxing occurrences that result in overactivated Hypothalamic, Pituitary, and Adrenal glands (Phang, 2017). As a consequence of these damaging effects, the products of impoverished childhood environments often manifest into long-term medical issues, far into adulthood, including heart disease, obesity, depression, ADHD, and anxiety.



The Everyday Discrimination Scale & Past Studies

The Everyday Discrimination Scale is a considerable measure of prejudice in sociology that utilizes questions coded as situational, frequency, and chronicity inquiries (Michaels,

Low-income and African American children are more likely to have stressful childhoods

Share of kindergartners exposed to frightening or threatening childhood experiences, by family income and by race

Number of frightening or threatening experiences:	0	1	2	≥ 3
By family income				
≥ \$20,000	50%	26%	15%	10%
< \$20,000	36%	30%	17%	17%
% more/less likely	-28%	18%	15%	74%
By race				
White	52%	22%	14%	12%
Black	36%	32%	18%	14%
% more/less likely	-31%	45%	29%	21%

Notes: Data are based on a study sample of 1,007 children who were born between 1998 and 2000 and were age 5 at the time these data were collected (2003–2005).
Source: Manuel E. Jimenez et al., "Adverse Experiences in Early Childhood and Kindergarten Outcomes," *Journal of Human Capital*, 2013, 7(2), 207–220. [Original Study](#)
Table 6

Figure 10: Effect of Toxic Stress of African American Kindergartners
Economic Policy Institute

2019). These sets of questions were developed by David R. Williams, a prominent figure in epidemiology and the most cited researcher in his respective field in the past decade. His ingenious development of the everyday Discrimination Scale has resulted in it being a recurring component of numerous scientific studies; however, most of

These investigations focus on African Americans and their encounters with injustice. Often, it is implemented to examine the medical implications of African Americans who are frequently exposed to chronic discrimination and the correlation between these encounters and health disparities. Discovering the chronicity section of questions to be most accurate, a team of epidemiologists at UC Berkeley concluded a correspondence between hypertension, depression, and experience with discrimination (Micheals, 2019).

Additionally, conditions of low-income living are explored in numerous populations of African Americans and how it interferes with the healthcare and academic performance of the developing child; in one study, African American children covered by Medicaid are observed for an abnormal severity and frequency in asthmas cases (Ebell, 2019); in another paper, the effect of toxic stress due to the socioeconomic status of their family and neighborhood are observed in African Americans to explain the “disrupted physiological functioning and depressed academic achievement,” in the students (Morsy, 2019). These studies yield beneficial information for the overall progression of society, yet, in retrospect, lacks diversity and dynamics. Without comparing other demographics suffering in the same situation, the research does not consider whether these outcomes are genetic and not a consistent factor throughout ethnically varied, impoverished, and minority populations. By conducting similar investigations on a populace with similar experiences with the adverse stimulation associated with poverty, Hispanics/Latinos, scientists can begin to identify if these disparities in health and learning prospects are native to one group or a uniform observation corresponding with a set of environmental conditions.

Problem Statement & Hypothesis

Problem Statement: There is not enough research regarding the adverse effects of low-income living and discrimination on the Hispanic and Latinx community.

Hypothesis: The Union City Hispanic population will yield similar results to those observed in the African American preschoolers when comparing their incessant exposure to toxic stress as a factor that inhibits students’ prospects.

METHODOLOGY

Considering the research is survey-based, the questions needed to be formatted uniformly and in a manner that allows for straightforward interpretation and coding.

Therefore, utilizing the commonly used Likert Scale ensured the questions remained consistent throughout and could be compared between the two surveys (teacher and parent). Along with incorporating

the Everyday Discrimination Scale by David Williams and CDC Developmental Standards For Elementary And Preschool Students,

questions were generated to appropriately measure the family dynamic, developmental level, and overall behavior of the children of Union City. The parent survey is split into three sections: food accessibility, healthcare, and discrimination. The teacher survey contained the same sections for convenient comparison; however, it had an additional component to measure the average academic performance of the students. After the surveys were finalized and approved by the superintendent of Union City Public Schools, Ms. Silvia Abotto, they were ready to be distributed throughout the Union City elementary and preschools. The first round of data collection was administered through a google form link sent to the schools and a letter explaining the project's significance to the survey participants. This initial distribution yielded about 50% of the total responses. The data from both surveys was used to draw preliminary conclusions on the observed topics of healthcare, food, discrimination, and academic performance. The second round of distribution was through the digital survey and hard-copy prints of the introduction letter and surveys that were delivered to the schools and collected once they were completed. The second round of data was analyzed for the same four categories and compared to the first round for any disparities. After the analysis, I studied the differences between past studies and the conditions of Union City to draw conclusions and explain the variation in results.

Items

1. Frequently treated with less courtesy than others
2. Frequently treated with less respect than others
3. Frequently received poorer service than others
4. Frequently people think you're not smart
5. Frequently people are afraid of you
6. Frequently people act like you are dishonest
7. Frequently people act better than you
8. Frequently called names/insulted
9. Frequently threatened/harassed

Survey Specification and Structure

Teacher Survey

The parents survey contained 32 questions while the teacher survey consisted of 35 questions.

There are four sections in both surveys, with an additional "Child Learning" section in the teacher survey: Demographics, Child Learning, Food, Discrimination Healthcare

The demographic portion includes inquiries on the child's household income, gender, and ethnicity.

The following section, Child Learning, investigates students' performance in school according to CDC Developmental Standards expected of their age. Some Child Learning examples and multiple-choice selections (Likert Scale) are shown below:

1. When a student speaks, their words are coherent and understandable...

Never

- Rarely, less than 10% of the time
- Occasionally, about 30% of the time
- Sometimes, about 50% of the time
- Frequently, about 70% of the time
- Usually, sound 90% of the time
- Every time

Teacher: The Food section examines the food provided by the school and asks teachers about the lunches brought from home. This helps analyze the nutrition source and determine whether improvement is needed at home or school.

1. The lunches students bring from home are often nutritious and promote healthy development.
2. The school provides nutritious foods for all students.

Parent: Questions on the food source, access to nutritious food, and knowledge on the required fruit, vegetable, and lean protein intake for developing children.

1. Are you aware that your child must eat 1-2 cups of fruits and 1-3 cups of vegetables a day?
2. What is stopping you from having access to nutritious foods? (select all that apply)

Teacher: The Discrimination section, similar to the food portion, identifies the differences of environments in school, home, and the public. By comparing the discrimination data provided by the parents, we can determine if the Union city schools are a safe environment for the children and genuinely narrow down the source of prejudice. Examples:

1. All students are treated with equality at my school
2. The teachers at my school create a comfortable environment for students of all cultures, religions, skin colors, and other personal traits.

Parent: Inquiries about injustice experienced in public, any direct reports of discrimination from their child, and the effect of the Black Lives Matter Movement on the perception of themselves in society.

1. You feel that you have to work twice as hard because of your ethnicity/nationality compared to individuals of another race.

2. The Black Lives Matter Movement has made you more aware of the disadvantages caused by your ethnicity/nationality.

Teacher: In the health section, the teachers are asked to report on the appearance of the child and their observed physical health. Also, the frequency of absence due to doctor’s appointments indicates care for the child’s wellbeing and correlates with the healthcare section of the parent survey.

1. Parents are prompted to remove their sick children from school to receive medical attention.
2. Students are absent due to physical checkups/exams.

Parent: The parent section focuses on whether the child has access to quality healthcare and if parents are able to take their child to receive medical attention.

1. My child's health care is covered under government Medicaid.
2. You experienced a language barrier that has prevented you from making a doctor's appointment for your child.

RESULTS & DISCUSSION

Data Collection R.1 **Demographics**

Highlighted in red indicated 56.3% of families who participated in the survey are living under the Federal Poverty Level (FPL)

(**Figure 1**), and 56.7% of children are covered under Medicaid

(**Figure 2**). Furthermore, 90.1% of parents and 80% of teachers

are Hispanic (**Figure 3**), establishing the study population

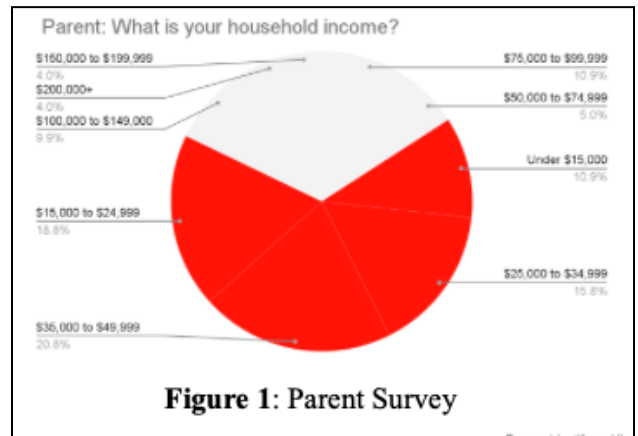


Figure 1: Parent Survey

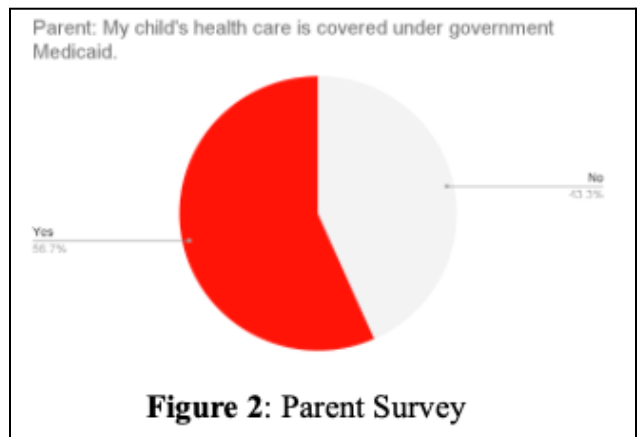


Figure 2: Parent Survey

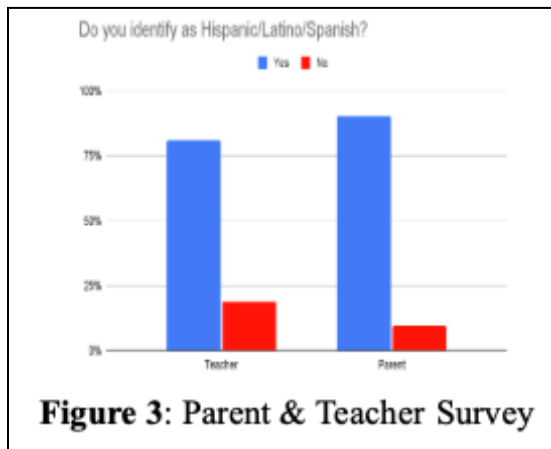
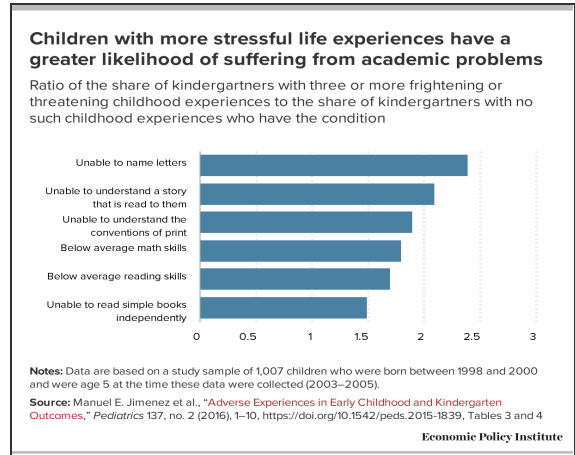


Figure 3: Parent & Teacher Survey

Data Collection R.1 **Education**

In previous research conducted on a group of African American Kindergarteners with similar ages and socioeconomic status as my studied population, researchers found that due to toxic stress, there was a decrease in academic achievement (Morsy, 2019) indicated by the unfulfillment of CDC Developmental Milestones as seen in **Figure 5**.



In contrast, the data portrayed that teachers believed the majority of the students are learning at an appropriate level, demonstrating understanding, and social skills in the classroom. According to these results, it could be concluded that contrary to the study conducted on African Americans, Union City Hispanic students living in comparable conditions and meet the developmental standards for their age.

Data Collection R.1 **Food Accessibility**

19% of teachers disagree that the lunches from home are nutritious and promote healthy development. Furthermore, 47.6% of teachers chose “Neither agree or disagree,” indicating a reluctance to answer the question. These results correlate with those extracted from the parent survey. 32.2% of parents report that they do not have access to nutritious foods due to factors associated with low-income living such as expenses, limited transportation, and available time. Although it is not a majority, 32.2% is a large number considering that developing children require nutritious foods to mature properly. Due to this inability to acquire nutritious food, the teachers, in turn, report unhealthy lunches from home. However, students are still attentive and engaged in school activities, suggesting that their energy derives from the school lunch which is reported to be nourishing and

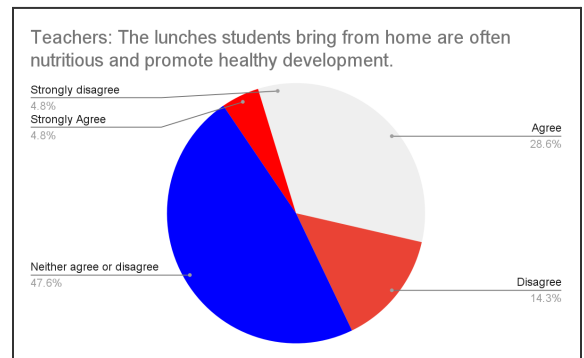


Figure 6: Lunch from home

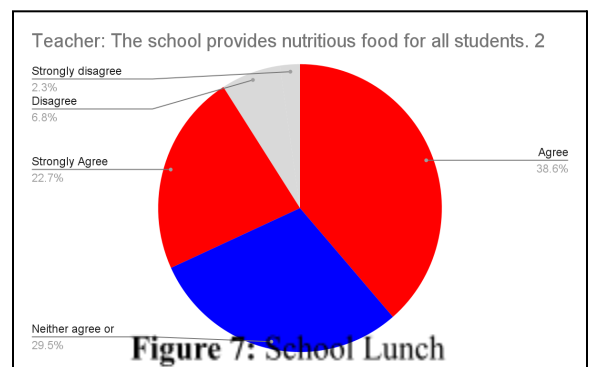


Figure 7: School Lunch

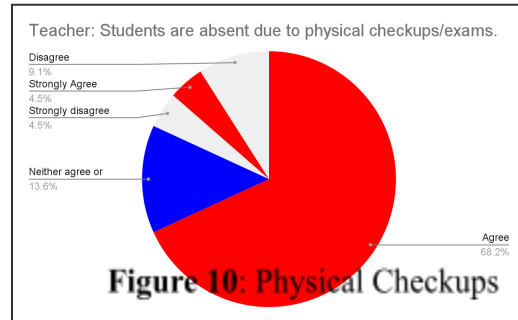
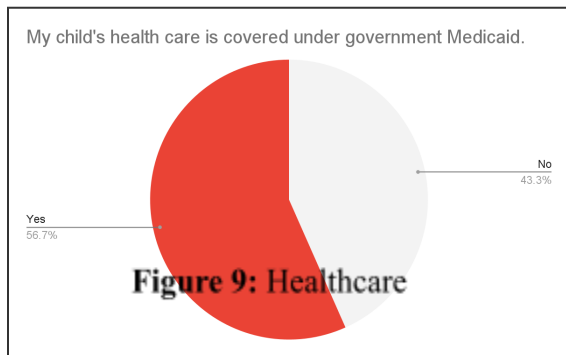
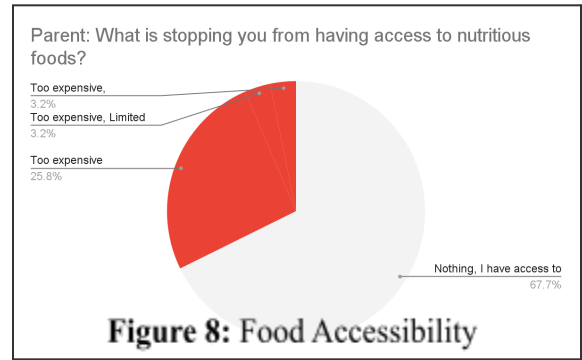
encourages hearty growth (**Figure 7**).

Data Collection R.1 Healthcare Accessibility

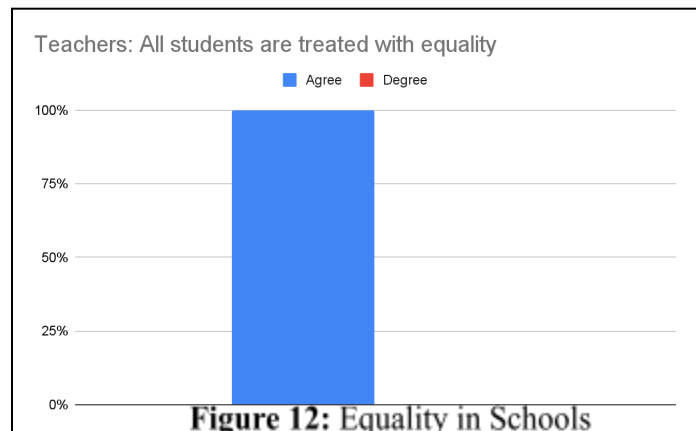
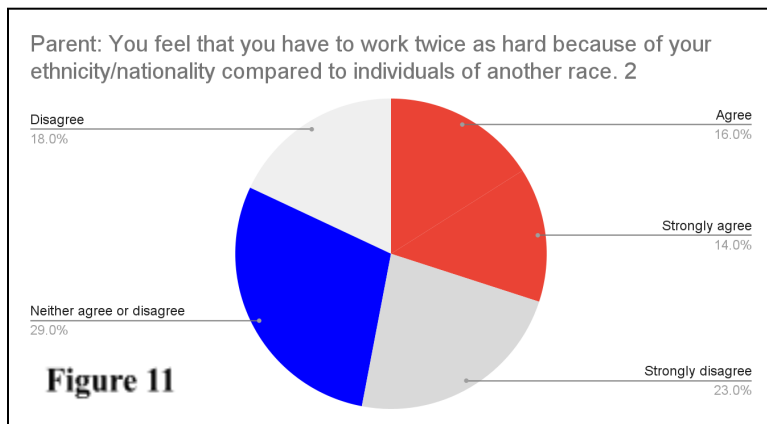
56.7% of children are covered under government Medicaid insurance (**Figure 9**). Typically, communities with most residents covered under Medicaid have poor quality healthcare since the offices are low-budget and government funded (Dayaratna, 2012). Due to the

“significantly poorer outpatient care” associated with Medicaid, one would assume that a community with a majority of the children covered under Medicaid would not have access to quality medical care.

However, the parent and teacher surveys depicted that Union City is quite the opposite; teachers report that students are often absent due to physical checkups and exams, exemplifying care for the children’s health (**Figure 10**). Furthermore, on the survey, the parents chose that they are prompt to remove their child from school when they are sick, contradicting the idea that low-income families do not have time to care for a sick child because the parents must prioritize the acquisition of money to support their families.



Data Collection R.1 Discrimination Exposure



As shown in **Figure 12**, 100% of teacher participants reported that all students are treated with equality at the schools they work in. This indicates that ALL teachers who answered the survey believe the schools are a safe and comfortable space for students of all backgrounds. However, 30% of parents agree that they must work twice as hard to obtain the same benefits as an individual of a different background; 29% of parents demonstrate a reluctance to respond to this question (**Figure 11**). This contradicts the responses provided by the teachers, which indicates that the Union City School administrations ensure that the learning environment is one established on equality despite the reality that the student's parents face outside the classroom.

APPLICATIONS

The information collected in this research is essential in understanding why Union City is a successful community despite its demographic of low-income families. By evaluating the action taken by the Union City government and school system (who have developed a unique and working partnership), other communities in the same conditions can replicate these results by implementing similar programs. Through this research, Union City will stand as a model for other communities, as it has for many years. Furthermore, this research will explain state and regional taxes and justify the distribution of the funding, as it is being utilized for the improvement of society and the nurturing of future generations. It should be noted that Union City's success in educating inner city youth has been so successful as a system as it was the focus of the book improbable Scholars:The Rebirth Of The Great American School System (Kirp, 2015) .In particular taking note that the city and the board of education worked cohesively to educate the students and provide the necessary services in order for them to find academic success. As this research shows this is still true especially when it comes to its youngest (prek-grade 1) and most vulnerable scholars whose brains are at highest risk.

FUTURE RESEARCH

In the future, further exploration of other minority communities such as Indigenous People and Pacific Islander performing the same research to compare the data and determine if the results are continuous throughout similar populations. Also investigating wealthy, white American communities to truly identify if toxic stress is the cause of these disparities in brain development between high and low income groups. An integration of more aspects of neurological studies which would include imaging studies and the use of brain scans, analysis of neuronal activity, or measure of levels of cortisol between both populations would allow for a deeper insight and more in depth medical analysis that at this point has not been explored. As a direct application of the data gathered from this project that will lead to action is a presentation of the findings to Brian P. Stack, the mayor of Union City and NJ State Senator,

and an explanation of how the results can be implemented in governmental policies to aid the young children of New Jersey and hoping one day the entire United States.

References

Brown, T. T., & Jernigan, T. L. (2012, December). *Brain development during the preschool years*. Neuropsychology review. Retrieved February 5, 2022, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3511633/>

Centers for Disease Control and Prevention. (2019, May 30). *A multicomponent, multi-trigger intervention to enhance asthma control in high-risk African American children*. Centers for Disease Control and Prevention. Retrieved February 5, 2022, from https://www.cdc.gov/pcd/issues/2019/18_0387.htm

Centers for Disease Control and Prevention. (2021, August 10). *Important milestones: Your baby by Five Years*. Centers for Disease Control and Prevention. Retrieved February 5, 2022, from <https://www.cdc.gov/ncbddd/actearly/milestones/milestones-5yr.html>

Centers for Disease Control and Prevention. (2021, August 10). *Important milestones: Your baby by Four Years*. Centers for Disease Control and Prevention. Retrieved February 5, 2022, from <https://www.cdc.gov/ncbddd/actearly/milestones/milestones-4yr.html>

Choi, J.-K., Wang, D., & Jackson, A. P. (2019, September 12). *Adverse experiences in early childhood and their longitudinal impact on later behavioral problems of children living in poverty*. Child Abuse & Neglect. Retrieved February 5, 2022, from <https://www.sciencedirect.com/science/article/abs/pii/S0145213419303588?via%3Dihub>

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Dayaratna, K. D. (n.d.). *Studies show: Medicaid patients have worse access and outcomes than the privately insured*. The Heritage Foundation. Retrieved February 5, 2022, from

<https://www.heritage.org/health-care-reform/report/studies-show-medicaid-patients-have-worse-access-and-outcomes-the>

Dellwo, A. (n.d.). *What is cortisol?* Verywell Health. Retrieved February 5, 2022, from <https://www.verywellhealth.com/cortisol-what-it-is-its-functions-associated-conditions-5208916>

Epitomes - *europemc.org*. (n.d.). Retrieved February 5, 2022, from <https://europemc.org/backend/ptpmcrender.fcgi?accid=PMC1003149&blobtype=pdf>

Everyday Discrimination Scale. (n.d.). Retrieved February 5, 2022, from <https://scholar.harvard.edu/davidrwilliams/node/32397>

Everyday experiences of discrimination among Chicago parents. Lurie Children's. (n.d.). Retrieved February 5, 2022, from <https://www.luriechildrens.org/en/voices-of-child-health-in-chicago/everyday-experiences-of-discrimination-among-chicago-parents/>

Harnois, C. E., Bastos, J. L., Campbell, M. E., & Keith, V. M. (2019, May 14). *Measuring perceived mistreatment across diverse social groups: An evaluation of the everyday discrimination scale*. *Social Science & Medicine*. Retrieved February 5, 2022, from <https://www.sciencedirect.com/science/article/abs/pii/S027795361930276X>

How developmental neuroscience can help address the ... (n.d.). Retrieved February 5, 2022, from <https://childemotion.waisman.wisc.edu/wp-content/uploads/sites/318/2021/01/how-developmental-neuroscience-can-help-address-the-problem-of-child-poverty.pdf>

Marks, H. (n.d.). *4-to-5 Year Old Child Developmental Milestones*. WebMD. Retrieved February 5, 2022, from <https://www.webmd.com/parenting/4-to-5-year-old-milestones#1>

McCoy, D. C. (2016, July 14). *Measuring development in children from birth to age 3 at population level*. Bernard van Leer Foundation. Retrieved February 5, 2022, from <https://bernardvanleer.org/ecm-article/2016/measuring-development-children-birth-age-3-population-level/>

Measurement. USDA ERS - Measurement. (n.d.). Retrieved February 5, 2022, from <https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/measurement.aspx>

Michaels, E., Thomas, M., Reeves, A., Price, M., Hasson, R., Chae, D., & Allen, A. (2020, December 14). *Prime pubmed: Coding the everyday discrimination scale: Implications for exposure assessment and associations with hypertension and depression among a cross section of mid-life African American women*. PRIME PubMed | Coding the Everyday Discrimination Scale: implications for exposure assessment and associations with hypertension and depression among a cross section of mid-life African American women. Retrieved February 5, 2022, from https://neuro.unboundmedicine.com/medline/citation/30894420/Coding_the_Everyday_Discrimination_Scale_implications_for_exposure_assessment_and_associations_with_hypertension_and_depression_among_a_cross_section_of_mid_life_African_American_women_

Oxford University Press. (1753, January 1). *Pediatrics*. American Academy of Pediatrics. Retrieved February 5, 2022, from <https://publications.aap.org/pediatrics>

Poverty, Stress, and Brain Development: New Directions for Prevention and Intervention. Define_me. (n.d.). Retrieved February 5, 2022, from [https://www.academicpedsjnl.net/article/S1876-2859\(16\)00026-7/pdf](https://www.academicpedsjnl.net/article/S1876-2859(16)00026-7/pdf)

Report • By Leila Morsy and Richard Rothstein • May 1. (n.d.). *Toxic stress and children's outcomes: African American children growing up poor are at greater risk of disrupted*

physiological functioning and depressed academic achievement. Economic Policy Institute.

Retrieved February 5, 2022, from

<https://www.epi.org/publication/toxic-stress-and-childrens-outcomes-african-american-children-growing-up-poor-are-at-greater-risk-of-disrupted-physiological-functioning-and-depressed-academic-achievement/>

RR;, C. U. S. M. E. R. H. (n.d.). *Experiences of discrimination are associated with greater resting amygdala activity and functional connectivity*. *Biological psychiatry. Cognitive neuroscience and neuroimaging*. Retrieved February 5, 2022, from <https://pubmed.ncbi.nlm.nih.gov/29628069/>

Survey tools. USDA ERS - Survey Tools. (n.d.). Retrieved February 5, 2022, from

<https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/survey-tools.aspx>

Toxic stress: A threat to the futures of millions of children. The EDIT Blog. (2017, November 6).

Retrieved February 5, 2022, from

<https://blogs.kcl.ac.uk/editlab/2017/11/06/toxic-stress-a-threat-to-the-futures-of-millions-of-children/>

WebMD. (n.d.). *6 Year Old child developmental milestones*. WebMD. Retrieved February 5, 2022, from <https://www.webmd.com/parenting/guide/child-at-6-milestones>