



# A Statistical Representation of the Inequities Encountered by African Americans Living in Atlanta During COVID: A Time for Action

John M. Trimboli<sup>1</sup>

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## Abstract

This research analyzes the statistically significant differences that exist between Blacks and Whites living in Atlanta via their social, economic, educational, and housing characteristics during COVID. Hypothesis tests confirmed what visual scatterplots and correlations inferred. The statistics overwhelmingly substantiate that all six of the important quality of life metrics viewed in this study are more favorable towards predominately White neighborhoods, as opposed to predominately Black neighborhoods. In particular, neighborhoods with a super majority of White residents tended to have higher life expectancies at the times of their births, sustained lower violent crime rates, held higher median household incomes, had a smaller percentage of its children living below the poverty level, had higher percentages of residents with at least a high school diploma, and maintained more occupied housing units, when compared to neighborhoods with a super majority of Black residents.

**Keywords** Racial inequities · Structural racism · Reparations · Poverty and youth · Violent crime

## Introduction

Growing up in New York State, what I distinctly remember learning about Atlanta, Georgia in grade school in the 1970s, had to do with the Civil War and Civil Rights. We learned General William Tecumseh Sherman burned Atlanta on his “March to the Sea,” and Dr. Martin Luther King, Jr. was a preacher at Ebenezer Baptist Church in Atlanta. We also learned the Civil War was mostly fought over slavery, and MLK died as the Father of the Civil Rights Movement for Blacks. I presume these facts

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✉ John M. Trimboli  
john.trimboli@mga.edu

<sup>1</sup> Mathematics and Statistics, Middle Georgia State University, Mathematics Bldg. Room 224, 100 University Parkway, Macon, GA 31206, USA

are still taught in some form to grade school children all over our county today. Therefore, race has played a central role in the history of Atlanta.

Historically, according to [Atlantaga.gov](https://atlantaga.gov), “Atlanta was founded in 1837 as the end of the Western & Atlantic railroad line (it was first named Marthasville in honor of the then-governor’s daughter, nicknamed Terminus for its rail location, and then changed soon after to Atlanta, the feminine of Atlantic—as in the railroad).” Factually, “Atlanta was named the fifth capital (of Georgia) in 1868.” (Peterson, 2017). In many important courses of action, Atlanta has come a long ways since its deep racial strife from the Civil War to the Civil Rights eras. Today, Atlanta is home to Hartsfield-Jackson Atlanta International Airport, which, according to *Air New Zealand* (2022), has been the busiest airport in the world (by passenger traffic) since 1998. Its traffic in people in 2015 was 101,491,106. *World Population Review* (2022) reports that Atlanta had a 2020 population of 532,695, is the largest city in Georgia, and is the 36th largest city in the USA. It also reports that Atlanta ranks 10th economically in the nation with a GDP of \$276 billion, it spans over 137 miles and has a population density of 3924 people per square mile.

Presently, the city of Atlanta is comprised of 103 Neighborhood Statistical Areas (NSA). ([Georgia Association of Regional Commissions](https://georgiaassociationofregionalcommissions.org)). As enumerated by the *Statista Research Department* (2022), Atlanta is the eighth largest metropolitan area in U.S. population overall (as of 2021), and second-largest region in the Census Bureau’s Southeast region behind Greater Washington. *World Population Review* (2022) reported that according to the most recent American Community Survey (ACS) of the U.S. Census Bureau, the two predominate demographic races of Atlanta in 2022 are Black or African American (50.95%) and White (40.90%). In addition, *World Population Review* asserts, “Atlanta is also the 2nd largest majority black metro area in the country.” Racially speaking, [Black Demographics](#) listed Atlanta as the second “blackest city” in America in 2020. They even go as far as calling Atlanta, the “Black Mecca,” due to its offering Black Americans favorable social mobility and entrepreneurship opportunities.

## Statement of the Problem

Fundamentally, racism is a major contributing factor to many of the principal economic and social inequities in the world today. In some embedded ways, remnants of Atlanta’s racial divide remain. The main objective of this research article is to present empirical statistical data displaying the statistically significant differences that persist between Blacks and Whites living in Atlanta via their social, economic, educational, and housing characteristics. There are many forms of racism. This paper focuses on the lasting influences of systemic structural racism. According to [Intergroup Resources](#), “structural racism refers to the ways in which the joint operation of institutions (i.e., inter-institutional arrangements and interactions) produce racialized outcomes, even in the absence of racist intent. Indicators of structural racism include power inequalities, unequal access to opportunities, and differing policy outcomes by race.”

## Method

### Subjects

Subjects in this study are the city of Atlanta's 103 Neighborhood Statistical Areas (NSAs). One of the NSAs is the Atlanta Airport (X05). It was removed from this study because the eight variables being utilized have to do with overall life quality characteristics of the inhabitants who live there. NSA F05, Emory University/Center for Disease Control and Prevention/Children's Health Care of Atlanta, is a new area that was annexed into the city in January 2018, so we do not have crime data for this target period, nor are we able to compare and contrast it to the pre-COVID data years 2012–2016 (Haspel, email communication, June 23, 2022). It too was removed from this study. These two removals leave 101 NSAs that will partake in this statistical inquiry. See Table 1.

Each NSA belongs to a larger Neighborhood Planning Unit (NPU), denoted by a letter A thru Z (except for U). According to [Atlantaga.gov](https://atlantaga.gov), "The City of Atlanta is divided into twenty-five Neighborhood Planning Units (NPU), which are citizen advisory councils that make recommendations to the Mayor and City Council on zoning, land use, and other planning-related matters." Each of these 25 NPUs contain between one and eleven NSAs, referred to as A01, A02, A03, B01, ... Z05, respectively.

### Variables

The eight variables of interest pertain to social, economic, educational, housing, and demographic characteristics of the 101 Neighborhood Statistical Areas that comprise the city of Atlanta. They are 2020 percent not Hispanic, Black or African American Alone ( $X_1$ ), 2020 percent not Hispanic, White alone ( $X_2$ ), the life expectancy at birth for 2010–2015 ( $X_3$ ), the 2021 violent crime rate, per 10,000 population ( $X_4$ ), 2020 median household income ( $X_5$ ), 2020 percent population under 18 years below poverty ( $X_6$ ), 2020 percent of population 25 years and over, high school graduate or higher ( $X_7$ ), and 2020 percent occupied housing units ( $X_8$ ). (see Table 2). With the exception of the  $X_3$  and  $X_4$  variables, all of the data was pulled from the [Data Nexus](https://data.neighborhoodnexus.org/) tool powered by *Neighborhood Nexus*, available at <https://data.neighborhoodnexus.org/>.

**Table 1** Mean, median, standard deviation, minimum, maximum, and total of Atlanta's 101 NSA 2020 populations (in people)

Mean	4837.0
Median	4148.0
Standard deviation	3138.27
Minimum	1,618 (Q01, Midwest Cascade, Regency Trace)
Maximum	22,688 (E07, Midtown)
Total population	488,537

**Table 2** A description of the eight variables used in the Atlanta NSA data

Variable	Description
$X_1$	2020 percent not Hispanic, Black or African American alone
$X_2$	2020 percent not Hispanic, White alone
$X_3$	Life expectancy at birth for 2010–2015
$X_4$	2021 violent crime rate, per 10,000 population
$X_5$	2020 median household income
$X_6$	2020 percent population under 18 years below poverty
$X_7$	2020 percent of population 25 years and over, high school graduate or higher
$X_8$	2020 percent occupied housing units

*2020 Percent Not Hispanic, Black or African American alone.* The minimum value of this demographic variable is 0.4%, the maximum value is 98.5%, the mean is 55.3%, and the standard deviation is 36.6%. The data source is the [U.S. Census Bureau's American Community Survey \(ACS\), 5-year estimates](#). See Table 3.

*2020 Percent Not Hispanic, White alone.* The minimum NSA value of this demographic variable is 0.3%, the maximum NSA value is 96.1%, the mean is 34.0%, and the standard deviation is 32.5%. The data source is the [U.S. Census Bureau's ACS, 5-year estimates](#).

*The life expectancy at birth for 2010–2015,* acts as a value indicator, in that a higher value signifies enhanced community progress. In essence, the higher this number, the longer and healthier are the lives of the residents of the community. Not only does it reflect the general overall health of the inhabitants of a community, but the longer a person lives is a cumulative function of his/her access to good quality health care, better education, avoidance of serious life threatening crime, as well as many other contributing factors. The data source is the [CDC, National Center for Health Statistics \(2018\)](#).

**Table 3** Means, medians, standard deviations, minimums, and maximums of the eight variables

	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$	$X_7$	$X_8$
Mean	55.29	33.95	76.27	71.77	69,217.05	28.45	90.21	88.35
Median	64.90	19.90	76.00	55.20	56,555.86	28.70	91.70	90.30
Standard deviation	36.64	32.53	4.77	59.30	45,650.25	21.83	7.69	5.87
Minimum	0.4	0.3	67.5	0.6	18,099.73	0.0	69.4	62.5
Maximum	98.5	96.1	86.9	278.7	225,000.00*	76.8	100.0	96.4

\*Two of the NSAs, Margaret Mitchell, Paces, Pleasant Hill (A01) and Brookhaven (B05), had their median household incomes set at \$225,000. We can only say for sure that their median household incomes are in excess of \$200,000. According to Moshe Haspel, this statistic is computed using the Census Bureau's recommended method for estimating medians from grouped data. However, this method does not work when the median falls in the top, unbounded category. (email correspondence, June 23, 2022)

There were 1774 data values given for the entire state of Georgia broken down by Census ID tract numbers, of which 288 pertained to Fulton and DeKalb Counties, the two counties comprising Atlanta. According to Tommy Pearce, Executive Director of *The Neighborhood Nexus*, “The NSAs are built from census block groups and do not necessarily align to the boundaries of census tracts. What it does follow are Neighborhood Planning Unit (NPU) boundaries.” (personal email communication on February 24, 2022). In a personal email on February 26, 2022, Moshe Haspel, a data scientist with *The Neighborhood Nexus*, provided this author with the 6652 census blocks within Atlanta in 2010. This allowed for a crosswalk between the 2010 Census blocks and Atlanta’s NSAs. From these two different data sources, I was able to merge them together to come up with a best data value for each of Atlanta’s 101 NSAs as to their life expectancies at birth for 2010–2015. Weighted averages were taken when multiple different Census blocks existed within the NSA tracts. For the data set used in this study, the minimum NSA value is 67.5 years, the maximum NSA value is 86.9, the mean is 76.3, and the standard deviation is 4.8. For comparison, the weighted mean life expectancy at birth for all of the 65,662 census tracts for the entire United States was 78.7 years. (Arias et al., 2018, p. 1). The median life expectancy for Atlanta’s 101 NSAs was 76.0 years.

Nationally, in 2010, the average White female tended to outlive the average Black female (81.3 years compared to 78.0 years, respectively), and the average White male tended to outlive the average Black male (76.5 years compared to 71.8 years, respectively) (Kochanek et al., 2013). Therefore, this length of life variable was selected for this study, to see if this important racial difference also existed in Atlanta in 2015.

*2021 Violent Crime Rate, per 10,000 population* of Atlanta’s 101 NSAs. It is the annual average rate per 10,000, for all violent crimes, 2017–2021, inclusive. The data source was a June 17, 2022 email from Moshe Haspel, Principal Data Scientist, with the Atlanta Regional Commission. This vital safety, economic, and social community variable is important for its serious encompassing costs to individuals, communities, and the nation as a whole. Economically, in year 2017, “Estimated crime costs totaled \$2.6 trillion (\$620 billion in monetary costs plus quality of life losses valued at \$1.95 trillion; 95% uncertainty interval \$2.2–\$3.0 trillion). Violent crime accounted for 85% of costs.” (Miller et al., 2020, Abstract). Communally, “crime generally reduces safety, disrupts order, creates chaos, generates stress and creates serious economic cost. Crime drives away development and investment as no good investor will like to invest in an environment with high crime rate.” (Okpukwie et al., 2021, p. 76).

During COVID, violent crime spikes across America have placed this issue near the very top of our national concerns. Brennan (2022) states,

Americans’ concern about crime and violence in the U.S. has edged up in the past year, and for the first time since 2016, a majority (53%) say they personally worry a “great deal” about crime. Another 27% report they worry a “fair amount,” which places the issue near the top of the list of 14 national concerns—behind only inflation and the economy, and on par with hunger and homelessness.

Severe violent crime fears always lead to the potential risk of urban flight out of our cities. “Most major cities experienced increases in violent crime during 2020,

and crime rates have historically predicted migration changes. The proposed and enacted cuts to police funding were also cited as a reason to leave by some people who feared that crime would increase further.” (Whitaker, 2021). When wealthier citizens leave an urban city, it represents a huge loss in tax revenue to the city, which tends to spiral downward, and lead to a whole host of other devastating circumstances. Case in point, Buckhead, which makes up a good portion of Atlanta’s largest Neighborhood Planning Unit, is trying to break away from the city of Atlanta to create its own city. According to McWhirter (2022),

An increase in violent crime has spurred a movement in Atlanta’s wealthiest and whitest neighborhood, Buckhead, to push harder to secede and create a new city with its own police force. The idea, which has been gaining momentum over the past year, is raising alarm among Atlanta officials worried about a loss of population and tax revenue.

For this 2021 NSA data, the minimum value is 0.6, the maximum value is 278.7, the mean is 71.8, and the standard deviation is 59.3.

*2020 Median Household Income* of Atlanta’s 101 NSAs. The data source is the [U.S. Census Bureau’s ACS, 5-year estimates](#). This variable is a leading gauge of community wealth, and represents another value indicator. The minimum NSA value is \$18,099.73, the maximum NSA value is \$225,000 (see the note at the bottom of Table 3), the mean is \$69,217.05 per NSA, and the standard deviation is \$45,650.25. For contrast, the U.S. Median Household Income in 2020 was \$67,521. (Shrider et al., 2021). Therefore, Atlanta’s median NSA median household income (\$56,555.86) was \$10,965 less than it was for the nation as a whole.

According to statistics from the Federal Reserve, “New data from the 2019 Survey of Consumer Finances (SCF) show that...the typical White family has eight times the wealth of the typical Black family.” (Bhutta et al., 2020). This variable was chosen for this study to see if the statistics for Atlanta, in particular, once again back up this established national racial inequity.

*2020 percent population under 18 years below poverty*, of Atlanta’s 101 NSAs. The data source is the [U.S. Census Bureau’s ACS, 5-year estimates](#). This variable is a leading socio-economic indicator that is inversely related to community health. That is, as the percentage of the NSA that lives in poverty goes up, the overall well-being of the community goes down. The minimum NSA value is 0%, the maximum NSA value is 76.8%, the mean is 28.5% per NSA, and the standard deviation is 21.8%. For comparison, the poverty rate for children under age 18 in America in 2020 was 16.1%. (*Census*, Release Number CB21-151, 2021). Therefore, Atlanta’s median NSA percent population under 18 below poverty (28.7) was 1.78 times that of the nation’s overall percentage.

Nationally, there are historical clear differences in the poverty rates between the races. According to Creamer (2020), “In 2019, the poverty rate for the United States was 10.5%, the lowest since estimates were first released for 1959.... The poverty rate for Blacks was 18.8%.” Again, this particular variable was chosen for this study to view suspected structural racial disparities in poverty levels in Atlanta in 2020.

*2020 percent of population 25 years and over, high school graduate or higher* of Atlanta’s 101 NSAs. The data source is the [U.S. Census Bureau’s ACS, 5-year estimates](#). This variable is a leading social education variable and acts as another

community value indicator. At its foundation, this value represents access to knowledge. The minimum NSA value is 69.4%, the maximum NSA value is 100%, the mean is 90.2% per NSA, and the standard deviation is 7.7%. For the entirety of the country in year 2020, 90.9% of the population aged 25 and older had completed high school (Statista, 2022). Therefore, Atlanta's median NSA percent of population 25 years and over with at least a high school diploma or GED (91.7) was right in line with the nation's percentage as a whole.

According to the [U.S. Department of Education's National Center for Education Statistics](#), for school year 2018–19, the public high school 4-year adjusted cohort graduation rate (ACGR) was 89.4% for White students and 79.6% for Black students. Similarly, this particular variable was selected for this study to examine suspected racial inconsistencies in high school graduation rates in Atlanta in 2020.

*2020 Percent Occupied Housing Units* of Atlanta's 101 NSAs. The data source is [The U.S. Census Bureau's Decennial Census](#). This variable is an important housing variable in that it acts as a value indicator metric, meaning a higher value signifies enhanced community progress. Communities with a high percentage of vacant properties tend to indicate a neighborhood in blight, and therefore, this variable serves as an overall community standard of living value. The minimum NSA value is 62.5%, the maximum NSA value is 96.4%, the mean is 88.4% per NSA, and the standard deviation is 5.9%. Atlanta's 2020 median NSA value (90.3%) was 1.9% above the nation's 88.4% occupied housing units rate in 2020 (*Census, 2020 ACS, DP04*).

In our country's structurally racist past, there were many decades of the discriminatory practice termed *redlining* in America's cities, which had harmful effects on African American neighborhoods.

The term "redlining" was coined by sociologist John McKnight in the 1960s and derives from how the federal government and lenders would literally draw a red line on a map around the neighborhoods they would not invest in based on demographics alone. Black inner-city neighborhoods were most likely to be redlined. Investigations found that lenders would make loans to lower-income Whites but not to middle- or upper-income African Americans. (Hayes, 2021)

Therefore, this housing variable was chosen for this study, to see if the detrimental effects of this racist practice remained in Atlanta in 2020.

## Procedure

When all of this wealth of data was being entered into SPSS (Version 28 was used for all of the statistical analyses presented in this manuscript) for the purpose of a much different research paper entirely, it became readily apparent as to the inequities present in most of these merit variables depending on the racial makeup of the NSA. NSAs with a super majority of White residents tended to have higher life expectancies at the times of their births, sustained lower violent crime rates, held higher median household incomes, had a smaller percentage of its children living below the poverty level, had higher percentages of residents with at least a high school diploma, and maintained more occupied housing units, when compared to NSAs with a super majority of Black residents. In totality combined, these six indicators,

if true, might be summed up as saying, “leading better lives.” However, this was just anecdotal observational data entry evidence. Empirical statistical confirmation is of course, required to support these contentions.

First, a visual inspection of the perceived race differences that exist between the predominately White neighborhoods and the predominately Black neighborhoods in Atlanta will be investigated by examination of scatterplots and Pearson product-moment correlation coefficients. Then, evidence that is more empirical will be explored by performing formal hypothesis tests.

## Results

### The Scatterplots and Correlations Analyses

One could easily argue that to any individual, nothing is more important than their life ( $X_3$ ), health and safety ( $X_4, X_6, X_7, X_8$ ), and wealth ( $X_5, X_6, X_7, X_8$ ), in that particular order. Personally speaking, I view the *life expectancy at birth* ( $X_3$ ), the *violent crime rate, per 10,000 population* ( $X_4$ ), and the *median household income* ( $X_5$ ) as the most influential measures of these three aspects of any individual’s life. See Table 4 to view all of the Pearson correlation coefficients between each of the eight variables.

Figure 1 details a scatterplot of *Life Expectancy at Birth* versus Percentage of Blacks living in Atlanta’s 101 NSAs. The plot contains its regression line and the outer bandwidths of the 95% confidence interval demarked on the plot running parallel to the regression line. The least squares regression line of best fit clearly slopes downwards from the upper left to the lower right. Accordingly, the Pearson product-moment correlation coefficient between the two variables is  $r = -0.746$ ,  $p < 0.001$ . Both of these indicate there is a significant strong negative linear relationship between these two variables. That is, as the percentage of the Black population within the NSAs increases, the life expectancy of the residents tends to decrease. It is worth reminding that correlation is not the same as causation, meaning when two variables are correlated, we cannot conclude that changing the value of one variable will cause a change in the value of the other.

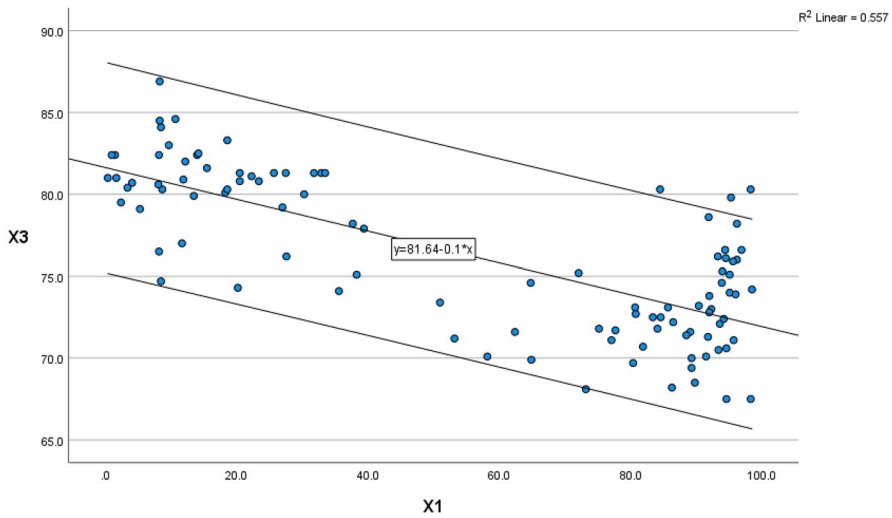
Figure 2, on the other hand, shows that just the opposite is true when it comes to the percentage of Whites living in Atlanta’s 101 NSAs. The least squares regression line of best fit (together with its 95% confidence interval bandwidths) slopes upwards from the lower left to the upper right. Consequently, the Pearson correlation coefficient between the two variables is  $r = 0.751$ ,  $p < 0.001$ . Both of these indicate there is a significant strong positive linear relationship between these two variables. That is, as the percentage of the White population within the NSAs increases, the life expectancy of the residents tends to increase.

The slopes of the two regression lines in Figs. 1 and 2 have a definite interpretation. The slope of  $-0.1$  in Fig. 1 means that for every increase of 10% in the Black population of an NSA, the life expectancy of its residents tends to decrease by 1 year. As for the slope of 0.11 in Fig. 2, the interpretation is that for every increase of 10% in the White population of an NSA, the life expectancy of its residents tends to increase by 1.1 years.



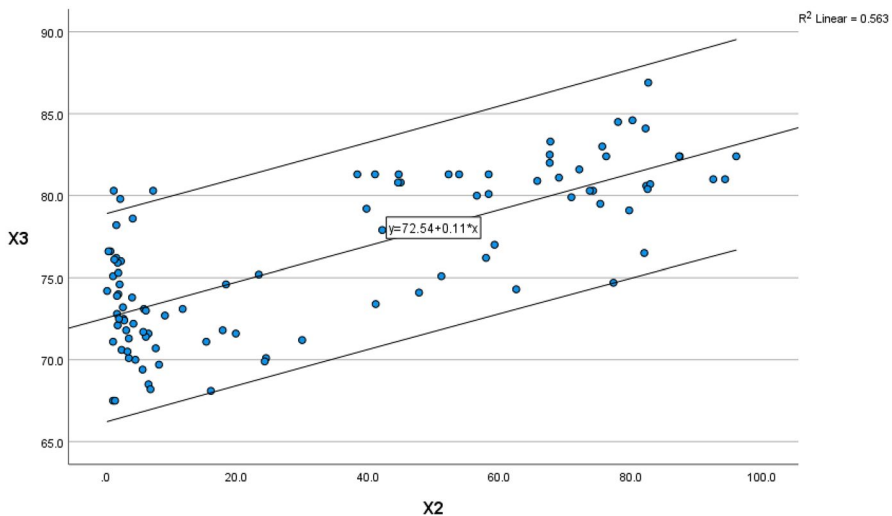
**Table 4** The Pearson correlation coefficients between the eight variables

	$X_1$	$X_2$	$X_3$	$X_4$	$X_5$	$X_6$	$X_7$	$X_8$
$X_1$	1.000							
$X_2$	-0.980	1.000						
$X_3$	0.751	1.000	1.000					
$X_4$	-0.746	0.658	-0.666	1.000				
$X_5$	0.867	-0.727	0.742	-0.663	1.000			
$X_6$	-0.823	0.751	-0.720	0.662	1.000	1.000		
$X_7$	0.769	-0.648	0.708	-0.667	1.000	1.000	1.000	
$X_8$	-0.332	0.37	0.485	-0.611	0.469	-0.389	0.393	1.000

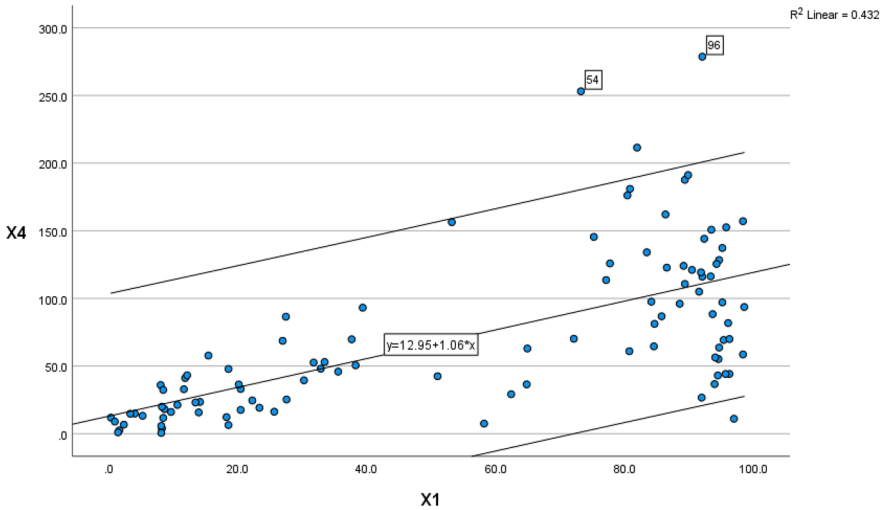


**Fig. 1** Scatterplot of life expectancy at birth for 2010–2015 ( $X_3$ ) versus 2020 percentage of Blacks ( $X_1$ ) living in Atlanta's 101 NSAs, with regression line and 95% confidence interval bandwidths

The same inverse relationship between the two races is seen when it comes to the *violent crime rate, per 10,000 population* metric. Figure 3 shows the least squares regression line of best fit (together with its 95% confidence interval bandwidths) sloping upwards from the lower left to the upper right in the scatterplot of violent crime versus percentage of Blacks living in the NSAs. The Pearson correlation coefficient between the two variables is  $r = 0.658$ ,  $p < 0.001$ . Both of these indicate there is a significant moderately strong positive linear relationship between these



**Fig. 2** Scatterplot of life expectancy at birth for 2010–2015 ( $X_3$ ) versus 2020 percentage of Whites ( $X_2$ ) living in Atlanta's 101 NSAs, with regression line and 95% confidence interval bandwidths

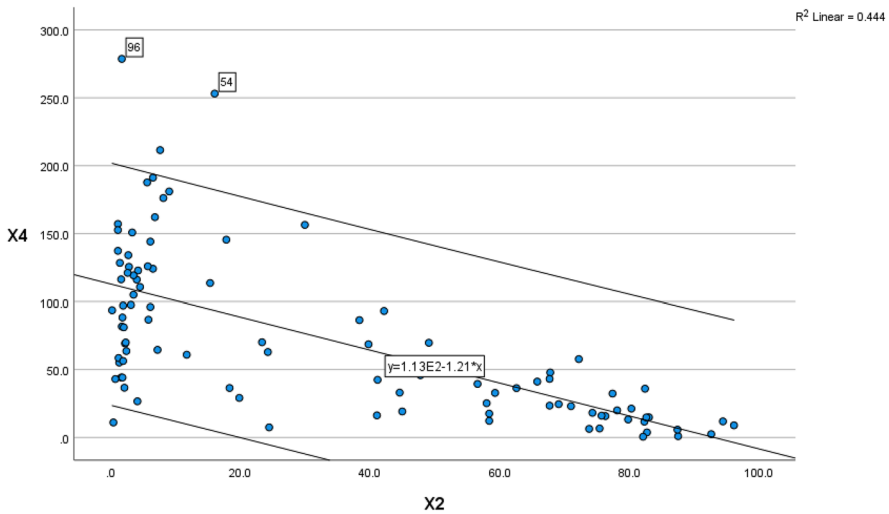


**Note:** Data point 96 is NSA Y04, Lakewood Heights; and data point 54 is NSA L02, English Avenue

**Fig. 3** Scatterplot of 2021 violent crime rate, per 10,000 population ( $X_4$ ) versus 2020 percentage of Blacks ( $X_1$ ) living in Atlanta's 101 NSAs, with regression line and 95% confidence interval bandwidths

two variables. That is, as the percentage of the Black population within the NSAs increases, violent crime also tends to increase. However, there is well-defined heteroscedasticity (unequal error variances) present in the funneling out aspect of the scatterplot. When heteroscedasticity is present, the analysis results may lack precision. In addition, data points 96 (Lakewood Heights, NSA Y04), and 54 (English Avenue, NSA L02), are outliers. Their violent crime rates per 10,000 population are 278.7 and 253.1, respectively. Their actual violent crime rates are way above 110.5 and 90.5, respectively, which are the values predicted by the regression. It is worth noting that the percentage of the population of Lakewood Heights that is Black is 92.0 and the corresponding value for English Avenue is 73.2.

Figure 4 shows the least squares regression line of best fit (together with its 95% confidence interval bandwidths) sloping downwards from the upper left to the lower right in the scatterplot of violent crime rate versus percentage of Whites living in the NSAs. The Pearson correlation coefficient between the two variables is  $r = -0.666$ ,  $p < 0.001$ . Both of these indicate there is a significant moderately strong negative linear relationship between these two variables. That is, as the percentage of the White population increases within the NSAs, violent crime rates tend to decrease. However, there is well-defined heteroscedasticity (unequal error variances) present in the funneling in aspect of the scatterplot, indicating the analysis results may lack accuracy. In addition, data points 96 and 54 are reiterated as outliers. It is worth mentioning that both of these NSAs have unusually high actual violent crime rates, while their percentages of White residents are relatively low, 1.8 and 16.1, respectively.



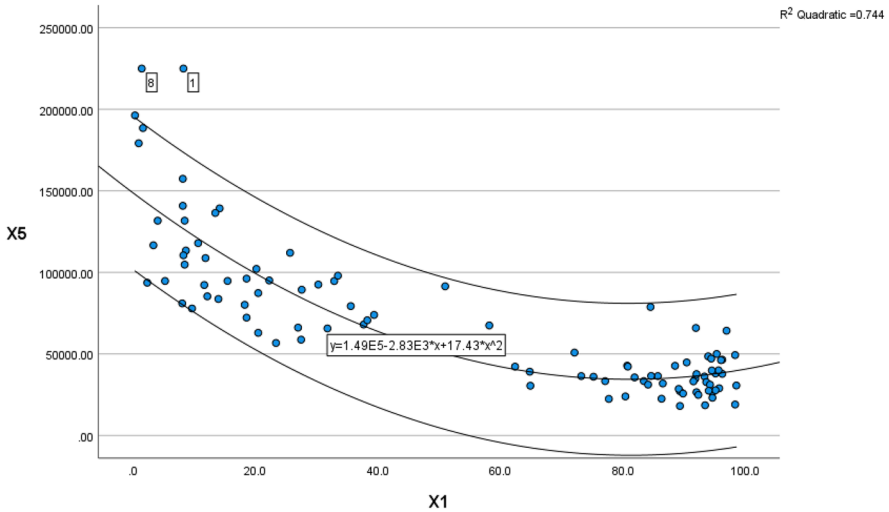
**Note:** Data point 96 is NSA Y04, Lakewood Heights; and data point 54 is NSA L02, English Avenue

**Fig. 4** Scatterplot of 2021 violent crime rate, per 10,000 population ( $X_4$ ) versus 2020 percentage of Whites ( $X_2$ ) living in Atlanta's 101 NSAs, with regression line and 95% confidence interval bandwidths

The slopes of the two regression lines in Figs. 3 and 4 have definite interpretations. The slope of 1.06 in Fig. 3 means that for every increase of 1% in the Black population of an NSA, the violent crime rate per 10,000 of its residents tends to increase by 1.06. As for the slope of  $-1.21$  in Fig. 4, the interpretation is that for every increase of 1% in the White population of an NSA, its violent crime rate per 10,000 of its residents tends to decrease by 1.21.

Since Blacks and Whites make up around 51% and 41% of the total population of Atlanta, respectively, the two variables  $X_1$  and  $X_2$  are unmistakably inversely related. That is, as the percentage of one of the races gets significantly bigger, the percentage of the other race must get significantly smaller. This is evident in the near perfect negative correlation that exists between the two variables,  $r = -0.980$ . As such, the scatterplots and correlations of the six metrics used in this study will mostly be just mirror opposites of each other when viewed for Blacks as compared to being viewed for Whites. This was clearly the case for the  $X_3$  and  $X_4$  variable analyses just performed. Therefore, for the rest of this section, the remaining four variables of interest will only be viewed via the percentage of the largest racial population in Atlanta, the Black population living in the NSAs.

Figure 5 shows that the original scatterplot of 2020 median household income versus 2020 percentage of Blacks Living in Atlanta's 101 NSAs is not fit well by a linear relationship, but by more of a quadratic one. The best fitting quadratic regression model is displayed, together with its 95% confidence interval bandwidths. After a natural logarithmic transformation was performed on the median household income variable, Fig. 6 shows a definite negative slope in the



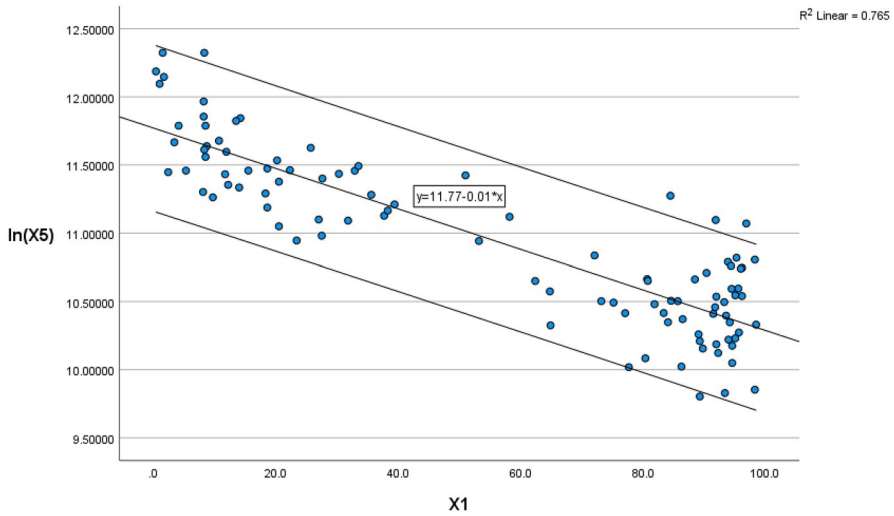
**Note:** Data point 1 is NSA A01, Margaret Mitchell, Paces, Pleasant Hill; and data point 8 is Brookhaven, NSA B05. See the note at the bottom of Table 3

**Fig. 5** Scatterplot of 2020 median household income ( $X_5$ ) versus 2020 percentage of Blacks ( $X_1$ ) living in Atlanta's 101 NSAs, with quadratic regression model and 95% confidence interval bandwidths

regression line (together with its 95% confidence interval bandwidths) through the data. The correlation between these two variables,  $r = -0.874$ , indicates there is a significant strong negative linear relationship between them. That is, as the percentage of the Black population rises within the NSAs, the natural logarithm of the median household income tends to decrease. Statistically, again, some sort of inequity is apparent in the median household income based on race.

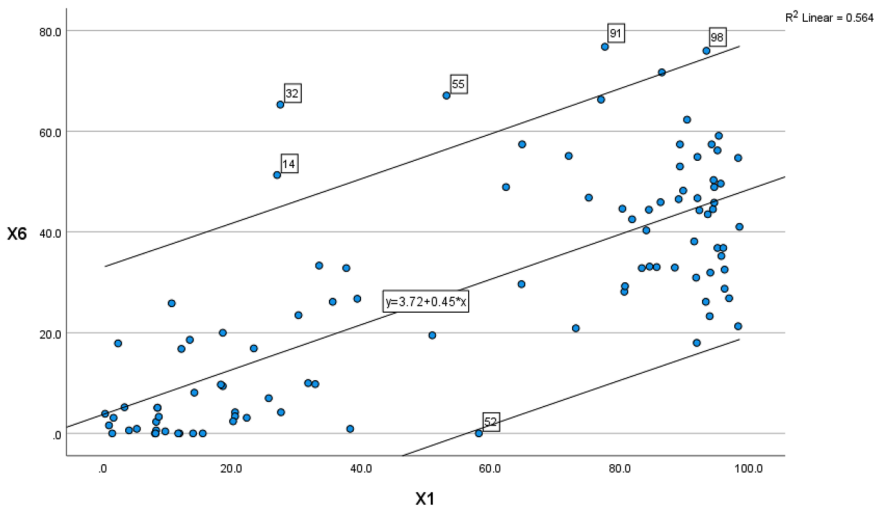
Figure 7 shows the scatterplot of 2020 percent of population under 18 years below poverty versus 2020 percentage of Blacks living in Atlanta's 101 NSAs. The regression line (together with its 95% confidence interval bandwidths) slopes markedly upwards from the lower left to the upper right. Subsequently, the Pearson correlation coefficient between these two variables is  $r = 0.751$ ,  $p$  value  $< 0.001$ . Both of these indicate there is a significant strong positive linear association between these two variables. That is, as the percentage of the Black population within the NSAs increases, the percent of its minor children that live in poverty also tends to increase. Six data points demarked on the plot lie outside of the 95% confidence interval bandwidths for the regression line. Data points 32, 55, 91, and 98 all have greater than 65% of their minor residents living below poverty. Their corresponding percentages of Black inhabitants are 27.5, 53.2, 77.7, and 93.4, respectively.

The slope of the regression line in Fig. 7 has a definite interpretation. The slope of 0.45 means that for every increase of 10% in the Black population of an NSA, the percentage of its population under 18 living below the poverty level tends to increase by 4.5.



**Fig. 6** Scatterplot of the natural logarithm of 2020 median household income  $\ln(X_5)$  versus 2020 percentage of Blacks ( $X_1$ ) living in Atlanta’s 101 NSAs, with regression line and 95% confidence interval bandwidths

Figure 8 details a scatterplot of 2020 percent of population 25 years and over, high school graduate or higher versus percentage of Blacks living in Atlanta’s 101 NSAs. The least squares regression line of best fit (together with its 95%

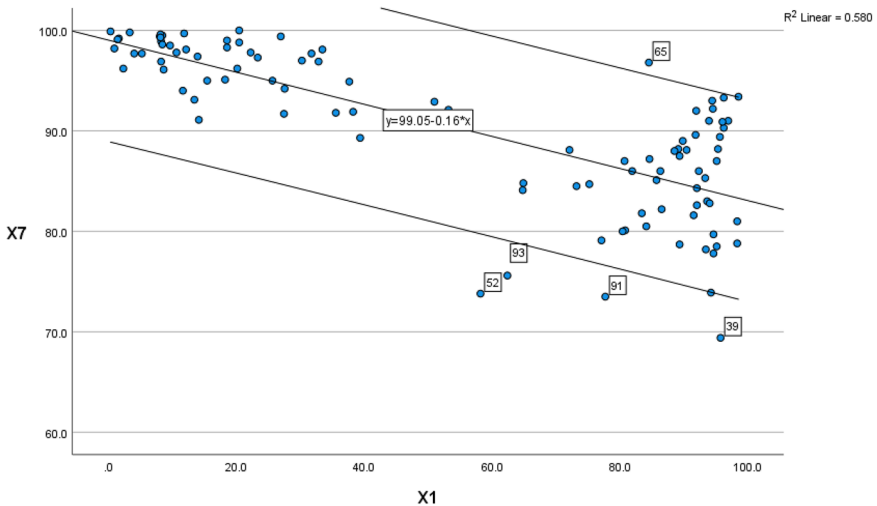


**Note:** Data point 32 is NSA F02, Lindridge/Martin Manor; data point 55 is NSA M01, Castleberry Hill/Downtown; data point 91 is NSA X03, Hammond Park; and data point 98 is NSA Z02, Thomasville Heights

**Fig. 7** Scatterplot of 2020 percent population under 18 years below poverty ( $X_6$ ) versus 2020 percentage of Blacks ( $X_1$ ) living in Atlanta’s 101 NSAs, with regression line and 95% confidence interval bandwidths

confidence interval bandwidths) unmistakably slopes downwards from the upper left to the lower right. Accordingly, the Pearson correlation coefficient between the two variables is  $r = -0.762$ ,  $p < 0.001$ . Both of these indicate there is a significant strong negative linear association between these two variables. That is, as the percentage of the Black population within an NSA increases, the percentage of its high school graduates tends to decrease. However, there is well-defined heteroscedasticity (unequal error variances) present in the funneling out aspect of the scatterplot. When heteroscedasticity is present, the results of the regression may not be completely reliable. Furthermore, the scatterplot reveals five neighborhood points that are significantly far away from their predictions in their vertical deviations from the regression line. They also lie outside of the 95% confidence interval bandwidths for the regression line of best fit. However, four of these outlying NSAs have actual high school graduation rate values that are way below their predicted values. NSA H02, data point 39, has 95.7% of its population Black. NSA K03, data point 52, has 58.2% of its population Black. NSA X03, data point 91, has 77.7% of its population Black. NSA Y01, data point 93, has 62.4% of its population Black.

The slope of the regression line in Fig. 8 has a definite interpretation. The slope of  $-0.16$  means that for every increase of 10% in the Black population of an NSA, the percentage of its population 25 years and over with at least a high school diploma tends to decrease by 1.6.



**Note:** Data point 39 is NSA H02, Adamsville, Oakcliff; data point 52 is NSA K03, Knight Park/Howell Station; data point 65 is NSA P02, Princeton Lakes; data point 91 is NSA X03, Hammond Park; and data point 93 is NSA Y01, Chosewood Park, Englewood Manor.

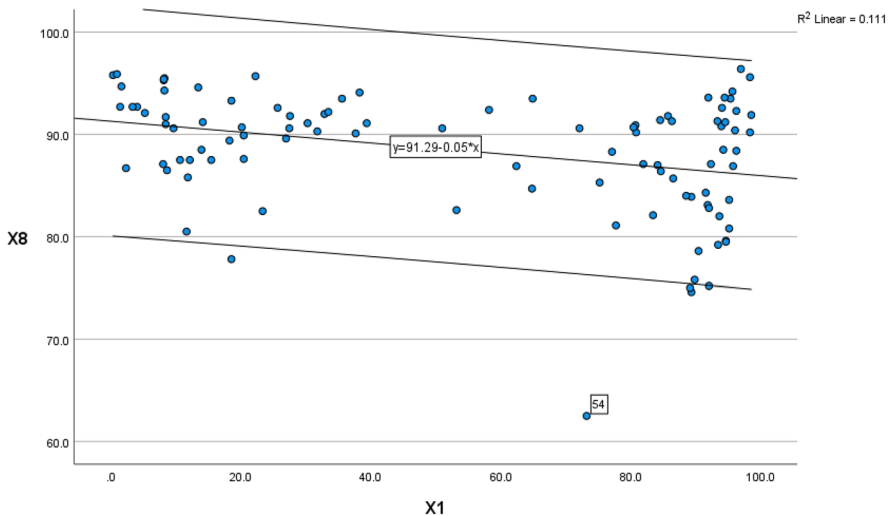
**Fig. 8** Scatterplot of 2020 percent of population 25 years and over, high school graduate or higher ( $X_7$ ) versus 2020 percentage of Blacks ( $X_1$ ) living in Atlanta's 101 NSAs, with regression line and 95% confidence interval bandwidths

Figure 9 details a scatterplot of *percent occupied housing units* versus percentage of Blacks living in Atlanta's 101 NSAs. The least squares regression line of best fit (together with its 95% confidence interval bandwidths) slopes slightly downwards from the upper left to the lower right. Clearly, data point 54, NSA L02, English Avenue, is an outlier on the low end for this variable. Analyzing this particular NSA's data, we see that its year 2020 percent occupied housing units was only 62.5. In contrast, the next lowest such percentage value belonged to NSA J02, Grove Park, at 74.6. In 2020, 37.5% of English Avenue's housing units were unoccupied. It should be noted that English Avenue is 73.2% Black. Accordingly, the Pearson correlation coefficient between the two variables is  $r = -0.332$ ,  $p < 0.001$ . Both of these indicate there is a weak negative linear relationship between these two variables. Even though the association is relatively weak, it still specifies, as the percentage of the Black population within the NSAs increases, the percent-occupied housing units of the neighborhood tends to decrease.

The slope of the regression line in Fig. 9 has a definite interpretation. The slope of  $-0.05$  means that for every increase of 10% in the Black population of an NSA, the percentage of its occupied housing units tends to decrease by one-half of a percentage point.

### Hypothesis Tests Analyses

Out of the 101 NSAs, 26 had more than 67% of its population White and 50 had greater than 67% of its population Black. This 67% threshold was used to represent a super majority of the race living within the NSA population. Normal Q-Q Plot



**Note:** Data point 54 is English Avenue, NSA L02

**Fig. 9** Scatterplot of 2020 percent occupied housing units ( $X_8$ ) versus 2020 percentage of Blacks ( $X_1$ ) living in Atlanta's 101 NSAs, with regression line and 95% confidence interval bandwidths



inspections, as well as formal hypothesis tests for normality, were conducted on all six of the variables for both the White and Black super majority populations. For both races, only the life expectancy variable was determined to be normally distributed in their respective populations. Therefore, a hypothesis test for the difference between two population means was run on this variable ( $X_3$ ). The results immediately follow.

### The Life Expectancy at Birth for 2010–2015

A hypothesis test for the difference between two population means was run on this length of life variable for the 26 NSAs that had more than 67% of its population White ( $M=81.43$ ,  $SD=2.48$ ) versus the 50 NSAs that had greater than 67% of its population Black ( $M=73.06$ ,  $SD=3.20$ ). The projected mean life expectancy for the predominately White neighborhoods is significantly greater than it is for the predominately Black neighborhoods,  $t(74)=11.63$ ,  $p<0.001$  (one-tailed). See Table 5.

However, for the other five variables of interest,  $X_4$  thru  $X_8$ , although the super majority of Black populations had normally distributed variables, the super majority of White populations did not have normally distributed variables. Therefore, for these five variables, the Mann–Whitney nonparametric statistical alternative test was performed.

### Violent Crime Rate, per 10,000 Population

A Mann–Whitney  $U$  test was run on this social health and safety community variable for the 26 NSAs that had more than 67% of its population White versus the 50 NSAs that had greater than 67% of its population Black. The test revealed that the violent crime rate for the predominately White neighborhoods ( $Md=15.35$ , mean rank = 14.85) was significantly less than it was for the predominately Black neighborhoods ( $Md=112.15$ , mean rank = 50.80),  $U=35.0$ ,  $z=-6.73$ ,  $p<0.001$  (one-tailed), with a large effect size  $r=0.77$ . See Table 6.

**Table 5** Analysis of the difference between two means  $t$ -test performed on the life expectancy at birth for 2010–2015 ( $X_3$ ) variable between the NSAs that had more than 67% of its population Black ( $N=50$ ) versus the NSAs that had greater than 67% of its population White ( $N=26$ )

Blacks	$X_3$
$M$	73.06
$SD$	3.20
Whites	
$M$	81.43
$SD$	2.48
$t$ score	11.63
df	74
$p$ value	<.001 (one-tailed)

**Table 6** Analysis of the Mann–Whitney tests performed on the 2021 violent crime rate, per 10,000 population ( $X_4$ ), the 2020 median household income ( $X_5$ ), the 2020 percent population under 18 below poverty ( $X_6$ ), the 2020 percent population 25 years and over, high school graduate or beyond ( $X_7$ ), and the 2020 percent occupied housing units ( $X_8$ ) variables between the NSAs that had more than 67% of its population Black ( $N=50$ ) versus the NSAs that had greater than 67% of its population White ( $N=26$ )

	$X_4$	$X_5$	$X_6$	$X_7$	$X_8$
<b>Blacks</b>					
<i>Median</i>	112.15	35,232.88	44.35	85.65	87.10
<i>Mean rank</i>	50.80	25.54	51.38	25.74	31.93
<b>Whites</b>					
<i>Median</i>	15.35	115,023.55	3.10	98.25	92.40
<i>Mean rank</i>	14.85	63.42	13.73	63.04	51.13
<i>U</i>	35.0	2.0	6.0	12.0	321.50
<i>z score</i>	-6.73	7.10	-7.05	6.99	3.60
<i>p value</i>	<.001	<.001	<.001	<.001	<.001
<i>r, effect size</i>	.77	0.81	0.81	0.80	0.41

### Median Household Income

A Mann–Whitney  $U$  test was run on this family wealth variable for the 26 NSAs that had more than 67% of its population White versus the 50 NSAs that had greater than 67% of its population Black. The test revealed that the median household income for the predominately White neighborhoods ( $Md = \$115,023.55$ , mean rank = 63.42) was significantly greater than it was for the predominately Black neighborhoods ( $Md = \$35,232.88$ , mean rank = 25.54),  $U = 2$ ,  $z = 7.10$ ,  $p < 0.001$  (one-tailed), with a large effect size  $r = 0.81$ .

### Percent of Population under 18 Below Poverty

A Mann–Whitney  $U$  test was run on this indicator of overall economic health of a community variable for the 26 NSAs that had more than 67% of its population White versus the 50 NSAs that had greater than 67% of its population Black. The test revealed that the percent of minors living below poverty for the predominately White neighborhoods ( $Md = 3.10$ , mean rank = 13.73) was significantly less than it was for the predominately Black neighborhoods ( $Md = 44.35$ , mean rank = 51.38),  $U = 6$ ,  $z = -7.05$ ,  $p < 0.001$  (one-tailed), with a large effect size  $r = 0.81$ .

### Percent of Population 25 Years and Over, High School Graduate, or Beyond

A Mann–Whitney  $U$  test was run on this important educational attainment variable for the 26 NSAs that had more than 67% of its population White versus the 50 NSAs that had greater than 67% of its population Black. The test revealed that the percent of high school graduates for the predominately White neighborhoods ( $Md = 98.25$ ,

mean rank = 63.04) was significantly greater than it was for the predominately Black neighborhoods ( $Md = 85.65$ , mean rank = 25.74),  $U = 12$ ,  $z = 6.99$ ,  $p < 0.001$  (one-tailed), with a large effect size  $r = 0.80$ .

### Percent Occupied Housing Units

A Mann–Whitney  $U$  test was run on this important community housing variable for the 26 NSAs that had more than 67% of its population White versus the 50 NSAs that had greater than 67% of its population Black. The test revealed that the percent occupied housing units for the predominately White neighborhoods ( $Md = 92.40$ , mean rank = 51.13) was significantly greater than it was for the predominately Black neighborhoods ( $Md = 87.10$ , mean rank = 31.93),  $U = 321.50$ ,  $z = 3.60$ ,  $p < 0.001$  (one-tailed), with a moderate effect size  $r = 0.41$ .

### Statistically Significant Conclusions

In conclusion, the hypothesis tests confirm what the visual scatterplots and correlations inferred. NSAs with a super majority of White residents tended to have significantly higher life expectancies, median household incomes, percentage of their adults with at least a high school diploma, and percent occupied housing units, when compared to NSAs with a super majority of Black residents. The opposite is true when viewing violent crime rates per 10,000 population and percent of minors living below the poverty level. In both of these instances, NSAs with a super majority of White residents tended to have significantly lower values when compared to NSAs with a super majority of Black residents. Overall, the statistics overwhelmingly substantiate that all six of these important quality of life metrics are more favorable towards predominately White neighborhoods, as opposed to predominately Black neighborhoods.

## Discussion

### Limitations of the Study

There were only a couple of minor limitations of this study. First, the data for six of the eight Atlanta NSA variables was from 2020, but the data for the violent crime rates was from 2021, and the life expectancy variable was from 2015. More precisely, the six variables, except for the two just mentioned, were 5-year average estimates based on aggregated data from 2016 thru 2020, inclusive. Therefore, this data incorporates the first year of COVID, 2020, and the 4 years leading up to it. *The Neighborhood Nexus* does not calculate summary statistics based on a single year. The violent crime rate, per 10,000-population variable was a 5-year average estimate based on aggregated data from 2017 thru 2021, inclusive. This data incorporates 2 years of living with COVID, 2020 and 2021, and the 3 years leading up to it. *The Neighborhood Nexus* does not have a way of measuring the life expectancies of

Atlanta's NSAs. I had to get this data from a different source (the *CDC, National Center for Health Statistics, 2018*), and it was only available for 2010–2015. These years were, of course, entirely prior to our affliction with COVID-19 and all of its consequences.

The data for all eight of the variables used is the most recent data available of its kind. With the exception of the life expectancy variable, all of the data first became available for public consumption in mid-June of 2022. The data for the 2020 variables were all taken from the *U.S. Census Bureau's ACS, 5-year estimates* or its decennial census. Moshe Haspel provided me with the data for the 2021 violent crime rates directly in an email on June 17, 2022. This author had to make do with the data that was straightaway obtainable. Since our states began their lockdowns to prevent the spread of COVID in March of 2020, and many states continued to be locked down right through March of 2021, we really wanted the violent crime rate data to include the year 2021, especially, as it was in this paper.

Secondly, as explained earlier, the life expectancy at birth for 2010–2015 data was not a perfect match from the data presented in the life expectancy estimates file for Georgia, 2010–2015 and the NSAs for Atlanta. The data presented there was broken down by Census ID tract numbers, and the NSAs are built from census block groups, but do not necessarily align perfectly to the boundaries of the census tracts. The author had to merge the data together from these two different data sources, and quite often had to take weighted means, in order to come up with a best-estimated data value for each of Atlanta's 101 NSAs as to their life expectancies at birth for 2010–2015. Again, the author had to make do with the data that was available.

## Directions for Future Research

This study represents the evident racial gap that existed between Whites and Blacks in Atlanta, in terms of their length of life, health and safety, and wealth, at the onset of COVID. The 2021 Violent Crime Rate per 10,000 population variable, involved data incorporating 2 years of COVID. To make the racial discrepancies even worse, COVID appears to be widening the already striking gap between the two races in terms of their respective qualities of life. The preliminary data indicate that this is indeed the case. According to the Centers for Disease Control and Prevention (2021),

The COVID-19 pandemic, and its disproportionate impact among communities of color, is another stark example of these enduring health disparities. Recent COVID-19 data show that Black/African American, Hispanic/Latino, American Indian and Alaska Native populations in the U.S. are experiencing higher rates of hospitalization and death compared to White populations.

This would indicate that COVID, in terms of these “quality of life” variables, might have been more overwhelming on Blacks than it was on Whites. COVID, was a once a century, worldwide contagion that at the time of this writing (July 6, 2022) killed 1.02 million of our fellow American citizens. (Our World in Data, 2022). Condensing all of this great wealth of indisputable statistical dichotomy is the following description in *The Lancet*, “Widening economic inequality in the USA has been accompanied by

increasing disparities in health outcomes. The life expectancy of the wealthiest Americans now exceeds that of the poorest by 10–15 years.” (Dickman et al., 2017).

This article represents a case study, involving one of our country’s historical big cities, which presents overwhelming empirical statistical evidence that the remnants of our country’s original sin of slavery have permanent lasting ramifications to African Americans today. Future research must continue to draw attention to the racial inequities in the overall quality of life experiences of African Americans, by presenting similar overwhelming statistical evidence of such, in the hopes of finally rectifying these glaring discrepancies. America appears to be at a crossroads in our 246-year history. I fear maybe even reaching a critical mass point. We have seen recent Black Lives Matter protests against racial police brutality and for equal social justice, the Me Too Movement for women in terms of their ongoing sexual harassment concerns, and even extremely high inflation and gas prices that are disproportionately decimating the middle and lower classes everywhere in our country, but particularly those living in our urban centers like Atlanta. Further future research needs to take the convincing empirical statistical evidence of the ongoing racial divide presented here, and produce viable solutions to correct for it, that all Americans can agree upon and that will be enacted into binding laws.

## Conclusion

### Uses of the Findings in this Study

This research article began by briefly noting some of the significant strides that Atlanta has made since its deep racial discord from the Civil War to the Civil Rights eras. The paper concludes by statistically highlighting the horrific racial inequities that clearly remain today, specifically in terms of six very important quality of life metrics. Most notably, the overall life expectancy, health and safety, and wealth of Atlanta’s Black Americans are significantly lower than they are for their White American counterparts. The data substantiating this is irrefutable. This document is in no way an indictment of the city of Atlanta or its residents. I envision similar results would be found in just about any large, urban, American city. Atlanta was selected for this manuscript, as an individual statistical case study, representative of a typical large American city, stressing the crucial racial inequities that persist in America today.

This study collected and analyzed the disaggregated Atlanta NSA data so that criminologists, sociologists, politicians, religious leaders, and other generous community philanthropists, can take the detailed statistical findings pronounced here in this study, and discover possible ways to help Atlanta’s neighborhood statistical areas achieve more equity in the overall quality of life among its entirety of people. In short, more dedicated and compassionate agencies promoting equity need to be created and heavily funded, like the [Atlanta Neighborhood Development Partnership \(ANDP\)](#), which was created in 1991, with its mission to develop, finance, and advocate for affordable housing at scale that promotes racial equity and healthy

communities where families thrive. Such valuable entities are desperately needed in most of our large, urban cities in America.

In 2014, Ta-Nehisi Coates published an article in *The Atlantic* entitled, “The Case for Reparations.” In the subtitle of the article, he summarizes, “Two hundred fifty years of slavery. Ninety years of Jim Crow. Sixty years of separate but equal. Thirty-five years of racist housing policy. Until we reckon with our compounding moral debts, America will never be whole.” (Coates, 2014). Since then, the idea of awarding reparations to African Americans has been a very hot political issue in America. Most notably, reparations was front and center in the 2020 Democrat Party Presidential Primary. While speaking at Al Sharpton’s National Action Network Convention in New York City, “Most of the 2020 contenders, often prompted by Sharpton himself, also affirmed their support for a bill introduced in Congress that would create a commission to study reparations for African-Americans.” (Breuninger, 2019). As part of *Vox’s* guide to where 2020 Democrats stood on policy issues, Lockhart (2019) quantified it.

For much of the 150 years since the official end of slavery in the United States, talk of the need for reparations has existed. In 2019, that discussion has become a full-blown political debate among politicians, presidential candidates, and academics over what it would look like to apologize and provide restitution to the people harmed by slavery and its legacy.

The definition of reparations from [Oxford Languages and Google](#) is “the making of amends for a wrong one has done, by paying money to or otherwise helping those who have been wronged.” In several important ways, the critique made in this manuscript is a statistical argument for making reparations (of some significant sort) to African Americans, by naming six important life deficits experienced by African Americans living in one of our most important American cities in 2020.

Before I wrote this article, I was against paying reparations of any kind to African Americans for our country’s original sin of slavery. As Coates (2014), himself expressed, “Broach the topic of reparations today and a barrage of questions inevitably follows: Who will be paid? How much will they be paid? Who will pay?” After all, personally speaking, my ancestors came to America in the 1920s from Italy and Germany. I reasoned, I never owned any slaves, nor did any of my ancestors ever own any slaves. Should I, and millions of other Americans like me, be forced to pay tax money to millions of African Americans who were never slaves themselves, nor direct descendants of any slaves? Furthermore, for those who are direct descendants of White slave owners, should they inherit the sins of their ancestral grandfathers who lived centuries before?

Politically speaking, in a *Vanity Fair* article, Nguyen (2019) states:

Polling suggests that the idea of reparations—defined here as paying money to people who are descendants of slaves—is overwhelmingly unpopular. While a slim majority of African-Americans endorse reparations, overall more than two-thirds of Americans are against it. The conventional wisdom holds that there’s no faster way to lose an election than to propose a massive, direct racial transfer of wealth.

I agree. However, the absolute striking disparities between Whites and Blacks in terms of their life expectancies, health and safety, wealth, education, and housing, statistically documented in this case study of Atlanta, implore a remedy. Undoubtedly, the statistical data emphasize the fact that today's Blacks are yet disadvantaged in very important life metrics we all value. This is the ugly legacy of slavery, still on ample display today, many generations after 1865.

While I think that the heuristics of the first part of the aforementioned definition of reparations from *Oxford Languages and Google*, “by paying money to,” are too impossible to implement in practice, I believe the rectifying answer lies in the second half of the definition, “or otherwise helping those who have been wronged.” The statistics presented in this paper clearly indicate that African Americans continue to be wronged. I would hope that both political parties could agree that trying to help undo the racial inequities in life expectancy, health and safety, and wealth, of centuries of structural racism in America is a monumental task, but is a debt we owe to the generations of African Americans who have lived here. It is now up to our two political parties, collectively, to decide to finally work together on truly achieving equity in health, education, housing, business entrepreneurship, and career opportunities between the races, if direct monetary payments to African Americans are never made.

**Availability of Data and Materials** The author confirms that the URL addresses for all data generated or analyzed during this study are included in this published article.

## Declarations

**Conflict of Interest** The author declares no conflict of interest.

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