SURPRISING ATLANTA VIOLENT CRIME RATE ANALYSES COMPARING DURING COVID TO BEFORE COVID

John M. Trimboli[1]

In this paper, statistical analyses were conducted in order to compare the 2021 during-COVID overall violent crime rates to the 2016 pre-COVID overall violent crime rates to comprehend the effect COVID had on violent crime in Atlanta, Georgia. A multiple regression model predicting the 101 Neighborhood Statistical Areas (NSA) 2021 violent crime rates was developed from five relevant potential predictor variables. The 2021 model was compared to the 2016 model, established from the same set of potential predictor variables, to be able to elucidate the effects the COVID pandemic seemed to have had on Atlanta's violent crime and its underlying contributing factors.

Overall, the violent crime rates dropped for 91.1% of Atlanta's 101 NSAs from 2016 to 2021. The Pearson product-moment correlation coefficient between the violent crime rates for the two periods is .952. This means there is a very strong significant positive association between their respective violent crime rates. That is, NSAs that had higher violent crime rates before COVID, still tended to have higher violent crime rates during COVID. However, there was a clear significant overall **decrease** in their violent crime rates. A nonparametric Wilcoxon paired-samples signed-rank test determined that there was a statistically significant decrease between violent crime rates before COVID (Median = 83.5 per 10,000 population) and violent crime rates during COVID (Median = 55.2 per 10,000 population), $z = 8.077$, $W = 4874$, $p < .001$. It is interesting to note, that of the eight NSAs that experienced increases in their violent crime rates

[1] Professor of Mathematics and Statistics, Middle Georgia State University, 100 University Parkway, Macon, GA 31206, john.trimboli@mga.edu

during COVID, only two of them had a super majority (> 60%) Black population. Like many major cities in America, Atlanta was greatly affected by the social justice demonstrations after a white police officer in Minneapolis, Minnesota killed the African American George Floyd on May 25, 2020.

The backward elimination procedure of variable selection was used, which started the analysis with the full regression equation containing all five predictor variables: X_1 = 2020 Percent Not Hispanic, Black or African American Alone; X_2 = 2020 Percent Occupied Housing Units; X_3 = 2020 Percent of Population 25 Years and Over, High School Graduate or Higher; X_4 = 2020 Median Household Income; X_5 = 2020 Percent Population under 18 Years Below Poverty. It then successively dropped one variable at a time based on their insignificant *t*-tests. The procedure ended, when the following three variables that remained, were all highly significant at the .01 level: $\hat{Y} = 379.349 + 0.535X_1 - 4.042X_2 + 0.702X_5$, where $\hat{Y}$ = the predicted 2021 violent crime rate, per 10,000 population.

For comparison, the multiple regression model for the 2016 violent crime rate data based on the same set of five potential predictor variables for the same 101 NSAs making up Atlanta was: $\hat{Y} = 526.475 - 3.951X_2 - 1.743X_3 + 1.471X_5$. All of the data for all of the predictor variables for this particular model came from 2015.

In the 2021 full regression model based on all 101 NSAs, $R^2 = .633$. This implies that 63.3% of the total variation in the violent crime rate for an Atlanta NSA can be accounted for by knowledge of its three significant predictor variables: 2020 Percent Not Hispanic, Black or African American Alone (X_1), (t = 3.540, p < .001); 2020 Percent Occupied Housing Units (X_2), (t = -5.977, p < .001); and 2020 Percent Population under 18 Below Poverty (X_5), (t = 2.705, p = .008).

The coefficient of determination value, R^2, was .704, for the 2016 model. It, therefore, accounted for 7.1% more predictability in the NSA violent crime rates based on its three highly significant predictor variables, than did its 2021 counterpart based on its three highly significant predictor variables. The two variables Percent Occupied Housing Units (X_2) and Percent

Population under 18 Years below Poverty (X_5) were significant in both the 2021 and 2016 models. Surprisingly, the Median Household Income (X_4) variable was not significant and therefore did not make either the 2016 or the 2021 models. The Percent Not Hispanic, Black or African American Alone (X_1) variable was significant in the 2021 model, but not in the 2016 model; while the Percent of Population 25 Years and Over, High School Graduate or Higher (X_3) variable was significant in the 2016 model, but not in the 2021 model.

COVID was a once in a century phenomenon, so it makes perfect sense that some of the variables that were significant in the more normal living and working conditioned 2016 model would change for the 2021 model. For instance, I speculate the Percent Not Hispanic, Black or African American Alone (X_1) variable is significant in the 2021 model, but not in the 2016 model, due to the George Floyd and Black Lives Matter protests that hit our cities during the spring and summer of 2020. These protests, and the disproportionate affect COVID seems to have had on Blacks when compared to Whites, could contribute to the change in the significance status of this demographic variable. These two factors statistically seemed to play out in terms of violent crime in the Black neighborhoods, even though perplexingly enough, overall violent crime rates went down between 2016 and 2021. The preliminary data indicate that this is indeed the case. On April 8, 2021, in an article entitled, *Impact of Racism on our Nation's Health*, the *Centers for Disease Control and Prevention* (CDC) stated, "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" predictor variables, might have been more overwhelming on Blacks than it was on Whites.

As for the loss in the significance of the high school graduation (X_3) variable from the 2016 to the 2021 models, I conjecture that the transition from normal in school education to prolonged at home online instruction due to the COVID lockdowns, could be one overarching reason. It will be very important to study the consequences of these prolonged school closures on the youth of our country in so many different realms, not the least of which is violent crime in our communities.

The poverty and housing variables were the two mainstays in terms of their significance in both the pre-COVID (2016) and COVID (2021) models. Inflation has hit hard in all of America, not just Atlanta, in 2022. We are seeing levels of inflation that we have not seen in America since 1980. Not being able to put food on the table, often leads people to do illegal affairs they might not otherwise do, just to sustain their lives. It is therefore, not surprising that the poverty variable (X_5) correlated the strongest of all five predictor variables with violent crime in the 2016 model (.739, versus the next closest value of -.690, the high school graduation variable) and basically the most correlated to violent crime in 2021 (.662, to median household income's, -.663). Curiously, even though the median household income variable correlated the strongest to violent crime in 2021, it was not significant (and therefore not retained in the final 2021 regression model) when taken cumulatively with the other four-predictor variables.