SOUTH CAROLINA COMMISSION FOR MINORITY AFFAIRS

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Explanatory Factors for Crime Rates in South Carolina: A Statistical Brief

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Executive Summary

This statistical report examines which factors have an effect on the violent crime rate and property crime rate in South Carolina. The data used for this analysis was gathered and reported in the *Crime in South Carolina 2016* report produced by the South Carolina Law Enforcement Division (SLED) and the South Carolina Department of Public Safety. [1] This report provides county level data regarding the eight Part I crimes, as identified by the FBI. This crime data was used in the development of the two dependent variables, violent crime rate and property crime rate. Data was also gathered from the American Community Survey (ACS) conducted by the U.S. Census Bureau. ACS data was used in the development of the independent variables, percent minority, percent below poverty, percent without diplomas, minorities without diplomas, and minorities in poverty. [2]These data sources were analyzed by the Research and Policy Division of the South Carolina Commission for Minority Affairs in order to produce this report. Key findings show the following:

- Percent below poverty in a county was the strongest explanatory factor for a county's violent crime rate, accounting for 16.45% of the variability. Though percent below poverty was statistically significant, effect sizes showed that it had

[1] South Carolina Law Enforcement Division (2016). *Crime in South Carolina*.
[2] American Community Survey 2013-2017 5-Year Estimates. *DP05: Demographic and Housing Estimates;* American Community Survey 2013-2017 5-Year Estimates. *B17001: Poverty Status in the Past 12 Months by Sex and Age*; American Community Survey 2013-2017 5-Year Estimates. *S1501: Educational Attainment*.

medium to small practical effects. This means that unexplained factors in addition to poverty may affect the frequency of violent crime in a county.

- Percent below poverty in a county was also the sole significant explanatory factor for property crime rate in a county, accounting for 10% of the variability. Though percent below poverty was statistically significant, effect sizes were small. This indicates that poverty cannot solely explain the prevalence of property crime in a county. At the same time, it is worthy of examination.

Introduction

The average American's likelihood of being a victim of crime is rather low, but the public typically perceives this risk to be fairly high[3]. This fear of crime is perpetuated by the media. Most depictions of criminals in the media and popular culture are disproportionately minority males and the victims are disproportionately female. These depicted criminals are often found in low income areas and may appear to have a low level of educational attainment[4]. The selection of the independent variables in this analysis was influenced by these misconceptions as a means to discredit this common depiction of the low income, uneducated, minority criminal. These facts indicate a need for statistical investigation.

This report provides an analysis of the possible correlates of violent crime and property crime rates. In order to read this report, it is imperative to understand how these two categories are defined. The FBI publishes a yearly report called the Uniform Crime Report (UCR) that contains a compilation of arrest and clearance data from more than 18,000 law enforcement agencies across the country. The crimes documented in the UCR are categorized in one or two

[3] Drakulich, Kevin M. *Strangers, Neighbors, and Race: A Contact Model of Stereotypes and Racial Anxieties About Crime.* 2012

[4] Callanhan, Valerie, and Rosenberger, Jared S. *Media, Gender, and Fear of Crime.* 2015.

ways; a crime is either a Part I offense or a Part II offense. This statistical brief focuses solely on Part I offenses. Homicide, forcible rape, robbery, aggravated assault, burglary, larceny, motor vehicle theft, and arson are considered to be the eight Part I offenses[5]. These can then be further broken down into two categories, violent crime and property crime. Violent offenses include homicide, forcible rape, robbery, and aggravated assault. Property crimes include burglary, larceny, motor vehicle theft, and arson. The frequency of these offenses is presented in the form of a rate, calculated using the following formula[6]:

$$Crime\ Rate = \frac{Number\ of\ Crimes}{Population}\ X\ 100{,}000$$

Public perception of crime and the common criminal is largely influenced by the media and popular culture. The violent crime rate in the United States is declining in most areas of the country and has been since the late 1970s. Figure 1 shows that South Carolina's violent crime rate has also been decreasing, for the most part, since the early 1990s. South Carolina's violent crime rate in 2016 (50.8 per 10,000) is almost half (49.4%) of what it was in 1991 (100.4 per 10,000). Property crime rates show a similar trend for the United States. South Carolina's property crime rate has also been following this downward trend since the 1990s (see Figure 2). In 1991 the property crime rate was 538.9 per 10,000 people. By 2016 this rate had fallen to 333.2, a 38.2% decline in that 25-year period. [7]

[5] https://www2.fbi.gov/ucr/cius_04/appendices/appendix_02.html
[6] ***The crime rates for South Carolina are calculated per 10,000 due to the state's smaller populations in rural counties
[7] South Carolina Law Enforcement Division (2016). *Crime in South Carolina*.

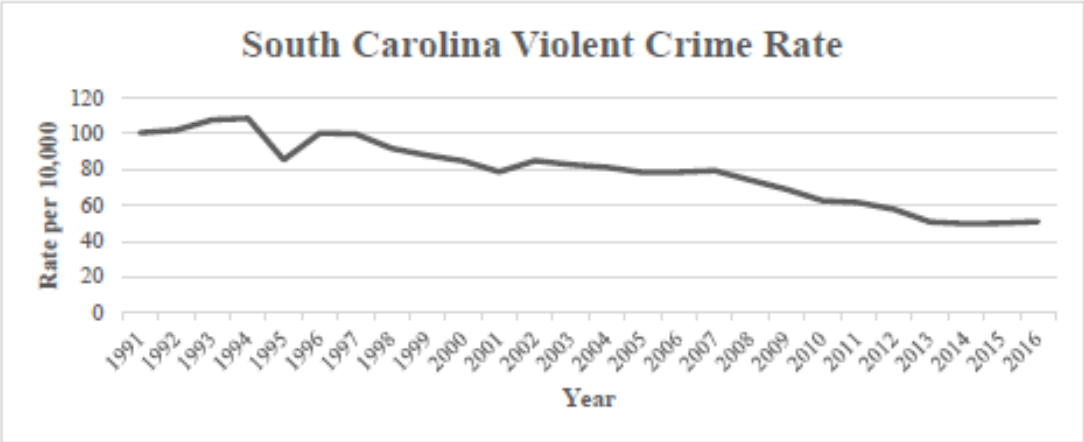
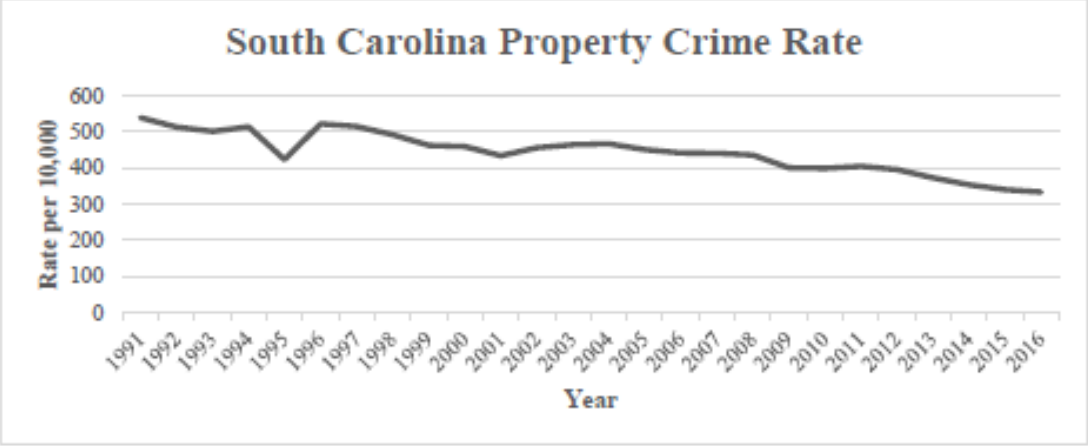


Figure 1. South Carolina Violent Crime Rate 1991-2016[8].



Source: South Carolina Law Enforcement Division (2016). *Crime in South Carolina*.

Figure 2. South Carolina Property Crime Rate 1991-2016[9].

[8] Ibid.
[9] *Crime in South Carolina*.

Methodology

To determine the explanatory factors that may affect the measured variables of interest in the present study, linear regression will be utilized. Linear regression can be used to either predict or explain an event's occurrence.[10] The use of regression depends on the research goals of a study.[11] Consistent with the title of the report, regression will be used to explain the variability in a measured outcome rather than predicting an outcome. The linear regression problem can be broken down into a dependent variable (outcome) and independent variables(s) that have an effect on the outcome.

Linear regression is conceptually based in linear algebra's equation of a line, $y = mx + b$. In the equation of a line, x denotes a selected x-coordinate and y denotes the corresponding y-coordinate on the line.

$$y = mx + b$$

Where: y = y-coordinate,

m = slope,

x = independent variable, and

b = y-intercept.

In a regression equation, notation changes are important. First, it must be noted that *y*, the y-coordinate, becomes *y*', a term that denotes y-predicted. This is because y' symbolizes a prediction not a definite *y* as observed in linear algebra. Additionally, y' has to be interpreted as a dependent variable that is being affected by an independent variable, *x*. The order of notations and symbols on the right side of the equation also change such that the first term is the y-intercept and it is denoted by *a*. Moreover, in linear regression your slope changes from *m* to *b* to

[10] Pedhauzur, Elazar J. *Multiple Regression in Behavioral Research: Explanation and Prediction* (3rd Edition). (United States: Thomson Learning 1997).
[11] Ibid.

indicate a beta statistic. Finally, x is the independent variable rather than an x-coordinate. The regression equation shown below is one that is often introduced in statistical texts as a way to facilitate conceptual transitions between linear algebra and statistics. The equation below was used in Allen Bluman's *Elementary Statistics* text. [12]

$$y' = a + bx$$

Where: y' = predicted dependent variable,

a = y-intercept or constant, and

bx = independent variable or slope.

Though Bluman's *Elementary Statistics* text acknowledged that a residual was the difference between y and y', it was not observable in the equation $y' = a + bx$. The final model accounts for what is not explained in the previous regression equation and follows the modeling present in general linear models. General linear modeling can include regression and analysis of variance (ANOVA) statistical modeling.[13] Though general linear modeling appears more complex than the basic regression model, it still contains components that correspond to the equation of a line. Y becomes y_i, b becomes β_0, and m becomes β_1. The major difference between a general linear model and a basic regression model is the addition of the residual term, e_i. The addition of the residual term accounts for real-life application of statistics. The residual term measures how far a given data point deviates from the equation.

[12] Bluman, Allen G. *Elementary Statistics: A Step by Step Approach, A Brief Version* (7th Edition). (New York, NY: McGraw-Hill Education 2015).
[13] Rencher, Alvin C. and Schaalje, G. Bruce. *Linear Models in Statistics* (7th Edition). (Hoboken, NJ: John Wiley & Sons 2008).

Below, base model that will be applied in the present report can be observed:

$$y_i = \beta_0 + \beta_1 x_1 + e_i$$

Where: y_i = dependent variable,

β_0 = intercept or constant,

$\beta_1 x_1$ = independent variable, and

e_i = residual.

Results

Bivariate Correlations

The correlation matrix displayed in Table 1 shows that the percent of minorities in a county (PM), the percent of people below poverty (PBP), the interaction between percent minority and percent without diplomas (MND), and the interaction between percent minority and percent below poverty (MP) have significant relationships to violent crime rate. It can also be noted that the property crime rate has a significant relationship with the percent of poverty in a county (PP). These relationships will be tested in two regression models that examine the dependent variables of violent crime rate and property crime rate.

Table 1

Correlations between Proposed Independent and Dependent Variables

	PM	PBP	ND	MND	MP	VC	PC
PM	1.00						
PBP	.69***	1.00					
ND	.52**	.84***	1.00				
MND	.91***	.85***	.80***	1.00			
MP	.95***	.87***	.68***	.96***	1.00		
VC	.40**	.43*	.21	.35*	.42*	1.00	
PC	.13	.34*	.09	.10	.20	.78***	1.00

Note. * = $p < .05$. ** = $p < .01$. *** = $p < .001$. Key: PM, Percent Minority; PBP, Percent Below Poverty; ND, Percent No Diploma; MND, Minority*No Diploma; MP, Minority*Poverty; VC, Violent Crime; PC, Property Crime.

Linear Regression Modeling: Violent Crime

Model 1:

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + e_i$$

Where: y_i = violent crime rate,

β_0 = intercept or constant,

$\beta_1 x_1$ = percent minority,

$\beta_2 x_2$ = percent below poverty,

$\beta_3 x_3$ = minorities*no diplomas,

$\beta_4 x_4$ =minority*poverty,

e_i = residual.

A multiple regression analysis was used to examine how much of the variability in violent crime rate could be explained by percent minority in a county, percent below poverty in a county, the interaction between percent minority and percent of people without diplomas, and the interaction between percent minority and percent below poverty in a county. The factors explained approximately 19.27 percent of the variance in violent crime rate, which is considered a medium effect. The regression model was significant, $F(4, 41) = 3.69$, $p < .05$ with a Cohen's f^2 effect size of 0.24, which is a medium effect. Though the full model was significant, neither of the independent variables were significant. This indicated multicollinearity issues. In fact, each of the independent variables had variance inflation factors greater than 10 (VIF > 10), definitively indicating multicollinearity. [14] As a result, the variable with the highest variance

[14] S. Chatterjee, A. S. Hadi, and B. Price. 2000. *Regression analysis by example*. John Wiley and Sons, New York, NY.

inflation factor, the interaction between percent minority and poverty, was dropped from the model.

Model 2

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + e_i$$

Where: y_i = violent crime rate,

β_0 = intercept or constant,

$\beta_1 x_1$ = percent minority,

$\beta_2 x_2$ = percent below poverty,

$\beta_3 x_3$ = minorities*no diplomas, and

e_i = residual.

A reduced model examined how much of the variability in violent crime rate could be explained by percent minority in a county, percent below poverty in a county, and the interaction between percent minority and percent without diplomas. The factors explained approximately 21.19 percent of the variance in violent crime rate, which is a medium effect. The regression model was significant, $F(3, 42) = 5.03$, $p < .05$ with a Cohen's f^2 effect size of 0.27, also a medium effect. Percent below poverty ($\beta = 4.03$, $p < .05$) and percent minority ($\beta = 1.36$, $p < .05$) were significant, positive explanatory variables for violent crime. Minorities without diplomas ($\beta = -0.06$, $p > .05$) was not statistically significant, and also had a variance inflation factor greater than 10 (VIF > 10)[15]. As a result, this variable was dropped from the model.

[15] Chatterjee, Hadi, and Price 2000.

Model 3: Final Model

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + e_i$$

Where: y_i = violent crime rate,

β_0 = intercept or constant,

$\beta_1 x_1$ = percent minority,

$\beta_2 x_2$ = percent below poverty, and

e_i = residual.

A reduced model examined how much of the variability in violent crime rate could be explained by percent minority in a county and percent below poverty in a county. The factors explained approximately 16.46 percent of the variance in violent crime rate, a medium effect. The regression model was significant, $F(2, 43) = 5.43$, $p < .05$ with a Cohen's f^2 effect size of 0.03, a small effect.

Finally, stepwise, backward elimination was used to test the final reduced model. Percent minority was dropped from the model, leaving percent below poverty as the sole explanatory factor for violent crime rate. This factor explained 16.45 percent of the variance in violent crime rate, a medium effect. The regression model was significant, $F(1, 44) = 9.86$, $p < .01$ with a Cohen's f^2 effect size of 0.03, a small effect.

Linear Regression Modeling: Property Crime

$$y_i = \beta_0 + \beta_1 x_1 + e_i$$

Where: y_i = property crime rate,

β_0 = intercept or constant,

$\beta_1 x_1$ = poverty, and

e_i = residual.

Based on the correlation matrix in Table 1, a single regression analysis was used to examine how much of the variability in property crime could be explained by poverty. This factor explained 10 percent of the variance in property crime rate, a small effect. The regression model was significant, $F(1, 44) = 5.88$, $p < .05$ with a Cohen's f^2 effect size of 0.01, a small effect.

General Discussion

The sociological study of violence has experienced a recent resurgence.[16] Researchers addressing this issue have pointed to the marginalization of violence studies in the social sciences. The present report aimed to contribute to the social scientific inquiry of violence and contextualize the study of violence to South Carolina. A previous report from the South Carolina Commission for Minority Affairs asserted a rural-to-urban economic disparity in the state.[17] In the report, poverty and other forms of socioeconomic deprivation were found to be more pronounced in South Carolina's rural counties. Given those findings and the statistical results of the present report, this should mean that rural areas have higher rates of violent and property crimes. This could be true at the state level, but one has to assume that there is a sizable share of poverty in even the most affluent parts of the state. Rural areas have fewer census tracts to delineate high crime areas from those in which crime is low. This was definitively shown in a geospatial study produced by the South Carolina Commission for Minority Affairs in which

[16] Walby, S. "Violence and Society: Introduction to an Emerging Field of Sociology." *Current Sociology 61,* no. 2 (2013); Hartmann, E. "Violence: Constructing an Emerging Field of Sociology." *International Journal of Conflict and Violence 11*, no. 1 (2017).
[17] C. Carter. October 2018. *Identifying South Carolina's Affluent and Deprived Counties: Computing with Standard Scores and Visualizing with Tableau Choropleth Maps.* South Carolina Commission for Minority Affairs, Columbia, SC. Retrieved from https://cma.sc.gov/research.

large swaths of socioeconomic deprivation were observed within South Carolina's most affluent cities.[18] This finding along with the results of the present report are encouraging because they lend to future study of violent crime in more populous areas of South Carolina. They can also statistically demonstrate relative deprivation in areas that are affluent at the county level of geographic analysis. The limitation of future examination might be the lack of data at lower levels of geography, but conclusions can still be drawn through the statistical evidence presented in the present report. Poverty is the strongest explanatory factor for both violent and property crime. If this were spatially mapped, then one could point to areas where crime is likely to be high.

The findings of the multiple regression analysis for violent crime shows that the percentage of people living below poverty in a county is the strongest explanatory factor for violent crime. It is important to note that the regression models cannot imply causation. Poverty is not necessarily the cause for crime, but there are strong relationships between poverty and crime. To draw more solid conclusions, statistical findings have to be linked with other research that has been conducted on poverty and crime.

Earlier in the discussion, the importance of relative deprivation in the study of crime was highlighted. The concept of relative deprivation suggests that individuals make social comparisons to groups or individuals that are in close physical proximity to them and judge the quality of their lifestyle and resources based on what is surrounding them. This can lead to them

[18] C. Carter. January 2019. *Geospatial Mapping of Community Socioeconomic Status with Publix and Whole Foods Locations.* South Carolina Commission for Minority Affairs, Columbia, SC. Retrieved from https://cma.sc.gov/cma-white-papers.

feeling deprived, whether it be socially or financially, and thus taking action for change.[19] Deprivation, whether it be relative or absolute, has become a backbone that many sociologists and criminologists use in their theories of conformity, deviance, and criminality.

Albert Cohen, a prominent criminologist, attempted to explain what he referred to as social disorganization in lower class communities through his theories of subcultural delinquency and status frustration. His research was grounded in Merton's research on anomie that is generated through the high value placed on competitive achievement in our culture and the wide disparities in the actual standard of living within communities.[20] Although Cohen studied individuals living in poverty, he did not explicit study the problem economically. Instead, he studied impoverished areas as places with unique subcultures. He asserted that impoverished persons still held the same values and desires as the middle-class, but lacked the legitimate means to achieve these middle-class aspirations.[21]

This sense of relative deprivation led to what he called status frustration. Status frustration sometime manifested itself in hostility and jealousy, and in extreme cases, crime. By a young age, children learned the informal distinctions between social classes. Material goods represented these distinctions such that clothing, homes, neighborhoods, and cars were outward symbols of class or status. Children then began to compare their material goods to those around them and came to learn about comparative desirability. Cohen argued that societal institutions in used what he called the "middle-class measuring rod." The "measuring rod" encompassed both

[19] Dennison, C. R. and R. R. Swisher. "Postsecondary Education, Neighborhood Disadvantage, and Crime: An Examination of Life Course Relative Deprivation." *Crime & Delinquency 65*, no. 2 (2019).
[20] Kawachi, I., B.P. Kennedy, R.G. Wilkinson. "Crime: social disorganization and relative deprivation." *Social Science & Medicine 48* (1999)
[21] Cohen, Albert K. *Delinquent Boys: The Culture of the Gang.* 1955. The Free Press, New York, NY.

material goods and social capital. Lower class boys lack the opportunities to meet these standards, and therefore experience strain due to their lack of conformity. [22]

Many sociologists and criminologists have hypothesized that crime rates will be higher in areas that have greater income inequality. Studies have shown that absolute poverty does not predict crime as strongly as relative poverty does. Previous scholarly research also indicates that poverty itself does not seem to be a cause of crime, but living in poverty in close proximity to wealth does seem to have a significant impact on both violent and property crime rates.[23] Relative poverty is closely linked to relative deprivation, which forms the backbone of Albert Cohen's idea of status frustration. Many of these studies regarding poverty, relative deprivation, and crime are conducted in urban areas. These findings may differ for the state of South Carolina, as it is a rural state. Further research needs to be conducted at the Commission for Minority Affairs to determine what effect income inequality in a county has on South Carolina's violent and property crime rates and how those results compare to previously published sociological and criminological research on the subject. Those findings should then be analyzed to see how they align with, or contradict, what has been reported in this brief.

[22] Cohen, Albert K. *Delinquent Boys: The Culture of the Gang.* 1955. The Free Press, New York, NY.
[23] Chester, Ronald C. "Perceived Relative Deprivation as a Cause of Property Crime." *Crime and Delinquency 22,* no. 1 (1976)