SOUTH CAROLINA COMMISSION FOR MINORITY AFFAIRS

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Explanatory Factors for School District Expulsion Rates: A Statistical Brief

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Executive Summary

This report examines the explanatory factors for school district expulsion rates. Key findings show the following:

- There were significant positive relationships between race, poverty, and expulsion such that African American racial composition and poverty was related to higher school expulsion. Conversely, white racial composition was related to fewer school expulsions.
- Though there were host of significant relationships for expulsion, the interaction between African American racial composition and poverty was the single most significantly explanatory factor for school district expulsion rates. School districts that simultaneously have high percentages of African American students and high poverty rates will be likely to have higher expulsion rates.
- Allendale, Williamsburg, Hampton 2, Barnwell 29, Jasper, and Charleston school districts had the highest school expulsion rates. Of these districts, Allendale and Hampton 2 were ranked in the top five in the interaction between percent African American and poverty rate. Though not in the top five for expulsion rates, Bamberg 2, Clarendon 1, and Lee school districts ranked in the top five in the interaction between African American race composition and poverty rate.

Introduction

School expulsion is a glaring problem in the state of South Carolina. A recent ProPublica report found particular disparities between African American and White students in expulsion rates. African American students in the state of South Carolina are almost twice as likely to be

suspended as their White peers[1]. For every 100 students expelled, 58 are African American and 33 are White. Moreover, South Carolina is in the top 10% in the nation for out-of school suspensions[2].

These findings warrant the need for statistical study. To address this concern, the present report examines the statistical relationship between the rates of expulsion in South Carolina's public school districts and several possible explanatory factors such as the poverty rate in a school district, percent of minority students in a school district (Native American, African American, Hispanic, and Asian), the interaction between minority racial composition and poverty rates, and the interaction between minority students and college enrollment after graduation. Data was compiled from the 2016-2017 South Carolina Department of Education District Report Card. [3]

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.[4] The use of regression depends on the research goals of a study.[5] 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

[1] ProPublica Miseducation Series: South Carolina. Retrieved from https://projects.propublica.org/miseducation/state/SC.
[2] Ibid.
[3] South Carolina Department of Education. *District Report Card 2016-2017*. Data Retrieved from https://ed.sc.gov/data/report-cards/historic-school-report-cards/2017/data-files-for-researchers-2017/.
[4] Pedhauzur, Elazar J. *Multiple Regression in Behavioral Research: Explanation and Prediction* (3rd Edition). (United States: Thomson Learning 1997).
[5] Ibid.

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 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. [6]

$$y' = a + bx$$

Where: y' = predicted dependent variable,

a = y-intercept or constant, and

[6] Bluman, Allen G. *Elementary Statistics: A Step by Step Approach, A Brief Version* (7th Edition). (New York, NY: McGraw-Hill Education 2015).

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.[7] 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.

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

Table 1 displays all of the variables of interest in the present statistical brief. Pearson's correlations were conducted to test which factors were significantly related to school district

[7] Rencher, Alvin C. and Schaalje, G. Bruce. *Linear Models in Statistics* (7th Edition). (Hoboken, NJ: John Wiley & Sons 2008).

expulsion rates across South Carolina's public school districts. It was found that poverty rate in a school district, percent African American in a school district, percent White in a school district, the interaction between percent African American and district poverty rate, the interaction between percent White and district poverty rate, the interaction between percent African American and college enrollment after graduation, and the interaction between percent White and college enrollment after graduation were significantly related to school district expulsion rates.

Some relationships differed by valence. For example, percent African American in a school district was positively related to expulsion rates. Conversely, percent White in a school district was negatively related to expulsion rates. This means that there is a relationship between higher percentages of African Americans in a school district and higher expulsion rates. On the other hand, where there are more White students in a school district, there may be fewer expulsions. Multiple regression analyses were used to test if these relationships had explanatory power for expulsion rates.

Table 1	
Factors of Interest in Report	
Dependent Variable	Independent Variables
School District Expulsion Rate	% poverty in a school district, Rate of college enrollment after graduation % African American in a school district, % Native American in a school district, % Hispanic in a school district, % Asian in a school district, % White in a school district, % African American* Poverty, % White* Poverty, % Native American* Poverty, % Asian* Poverty, % Hispanic* Poverty, % African American* College Enrollment, % White* College Enrollment, % Native American* College Enrollment, % Asian* College Enrollment, % Hispanic* College Enrollment

Linear Regression Model

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_6 + \beta_7 x_7 + e_i$$

Where: y_i = expulsion rate,

β_0 = intercept or constant,

$\beta_1 x_1$ = percent poverty in a school district,

$\beta_2 x_2$ = percent African American in a school district,

$\beta_3 x_3$ = percent White in a school district,

$\beta_4 x_4$ = African American* Poverty,

$\beta_5 x_5$ = White* Poverty,

$\beta_6 x_6$ = African American* College Enrollment,

$\beta_7 x_7$ = White* College Enrollment, and

e_i = residual.

A multiple regression analysis was used to examine how much of the variability in district expulsion rates could be explained by poverty rate in a school district, percent African American in a school district, percent White in a school district, the interaction between percent African American and district poverty rate, the interaction between percent White and district poverty rate, the interaction between percent African American and college enrollment after graduation, and the interaction between percent White and college enrollment after graduation.

The factors explained 9.33 percent of the variance in school district expulsion rates, a medium effect. The regression model was significant, $F(7, 74) = 2.19$, $p < .05$ with a Cohen's f^2 effect size of 0.1, a small effect. Though the full model was significant, none of the individual independent variables were significant explanatory factors for district expulsion rate. This indicates multicollinearity. In fact, variance inflation statistics indicated that there was definitive multicollinearity in all independent variables (VIF $\geq$ 10). [8] As a result, the variable with the highest variance inflation factor, the interaction between percent African American and poverty rate was dropped from the model.

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_{6+} e_i$$

Where: y_i = expulsion rate,

β_0 = intercept or constant,

$\beta_1 x_1$ = percent poverty in a school district,

$\beta_2 x_2$ = percent African American in a school district,

$\beta_3 x_3$ = percent White in a school district,

$\beta_4 x_4$ = White* Poverty,

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

$\beta_5 x_5$ = African American* College Enrollment,

$\beta_6 x_6$ = White* College Enrollment, and

e_i = residual.

A reduced model examined how much of the variability in district expulsion rates could be explained by poverty rate in a school district, percent African American in a school district, percent White in a school district, the interaction between percent White and district poverty rate, the interaction between percent African American and college enrollment after graduation, and the interaction between percent White and college enrollment after graduation.

The reduced model explained 10.5 percent of the variance in school district expulsion rates, a medium effect. The regression model was significant, $F(6, 75) = 2.58$, $p < .05$ with a Cohen's f^2 effect size of 0.11, a small effect. As observed with the full model, there was multicollinearity. As a result, stepwise regression was used to eliminate variables that were not significant.

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + \beta_6 x_{6+} e_i$$

Where: y_i = expulsion rate,

β_0 = intercept or constant,

$\beta_1 x_1$ = percent poverty in a school district,

$\beta_2 x_2$ = percent African American in a school district,

$\beta_3 x_3$ = percent White in a school district,

$\beta_4 x_4$ = White* Poverty,

$\beta_5 x_5$ = African American* College Enrollment,

$\beta_6 x_6$ = White* College Enrollment, and

e_i = residual.

Stepwise regression using the original full regression model determined that the interaction between percent African American in a school district and district poverty rate was the sole significant explanatory factor for school expulsion rates. The interaction explained 11.38 percent of the variance in school district expulsion rates, a medium effect. The regression model was significant, $F(1, 80) = 11.4$, $p < .01$ with a Cohen's f^2 effect size of 0.13, a small effect. The interaction between percent African American in a school district and district poverty rate ($\beta = .02$, $p < .01$) was a significant explanatory factor for district expulsion rates.

Table 2

Top Five Districts by Significant Explanatory Variables

	Significant Variables for Expulsion Rates			
Rank	**Expulsion Rate x 100**	**% African American**	**Poverty Rate**	**African American*Poverty**
1	Allendale (790)	Bamberg 2 (96.57%)	Allendale (92)	Bamberg 2 (8806.87)
2	Williamsburg (480)	Allendale (94.62%)	Florence 4 (91.8)	Allendale (8704.73)
3	Hampton 2 (380)	Clarendon 1 (93.81%)	Bamberg 2 (91.2)	Hampton 2 (8435.97)
4	Barnwell 29/ Jasper (270)	Hampton 2 (93.73%)	Lee (90.8)	Clarendon 1 (8386.3)
5	Charleston (250)	Williamsburg (92.72%)	Hampton 2 (90)	Lee (8363.87)

Source: SC Department of Education, 2017 District Report Card.
Note: Expulsion rates reported by SC Department of Education were multiplied by 100 for statistical scaling. Interaction terms calculated by data analysts at SC Commission for Minority Affairs.

Discussion

Statistical Results

The districts found to have the three highest expulsion rates did not have enough White students to draw conclusions about racial gaps in expulsion. Barnwell 29, Jasper, and Charleston school districts were the only districts in the top five for school expulsion that were not also top

five in either percentage African American, poverty rate, and the interaction between African American race composition and poverty. Given the statistical finding that the interaction between race composition and poverty was the single significant explanatory factor for school expulsion, this would lead one to believe that there may be racial gulfs in the aforementioned districts regarding expulsion. ProPublica's report confirms this conjecture, such that African American students in Charleston are three times as likely to be expelled as White students. Barnwell 29 and Jasper are on par with the state figures, such that African American students in both districts are about twice as likely to be expelled than White students. [9]

The interaction between African American race composition and poverty was the single most significant explanatory factor for school district expulsion rate. Bamberg 2, Allendale, Hampton 2, Clarendon 1, and Lee for the top five districts in the interaction between the two factors. A South Carolina Commission for Minority Affairs whitepaper found Allendale, Bamberg, Hampton, Lee, and Clarendon counties to be socioeconomically deprived across three different metrics[10]. These collective findings may indicate that students in these areas are not only at risk of school expulsion during school but also face socioeconomic risk after graduation.

Abbeville Case

Of the six districts that fall in the top five of highest expulsion rates in South Carolina, five (Allendale, Barnwell 29, Hampton 2, Jasper, and Williamsburg) were plaintiffs in *Abbeville County School District v. State of South Carolina* (Abbeville I). In the 1999 lawsuit against the state of South Carolina, forty school districts argued that South Carolina had failed in providing

[9] ProPublica Miseducation Series.
[10] Carter, C. L. (2018, November). *Comparing three economic diagnosis measures: Development of a more precise socioeconomic distress metric*. South Carolina Commission for Minority Affairs. Retrieved from https://cma.sc.gov/cma-white-papers.

equitable funding to districts across the state and violated the education clause of the state constitution. The South Carolina Supreme Court ruled that the state had not failed in providing equitable education and per the state's education clause, South Carolina was responsible only for "[providing] the opportunity to receive a minimally adequate education."[11] In 2014, the South Carolina Supreme Court issued an opinion in *Abbeville County School District et al. v. State of South Carolina et al*. (Abbeville II), finding that "South Carolina's educational funding scheme [was] a fractured formula [that denied] students in the Plaintiff's Districts the constitutionally required opportunity."[12] In the Abbeville II opinion, the South Carolina Supreme Court affirmed its adherence to the judicial precedent set forth by *Brown v. Board of Education* and found that in failing to provide a "minimally adequate education" to South Carolina students, that they were in violation of the South Carolina State Constitution and failing to provide students with the constitutional opportunity that was established in the *Brown* decision.

In the *Abbeville II* decision, the South Carolina Supreme Court found also determined that a variety of contributing factors such as poverty, lack of funding, lack of school resources, inadequate transportation, unprepared teachers, and low teacher retention that contributed to the disparate experiences of students in the plaintiff districts. [13] Of these factors, the court found poverty to have a significant effect on the academic outcomes of students in these districts, citing it as the only significant variable that accounted for differences in PACT scores when compared against funding, teacher certification, teacher turnover, and professional development.[14]

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[11] *Abbeville County School District v. State of South Carolina,* 335 S.C. 58, 515 S.E.2d 535(1999).
[12] *Abbeville County School District et. al v. State of South Carolina*, 410 S.C. 619, 767 S.E.2d 157 (2014).
[13] Ibid.
[14] Ibid.

Schools as Sites of Social Reproduction

Significant scholarship in educational studies, sociology, and anthropology offer critical perspectives to contextualize South Carolina's inequities in schooling within a larger discourse of the implications that come with inequitable resources and treatment within educational spaces in the United States. Scholars of education have thought of the educational space as a significant site of social control and maintenance, in which the school serves as a microcosm of society.[15] In this way, schools are thought to reflect societal systems and reproduce them within the institution. This reproduction of societal systems is manifested in the way that knowledge is produced and how students are socially evaluated by teachers, administrators, and peers. For minority students, the experience within the educational space often mirrors experiences of inequality within society. Critical race theorists have found that the interplay between poverty and race places minority students at a significant social disadvantage because of their inability to access forms of social capital readily available to their White peers of higher socioeconomic status. [16] As schools serve as sites where knowledge is produced and reaffirmed, the social evaluation of minority and impoverished students is often that they do not fit within the construction of what a successful student looks like. This plays out in an overrepresentation of minority students in the disciplinary system, with significantly more punitive practices to regulate behavior.

[15] Noguera, Pedro A. "Schools, Prisons, and Social Implications of Punishment: Rethinking Disciplinary Practices." *Theory Into Practice* 42, no. 4 (2003): pg. 341-50
[16] Dixson, Adrienne D., Celia Rousseau Anderson, and Jamel K. Donner. "Chapter 1: Toward a Critical Race Theory of Education." 2017. *Critical Race Theory in Education: All God's Children Got a Song.*

As microcosms of society, educational spaces also reproduce structures of social control, and in their disciplinary practices, often resemble strategies used to punish adults for criminal behavior in society.[17] Sociologist Pedro Noguera argues that there is an "implicit social contract [that] serves as the basis for maintaining order in schools."[18] Embedded within the social contract is the expectation that students will relinquish forms of individual freedom and defer to higher authority in order to maintain order. Noguera further argues that the social contract present within the school functions effectively because as students defer to adult authority and remain in compliance with school behavioral standards. The reward of adherence to the informal is the attainment of knowledge and skills that lay the foundation for upward mobility in society. However, for students who are not in such school environments that provide them such resources, Noguera argues that there is little incentive to comply with school regulations.[19] Students failing to comply with the social contract of school become labeled as defiant and difficult, labels that become embedded into a narrative of deviance for these students.[20] The negative labeling of these students as "bad," often leads to their prolonged exclusion from the classroom, most often beginning with suspension and in many cases leading to expulsion. According to Noguera, one of the main functions of a school is the implicit and explicit social ordering of students. In this way, students are sorted according to what their eventual societal contribution and economic output is perceived to be, based on their initial academic performance and behavior from their entry into the school. [21]For students labeled as "bad" or disruptive to the

[17] Noguera, Pedro A. "Schools, Prisons, and Social Implications of Punishment: Rethinking Disciplinary Practices." *Theory Into Practice* 42, no. 4 (2003): pg. 341-50
[18] Ibid.
[19] Ibid.
[20] Ibid
[21] Ibid.

educational space, they are essentially filtered out of the school system, as their removal is seen as necessary in order to maintain the school's ability to educate its other students. African American and Hispanic students, who experience the highest rates of suspensions and expulsions, are particularly susceptible to this negative social filtering. For these students, the filtering has implications beyond school such that they are most likely to be introduced into the carceral system and thus, placed on the socioeconomic fringes of society.

Higher rates of expulsions carry significant implications for educational and economic trajectories of minority students. For students grappling with the harsh realities of living in poverty, these implications are amplified when forms of school discipline place them at a higher risk of being jailed after finishing school. This could subsequently limit avenues to achieving social mobility. Intersectionality offers a framework to contextualize this experience for minority students as it seeks to explain the interconnectedness of social positions and consider how societal structures such as the economy, schools, and the carceral state craft inequitable experiences for minority populations. As scholars of critical race theory are currently conceptualizing new ways to consider how repeated suspensions and expulsions result in "push-out," where African American and Hispanic students are removed from narratives of schooling all together, it is important to consider how expulsion in South Carolina fits within the larger discourse of race, class, and difference in education.[22] As evidenced by this report, for districts with high percentages of African American students and poverty will be likely to experience more expulsion. With these findings, it is critically important to develop further study into why

[22] *Black Girls Matter: Pushed Out, Overpoliced, and Underprotected*. Retrieved from African American Policy Forum (AAPF) https://static1.squarespace.com/static/53f20d90e4b0b80451158d8c/t/54d2d37ce4b024b41443b0ba/1423102844010/BlackGirlsMatter_Report.pdf.

these higher percentages persist in South Carolina and what they mean for the success of minority students beyond the state.