Research Brief

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Relationship Between Students' Academic Performance and Selected System Variables: Policy Implications

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Introduction

The No Child Left Behind Act of 2001 (Public Law 1997-1007-110) is a primary outcome of President George Bush's statement: "One of the most important goals of my Administration is to support States and local communities in creating and maintaining a system of public education where no child is left behind…"[1] This statement can be viewed as a powerful response to those who state that some are genetically inferior.[2] Also, it affirms the statement that "all men are created equal…"[3] However, students' performance on standardized tests documents disparities. Numerous factors can be responsible for these disparities (e.g., poverty, system

[1] Bush, G. W. (2001). No child left behind act. *HRI United States Department of Education. Retrieved October*, *28*, 2008.

[2] Jayaratne, T. E., Ybarra, O., Sheldon, J. P., Brown, T. N., Feldbaum, M., Pfeffer, C. A., & Petty, E. M. (2006). White Americans' genetic lay theories of race differences and sexual orientation: Their relationship with prejudice toward Blacks, and gay men and lesbians. *Group Processes & Intergroup Relations*, *9*(1), 77-94.

[3] Obama, B. (2016). *Second inaugural address*. Barack Obama.

variables, etc.). Hair et al. [4] noted that children living in poverty generally perform poorly in school and have markedly lower standardized test scores and lower educational attainment. Also, they suggested the longer children live in poverty, the greater their academic deficits. Thus, poverty's depression of tests scores and lower educational attainment should be the same for all children living in poverty.

Conducting a multiple regression analysis, Monroe-Lax and Ko (2017) reported that poverty in the school district was the best predictor of students' academic performance. They concluded that while student academic performance is linked to the school learning environment, residing in low income families within high poverty school districts is just as important in explaining differences in students' academic performance.

Nationally, rural Americans have lower median household incomes than urban households, but people living in rural areas have lower poverty rates than their urban counterparts.[5] According to the 2015 American Community Survey, median household income for rural households was $52,386, about 4.0 percent lower than the median for urban households, $54,296. Whereas, 13.3 percent of people in rural areas lived in families with incomes below the official poverty threshold, but the poverty rate for people in urban areas was 16.0 percent.[6] Thus, we would expect students' academic performance to be higher for rural rather than urban school districts.

Given the documented link between poverty and students' academic performance, Public Law 1997-1007-110 is a tall order because economic disparities have to be eradicated to ensure no child is left behind. Notwithstanding, anecdotal evidence highlights examples of children living in poverty whose test scores and educational attainment exceed the norm. Thus, there must be factors other than poverty contributing to disparities in academic performance. This manuscript investigates the relationship between students' academic performance and select system variables within the state of Mississippi. These variables, for the most part, are under the direct control of local and district administrators and school boards. The intent of this research brief is to inform school officials and other policymakers regarding the relationship between students' academic performance and system variables. This Research Brief (# 2) looks beyond the variables of poverty and percentage of Highly Qualified Teachers (see Research Brief 1) as explanations for differences in academic performance. It seeks to examine how other selected variables are also impacting academic performance in urban and rural areas. In addition to its macro purpose of examining system variables contributing to academic differences in urban and rural school districts, this research brief's micro purpose is to help identify potential policy areas that could be used to increase the academic performance of students scoring lower on selected standardized test measures. Collectively, these two purposes provide a framework for policymakers to use empirical evidence to better inform their policy decisions.

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[4] Hair NL, Hanson JL, Wolfe BL, Pollak SD. Association of Child Poverty, Brain Development, and Academic Achievement. *JAMA Pediatr.* 2015;169(9):822-829. doi:10.1001/jamapediatrics.2015.1475

[5] https://www.census.gov/newsroom/blogs/random-samplings/2016/12/a_comparison_of_rura.html

[6] Ibid

Overview of Mississippi's Public Education System

Mississippi's public education system currently has 148 school districts which are governed by locally elected and/or appointed school boards and superintendents. According to the Mississippi Department of Education (MDE) in 2013, Mississippi had 492,586 students enrolled in its public schools system. Of those, 305,157 were enrolled in grades 1-8.

The Mississippi Board of Education appoints the State Superintendent of Education, sets public education policy and oversees the Mississippi Department of Education (MDE). The department is responsible for implementing state and federal education laws, disbursing state and federal funds, holding schools and districts accountable for performance, and licensing all educators. The funds which support the Mississippi public school system are derived primarily from three governmental sources: Local, State, and Federal.

In regards to national comparisons, Mississippi is often ranked on the lower end of public education performance measures. In the 2016 Quality Counts report (http://www.edweek.org/ew/toc/2016/01/07/), Mississippi ranked second to last on school performance Mississippi's average ACT score for the 2012-2013 school year was 18.6, compared to the national average of 20.7, which ranked Mississippi 49th among the states. Mississippi's four-year dropout rate was 12.8% in 2014-15, compared to the national average of 6.8 (Monroe-Lax, D., & Ko, J., 2017). Many people attribute Mississippi's national low-level placement with its level of funding of public education (Monroe-Lax, D., & Ko, J., 2017). For instance, the national average for per pupil expenditures for the 2012-2013 school year was $10,700, whereas, in Mississippi it was $8,130, making it the fifth lowest among the states.

Methods

Research Design. A correlation research design was used. This design explores the relationship between variables. While the design does not support causation, the predictive relationship between two or more variables can be determined.

Description of Sample. Data for 142 school districts (which excludes 6 districts) in Mississippi were collected from the Mississippi Department of Education's website. Total enrollment for the 2013-2014 school year was 492,586 students. Of those students, 49% (243,845) were Black, 46% (224,505) were White, 3% (14,844) were Hispanic, 1% (4,938) were Asian, 1% (3,173) were Multiracial, and 1,281 were Native American. The 142 school districts included in this study were divided into two groups representing rural and urban areas. These two groups were then compared against each other across selected variables.

Operational Definition. Every school in the United States is located in either a rural or an urban area as classified using Metropolitan Statistical Areas (MSA). An MSA is a county or group of contiguous counties that contains at least one city with a population of 50,000 or more, or includes a Census Bureau-defined urbanized area of at least 50,000 with a population of at least

100,000. MSAs are defined by the Office of Management and Budget (OMB) and used by the Census Bureau and other federal government agencies for statistical purposes.[7]

Procedure. Secondary data were accessed from the Mississippi Department of Education, National Center for Education Statistics, and the Children's First Annual Report 2012-2013. Student achievement was measured using the Mississippi Curriculum Test, 2nd Edition Mathematics and Language scores for grades 3-8 (2013-14 school year).

Results

Table 1 shows averages for selected system variables by location (that is, urban versus rural) (Insert Table 1). As expected, average enrollment was higher for urban school districts (11,602) versus rural school districts (2,609). However, average expenditure per student was lower for urban districts ($9,154.31) than for rural districts ($9,307.76). Thus, rural school districts spent more per student than urban school districts even though average enrollment was lower in rural districts. When specific budget categories are reviewed, a statistically significant difference between the two locations (urban versus rural) did not emerge for the Instructional category or the School Administration category. Notwithstanding, rural school districts spent a statistically significant higher percentage of their budget for General Administration ($t_{\text{general admin}}$ = -3.10, p = .002) and Operations ($t_{\text{operations}}$ = -2.78, p = .007) than urban school districts. Urban school districts spent a statistically significant higher percentage of their budget for "Other Instructional" ($t_{\text{other instructional}}$ = 2.49, p = .03) than rural districts. Thus, both locations spent about the same percentage of their budget for Instruction, but urban school districts spent a higher percentage for "Other Instructional" while rural school districts spent a higher percentage of their budget for General Administration and operations.

Composite language scores tended to be higher for the urban school districts than the rural school districts ($M_{\text{language for urban}}$ = 151.17, $M_{\text{language for rural}}$ = 149.49, $t(140) = 2.65$, p = .01). Thus, students enrolled in urban schools displayed higher language scores. Similar findings showed urban school districts having higher composite math scores than rural school districts ($M_{\text{math for urban}}$ = 153.15, $M_{\text{math for rural}}$ = 151.59, $t(140) = 2.65$, p = .03). In addition to higher language and math scores, urban school districts reported a better graduation rate ($M_{\text{graduation rate for urban}}$ = 77.88, $M_{\text{graduation rate for rural}}$ = 73.70, $t(140) = 2.07$, p = .05), and a lower dropout rate ($M_{\text{dropout for urban}}$ = 11.77, $M_{\text{dropout for rural}}$ = 14.65, $t(140)$ = -1.78, p = .08). Despite this better showing for urban school districts, the percentage of highly qualified teachers did not differ significantly between the two locations. However, rural school districts had a higher percentage of free lunch and reduced lunch (72.83) than urban school districts (67.83), but the difference was not statistically significant. Using the "free lunch and reduced lunch" percentage measure as a proxy for poverty, this finding somewhat contradicts the

[7] Nussle, Jim (Nov 20, 2008). "Update of Statistical Area Definitions and Guidance on Their Uses" (PDF). Office of Management and Budget. pp. 1–2

national finding of rural areas having lower poverty rates. However, this finding is consistent with findings from Hair et al regarding poverty's relationship to lower test scores.[8]

Table 2 shows the correlation matrix. Location in this table identified the type of school district; urban coded "0" versus rural coded "1". Thus, as type of school district changed from urban to rural, an increase in the percentage of the budget spent for General Administration occurred 25% of the time. Also, as the type of school district changed from urban to rural, an increase in the percentage of the budget spent for Operations occurred 23% of the time. Thus, differences exist between urban and rural school districts regarding the percentage of funds allocated for specific line items.

Targeting these line items more intently, expenditures per student correlated negatively with Instructional ($r = -.35$, $p = .05$); Highly Qualified Teachers ($r = -.37$, $p = .05$); Composite Language ($r = -.41$, $p = .05$); and Composite Math ($r = -.41$, $p = .05$). Thus, as total expenditures per students increased, funds allocated to Instructional decreased, and the Percentage of Highly Qualified teachers decreased. Also, Composite Language and Composite Math decreased. At the same time, as total expenditures per student increased, 53% of the time, the percentage allocated for General Administration increased. When the Instructional line item is considered, an interesting observation emerged. The Instructional category correlated negatively with the categories of "Other Instructional" ($r = -.74$, $p = .01$); General Administrative ($r = -.46$, $p = .01$); School Administration ($r = -.18$, $p = .05$); and Operations ($r = -.30$, $p = .05$). However, a

[8] Hair et al (ibid)

Table 1

Select System Variables by Type of School District

System Variables	Urban	Rural
	Mean (std)	Mean (std)
Composite Language[a]	151.17 (2.10)	149.49 (2.87)
Composite Math[a]	153.15 (2.28)	151.59 (3.11)
Expenditures per Pupil	$9,154 (1,389)	$9,307 (1,381)
Instructional	66.85% (3.07)	66.34% (3.66)
Other Instructional[a]	17.29% (2.58)	15.40% (2.97)
General Administrative[a]	3.89% (1.47)	5.56% (1.88)
School Administration	6.00% (.58)	5.72% (.99)
Operations	6.03% (.81)	6.96% (1.19)
Total Enrollment[a]	11,602 (9,831)	2,609 (1,829)
Percent of Highly Qualified Teachers[a]	97.87 (1.30)	96.86 (2.88)
Graduation Rate[a]	77.88% (6.54)	73.70% (9.43)
Average Daily Attendance	94.45% (.57)	94.70% (1.03)
Free Lunch and Reduced Lunch	67.83% (14.84)	72.83% (13.07)
Dropout Rate	11.77% (4.85)	14.65% (10.07)
Black Students	44.15% (28.63	54.59% (30.92)
White Students	49.88% (27.61	41.43% (30.24
Hispanic Students[a]	4.08% (3.02)	2.26% (2.88)
Native American Students	.22% (.16)	.26% (.90)
Asian Students[a]	1.64% (1.51)	.52% (.80)

[a]Significant, $t(140) = 2.48$, $p < .03$