

The Accuracy of Community and Family Demographic Factors to Predict the Percentages of Students Proficient or Above on Grade 8 State Tests in Math and Language Arts

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Introduction

The value of using standardized assessment as an indicator of school district, teacher and student success has long been debated among progressive and essentialist educational theorists. The so-called “education reform” initiatives from the federal and state governments aimed at increasing teacher and administrator accountability and student achievement rarely take into consideration factors outside of the realm of classroom instruction and administrative leadership (Leithwood, 2001). Factors that strongly influence student achievement such as the level of education of parents, students living in single parent households, and median household income are not included by any state and federal education agencies school or district performance reports (Davis-Kean, 2005). Yet those human capital factors can have more sway over test scores than teacher mobility or the percent of teachers with an advanced degree.

Problem

Little quantitative, correlational, cross-sectional research has been conducted that links student performance on standardized assessments such as the New Jersey Assessment of Skills and Knowledge (NJ ASK) and the future success of students educationally and/or professionally. Moreover, research on this topic has been limited since 2010 with the inception of the Common Core era. However, results from empirical evidence have demonstrated time and again that socioeconomic status proves to be a major influence in determining the success or failure of students on standardized tests (Tienken & Orlich, 2013).

The modern educational systems of the 21st century focus on skills that promote college and career readiness. Policymakers and legislators alike correlate the word “readiness” with student proficiency on standardized assessments such as the NJ ASK and have implications that extend beyond the realm of the student to factors such as teacher accountability and principal leadership (Marzano, 2005). College and career readiness is now an indicator of school district quality on state mandated school district performance reports. Yet, little substantial research has been conducted on the influence that factors explaining out-of-school socioeconomic variables such as parent education level, single parent households and median household income has in the overall success of students on the NJ ASK since the Common Core era.

Purpose and Questions

Our purpose for this study was to identify community and family demographic factors that can predict, with the most accuracy, the percentage of students scoring proficient or above, at the school district level, on the 2012 NJ ASK 8 in Language Arts and Mathematics tests.

This study was guided by three main research questions:

1. How much variance in 2012 NJ ASK Grade 8 test results in Language Arts and Mathematics is explained by out-of-school socioeconomic variables?
2. How accurately can out-of-school socioeconomic and community-level variables predict a school district's percentage of students scoring Proficient or Advanced Proficient on the 2012 NJ ASK Grade 8 Language Arts and Mathematics sections?
3. Which community-level variables account for the greatest amount of variance in a school district's percentage of students passing the 2012 NJ ASK Grade 8 in Language Arts and Mathematics?

Methodology

We used a non-experimental, correlational, explanatory, cross-sectional design with quantitative methods because the study provided research and corresponding data that explored the relationship between two or more variables at one moment in time. Multiple linear regression models were used in the study to determine the statistical significance of the out-of-school variables that were reported in the 2012 NJ ASK 8 Language Arts and Mathematics student scores. Multiple regression (MR) analyses are commonly employed in social science fields. Community wealth demographic factors were considered in the study to determine the influence that those factors played in predicting student outcomes on the 2012 NJ ASK 8. The strength and relationship between the out-of-school variables and community wealth demographic factors remained undetermined. The information and results of the data contained in this study will contribute to the limited body of literature that exists on this topic.

Johnson (2001) wrote that non-experimental research could be categorized in one of three ways: descriptive, predictive, and explanatory (Johnson, 2001). The research conducted aimed to collect data that were connected with an educational topic. Johnson (2001) contended

that non-experimental research is “frequently an important and appropriate mode of research in education (Johnson, 2001, p. 3). The correlational study that is being conducted investigated data that were gathered from one point in time; namely, 2012 NJ ASK 8 scores in Language Arts and Mathematics. Furthermore, the study was non-experimental, cross-sectional and explanatory. Therefore, it was appropriately designed because it aimed to investigate the relationship between two or more variables using quantitative methods at one point in time.

Following a similar format to that of Turnamian’s (2012) study, simultaneous and hierarchical regression analyses were used to determine the statistical significance of out-of-school variables on school districts 2009 NJ ASK Grade 8 Language Arts and Mathematics scores.

Sample

All school district data examined in this study related to district-level Grade 8 student achievement as measured by 2012 NJ ASK 8 for Language Arts and Mathematics. According to the New Jersey Department of Education, New Jersey has approximately 590 school districts categorized into eight different district factor group (DFG) categories determined by 2010 U.S. Census data. Not all school districts in NJ serve students in Grade 8. Some of the 590 school districts in New Jersey include regional high schools and county schools that do not serve elementary grades. The target population for this study was 100% of all New Jersey school districts with both 2012 NJ ASK 8 data and 2010 U.S. Census data and at least 25 students enrolled in Grade 8 who achieved a valid score on the NJASK in both sections. As a result, the available population for the study was 409 districts and the sample size for the study was 409 school districts or 100% of the population.

Data Collection

The primary method for data collection was assessment results on the 2012 NJ ASK for Grade 8 students in Language Arts and Mathematics that was administered during the 2011-2012-calendar school year. Student achievement information was publically available by accessing New Jersey School Report Card data that are published annually on the New Jersey Department of Education website and was downloaded into an Excel spreadsheet to be used for analysis of the variables that were explored (NJDOE, 2011). There were two distinct locations from which the data for the independent variables were collected. The data regarding the percentage of economically disadvantaged families in the New Jersey public school districts were downloaded into an Excel spreadsheet from the New Jersey Department of Education website where annual school report card data are made available (NJDOE, 2013b). Remaining data regarding independent variables for each New Jersey school district were gathered from the U.S. Census Bureau American Community Survey (ACS).

Data Analysis

Simultaneous multiple liner regression models and hierarchical linear models were developed. A two-way ANOVA test was generated for each dependent variable. *F*-Statistics were analyzed to determine if the regression models that were generated were statistically significant.

The independent variables that were examined include the following:

- Employment status
- Percentage of annual household income under \$25,000
- Percentage of annual household income under \$35,000
- Percentage of annual household income above \$200,000
- Percentage of family income under \$25,000

- Percentage of family income under \$35,000
- Percentage of family income above \$200,000
- All families in poverty for 12 months
- All female households in poverty
- All people under poverty
- Percentage of male households with no wife
- Percentage of female households with no husband
- Parents with less than a 9th grade education
- Percentage with no high school diploma
- Percentage that are high school graduates with some college education
- Percentage with a bachelor's degree
- Percentage with an advanced degree
- Lone parent households, total

The dependent variables that were explored in this study were inclusive of school district data obtained from 2012 NJ ASK 8 Language Arts and Mathematics results, which were defined as the percentage of the student population that achieved a score of either Proficient or Advanced Proficient on the assessment.

Model of Best Fit for 2012 Grade 8 NJ ASK Language Arts Scores

An analysis of the hierarchical linear regression was used to estimate the influence that the three models had on the dependent variable of the percentage of students passing the Grade 8 Language Arts portion of the 2012 NJ ASK (Table 1). It was evident from the data in Model 1 that the predictor of no high school explained 51.4% of the variance in the dependent variable of percentage of students passing Language Arts with an *R* Square value of .514. Model 2

indicated that 60.5% of the variance could be explained by combining the predictors of no high school and all people under poverty in the dependent variable as represented by an *R* Square value of .605. Model 3 demonstrated that when the three predictors of no high school, all people under poverty, and employment status were combined, then 62.5% of the variance could be explained in the dependent variable percentage of students passing Language Arts at an *R* square value of .625. Consequently, an analysis of the three models showed that Model 3 explained the greatest amount of variance in the dependent variable of percentage of students passing Language Arts. As each new predictor was introduced to the hierarchical regression model, the *R* Square value became stronger.

Table 1

Grade 8 Language Arts Hierarchical Linear Regression Model Summary

Model Summary									
Model	<i>R</i>	<i>R</i> Square	Adjusted <i>R</i> Square	Std. Error of the Estimate	Change Statistics				
					<i>R</i> Square Change	<i>F</i> Change	<i>df</i> 1	<i>df</i> 2	Sig. <i>F</i> Change
1	.717 ^a	.514	.513	8.054	.514	425.401	1	402	.000
2	.778 ^b	.605	.603	7.271	.091	92.221	1	401	.000
3	.791 ^c	.625	.622	7.093	.020	21.390	1	400	.000

- a. Dependent Variable: % Passing LAL
- b. Predictors: (Constant), No HS
- c. Predictors: (Constant), No HS, All People under Pov
- d. Predictors: (Constant), No HS, All People under Pov, Employ Status

The existing empirical literature and results from this study suggested that student outcomes on the 2012 Grade 8 Language Arts portion of the NJ ASK were significantly influenced by out-of-school, demographic factors that were not associated factors under the influence of school district personnel. The three predictors identified in this study that

demonstrated the strongest influence were no high school, all people under poverty, and employment status. The statistically significant variables combined to accurately predict the percentage of students scoring Proficient or Advanced Proficient in 89.0% of school districts on the Language Arts section of the 2012 NJ ASK 8. This predictive power is notable and provides data that demonstrate undeniably that student performance is strongly influenced by factors besides teaching and learning in the classroom.

Model of Best Fit for 2012 NJ ASK Grade 8 Mathematics

We used hierarchical linear regression again to estimate the influence that the three models have on the dependent variable of the percentage of students passing the Grade 8 Mathematics portion of the 2012 NJ ASK (Table 2). It was evident from the data in Model 1 that the predictor of no high school explained 47.9% of the variance in the dependent variable of percentage of students passing mathematics with an *R* Square value of .479. Model 2 indicated that 54.5% of the variance could be explained by combining the predictors of no high school and all people under poverty in the dependent variable as represented by an *R* Square value of .545. Model 3 demonstrated that when the three predictors of no high school, all people under poverty, and employment status were combined, then 56.8% of the variance could be explained in the dependent variable percentage of students proficient on the mathematics section at an *R* square value of .568. Consequently, an analysis of the three models showed that Model 3 explained the greatest amount of variance in the dependent variable of percentage of students passing Language Arts. As each new predictor was introduced to the hierarchical regression model, the *R* Square value became stronger.

Table 2

Grade 8 Mathematics Hierarchical Linear Regression Model Summary

Model Summary									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.692 ^a	.479	.477	10.763	.479	372.784	1	406	.000
2	.738 ^b	.545	.543	10.070	.066	58.792	1	405	.000
3	.754 ^c	.568	.565	9.819	.023	21.927	1	404	.000

- a. Dependent Variable: % Passing Mathematics
- b. Predictors: (Constant), No HS
- c. Predictors: (Constant), No HS, All People under Pov
- d. Predictors: (Constant), No HS, All People under Pov, Employ Status

Similar to the results for Language Arts, the results of the study for student outcomes on the 2012 Grade 8 Mathematics portion of the NJ ASK were also statistically significantly as influenced by the three predictors of no high school, all people under poverty, and employment status. The statistically significant variables combined to accurately predict the percentage of students scoring proficient or advanced proficient in 89.2% of school districts in the Mathematics section of the 2012 NJ ASK 8. Simply stated, this result is too powerful to be ignored by policymakers and educational leaders.

Research Questions and Answers for Dependent Variables

This study sought to answer three main research questions. As a result of the examination of the information and literature and after a thorough analysis of the data, the following responses to the research questions were delineated:

Research Question 1: How much variance in 2012 NJ ASK Grade 8 test results in Language

Arts and Mathematics is explained by out-of-school socioeconomic variables?

Null Hypothesis: No statistically significant relationship exists between 2012 NJ ASK Grade 8 test results in Language Arts and Mathematics that can be explained by out-of-school socioeconomic variables.

Answer: The null hypothesis is rejected. The predictor variables of no high school, all people under poverty, and employment status proved to be statistically significant predictors of 2012 NJ ASK Grade 8 scores in Language Arts and Mathematics.

Research Question 2: How accurately can out-of-school socioeconomic and community-level variables predict a school district's percentage of students scoring Proficient or Advanced Proficient (percentage passing) on the 2012 NJASK Grade 8 Language Arts and Mathematics sections?

Null Hypothesis: There is no statistically significant, research demonstrated, combination of independent variables with reliable, predictive power for 2012 NJ ASK Grade 8 test results in Language Arts and Mathematics for New Jersey school districts.

Answer: The null hypothesis is rejected. A combination of no high school, all people under poverty, and employment status was found to have reliable, predictive power for 2012 NJ ASK Grade 8 test results in Language Arts and Mathematics for New Jersey school districts. The statistically significant variables combined to accurately predict the percentage of students scoring Proficient or Advanced Proficient in 89.0% of school districts on the Language Arts section of the 2012 NJ ASK 8 and in 89.2% of school districts in the Mathematics section of the 2012 NJ ASK 8.

Research Question 3: Which community-level variables account for the greatest amount of variance in a school district's percentage of students passing the 2012 NJ ASK Grade 8 in

Language Arts and Mathematics?

Null Hypothesis: There is no statistically significant relationship that exists between community-level variables and a school district's percentage of students passing the 2012 NJ ASK Grade 8 Language Arts and Mathematics sections.

Answer: The null hypothesis is rejected. A combination of no high school, all people under poverty, and employment status proved to account for the greatest amount of variance in a school district's percentage of students passing the 2012 NJ ASK Grade 8 Language Arts and Mathematics sections.

Recommendations for Policy

The New Jersey Assessment of Skills and Knowledge (NJ ASK), the Partnership for the Assessment of College and Career Readiness (PARCC), the Scholastic Aptitude Test (SAT), and results from other forms of standardized assessments used to measure student academic proficiency, teacher and school administrator effectiveness, and overall school district quality are not going away; they simply evolve as they continue to align to the Common Core Standards. However, we caution policy makers that the information they receive from high stakes tests about school district quality might actually only be telling them the social health of the community served by the school district.

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