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Educational Inequality in Indiana: The Impact of Socioeconomic Status and Race on ISTEP+ Exam Performance¹

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ABSTRACT

A gap in education outcomes exists in Indiana for female and male students. The gap in educational outcomes can be seen in the standardized tests that are a requirement for students to take as a part of their education. In Indiana, students in K–12 education are required to take the ISTEP+ exam in grades 3–8, and in grade 10 as a graduation requirement. Indiana had 292 school districts or corporations, which were used in this analysis to determine the gap in educational outcomes. The 2011 and 2012 ISTEP+ exam scores were analyzed to determine how SES and race affect male and female performance on the exam for students in all public school corporations or districts in the state of Indiana. In this study, both race ($\beta = -.100, p = .016$) and SES ($\beta = -.155, p = .000$) negatively affected female student performance, and SES ($\beta = -.266, p = .000$) negatively affected male student performance on the ISTEP+ exam.

KEY WORDS Educational Inequality; ISTEP+; SES; Race

An educational achievement gap for male and female students exists in this country and is measured by standardized tests. Many scholars have conducted research on student performance in the classroom and on the SAT, ACT, intelligence tests, and some state-mandated standardized tests. Each study shows differences in how female and male students perform on various standardized tests and in the classroom.

Standardized exams have been used to influence change in the K–12 education system in this country, and they are required annually for all elementary and middle school students. High school students are required to take the state-required standardized tests in their high school careers. Standardized tests compare the test takers to a “norming sample” of their peers who took the same test, and standardized tests are given the “same

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way with the same directions to all children taking them” (Bennett, Finn, and Cribb 1999:424–25). Standardized tests allow school administrators and policy makers to have information on how their students are academically performing compared to a peer sample. Standardized tests can be “used to determine which students are ready to be promoted to the next grade, or graduate from high school” (Bennett et al. 1999:426).

Each state has a required standardized test for its students to take as a part of the curriculum as a part of the No Child Left Behind Act, and each state has control over creating and administering the state-mandated standardized test. In Indiana, students are required to take the Indiana Statewide Testing for Educational Progress Plus (ISTEP+) exam (Bremmer 2008). The purpose of the ISTEP+ test “is to measure student achievement in the subject areas of English/language arts, mathematics, science, and social studies” (Indiana Department of Education 2011b:7). The ISTEP+ test was created in 1987, and it was first given in the spring of 1988 to students in grades 1, 2, 3, 6, 8, and 9 (Indiana Department of Education 2011b).

The ISTEP+ test is currently given to students in grades 3–8 and in grade 10 as an “End of Course Assessment (CSA)” (Indiana Department of Education 2011b:9). The exam has multiple-choice and free-response questions. Math and language arts are tested every year, whereas science is tested in grades 4 and 6 and social studies is tested in grades 5 and 7 (Indiana Department of Education 2011b). CSA exam has multiple testing methods of multiple-choice, free-response, and graphing questions. The exam contains multiple areas of knowledge, including algebra, language arts, and biology. The results of both types of ISTEP+ exam are reported to school corporations that have more than 10 students in attendance and to state and local agencies (Indiana Department of Education 2011b).

Research has been done on the impact of gender performance on standardized tests and on how racial and economic background affect performance on standardized tests. This study extends the current research on standardized testing. This study focuses on how equitable the ISTEP+ exam is for male and female students, especially for low-income and minority students. This study focuses on two specific research questions: (1) Is there a difference between male and female performance on the ISTEP+ test? and (2) How do race and socioeconomic status (SES) affect male and female performance on the ISTEP+ test? To answer these questions, a literature review is conducted, followed by a discussion of the data and research methods, which include correlation and regression analysis. The results are presented and discussed, and the study concludes with policy implications and potential future research.

Literature Review

Gender and Standardized Testing

Many studies have been conducted to analyze male and female performance on standardized tests and educational performance. Student performance on standardized tests and in school has an impact on a student’s future. The education system for most of

history has been geared more towards male students, and educational policies have started to change toward equality for females in the education system during the past few decades (Marks 2007). Marks studied the gender gap in reading and math in 31 countries around the world. He found that female students tended to perform better in reading while males performed better in math. Gender differences in education are not unique to the United States.

The gender achievement gap is present in the classroom as well as in standardized tests. Duckworth and Seligman (2006) conducted two studies on male and female student performance in Algebra I, Algebra II, English, and social studies courses; GPA; and standardized test performance. The research was conducted to see if female students' dedication affected their performance in the classroom and on standardized tests. The researchers found that female students perform better in the classroom because they are dedicated to learning, whereas male students perform better on standardized tests. This research shows that the gender gap exists in the classroom.

Male and female students have similar performance when they start school, but this changes throughout their educational attainment. Male and female students tend to have a similar knowledge base in kindergarten and first grade. Female students in the K–12 education system do better in reading and writing than their male counterparts. Male students start to fall behind in reading and writing skills between grades 1 and 3. Male students do better in science and math overall than their female counterparts. Females start to fall behind on math assessments in grade 3. Female and male students perform differently in math assessments in grades 4, 8, and 12 but perform similarly in history in the same grades. Males perform much better in geography in grades 4, 8, and 12 (Freeman 2004). Freeman's research shows that educational assessments show a change in male and female educational attainment throughout the course of their education.

Male and female performance on assessments and tests is not unique to this country. Marks (2008) found differences between male and female students on math and reading assessments. The gap for math is decreasing slightly, but it still seems that males perform better than females on math exams. Marks looked at the mean scores of male and female students on reading and math tests in 31 countries. Marks found that the gender gap can be influenced by the following factors: educational standards placed on schools; students' future educational and career choices; social and economic factors in a country or region; and social and monetary inequity.

Indiana is also affected by male and female student performance in school and on standardized tests. In 2007, the Center for Evaluation and Education Policy conducted a survey on the public's perception of the educational system for K–12; survey participants believed that it was important to close the educational gap for students in the state of Indiana. In their research, they found that 59.1 percent of Indiana residents thought it was very important to close the educational gap and 29.9 percent believed it was somewhat important to close the gap (Plucker et al. 2008). Seventy-six (76) percent of the educational gap was perceived to be because of social factors, and 17 percent of the educational gap was perceived to be because of the quality of education (Plucker et al.

2008). The survey stated that participants were mixed about what the schools and policy makers were doing to close the educational gap in the state. Fifty-six (56) percent of residents thought that schools should correct the gap in the education that they provide to students, and 39 percent of residents thought that the schools should not be required to correct the educational gap (Plucker et al. 2008). Sixty-three (63) percent of surveyed individuals believed that leaders and policy makers were not doing enough to close the educational gap, and 24.4 percent of individuals believed that leaders and policy makers were doing enough to close the gap (Plucker et al. 2008). The findings from the survey show that citizens of Indiana perceived that an educational gap existed in Indiana and believed that the educational gap needed to be corrected.

Research studying the ISTEP+ exam and gender has been conducted. Bremmer (2007) found that female students do better on the math section of the ISTEP+ exam than their male counterparts. Bremmer continued his research with the ISTEP+ exam in 2008. In this research, Bremmer (2008) discussed that standardized exams may be geared towards males and that the standardized exams with the proclivity toward male students may cause a bias. The discussion of the design of standardized exams may affect how male and female students perform on the ISTEP+ exam.

The design of standardized exams may have an impact on male and female performance. Halpern (1997) found that standardized exams tend to overstate how well male students perform on the exam, while female students' performance is understated. Standardized exams may need to be revised to allow for females to perform better on them, especially in the reading and writing aspects of the exam (Halpern 1997). Duckworth and Seligman (2006) found that standardized tests have given an advantage to male students and that the tests tend to have male-centered topics. For example, reading-comprehension topics are more interesting to male students than to female students. The trends are starting to change for gender performance on standardized exams. Female students are now starting to perform better on standardized exams, although historically, male students performed better (Duckworth and Seligman 2006). Research on student performance on standardized exams could change educational policy regarding standardized test design.

The gender gap affects the educational process of all students, and it has an effect on the standardized exams that are given throughout a student's educational career. The literature shows that male and female students perform differently in the classroom and on standardized tests. The ISTEP+ test can be used to determine if a difference in performance between male and female students exists in the state of Indiana.

Socioeconomic Status, Race, and Gender Educational Performance

SES, racial background, and gender affect performance in school and on standardized tests. SES has an impact on human development, especially on health, education, and human well-being. SES has an impact on the resources an individual or a family has, and resources can affect the experiences that an individual has in life (APA

Task Force on Socioeconomic Status 2007). SES can influence multiple aspects of a child's life.

SES can affect the educational opportunities that a child may have, and a family's income often determines where a family lives and the school that a child will attend. SES connects how well a student performs in the classroom, and SES has a definite impact on how a student performs in the classroom. If a child has an opportunity to attend a school in a better neighborhood, the child has the potential to perform better in school and will have more opportunities and resources to succeed in school (Sirin 2005).

SES has an impact on gender retention in school. Female and male students who receive financial aid in elementary school perform lower than those students who do not receive aid. In the first year, in reading tests, females who receive aid scored 19.1 points below their female peers who did not receive aid, and males who received aid scored 21.4 points below their male counterparts who did not receive aid. In the fifth year, females who received aid scored 49.9 points lower on reading tests than their female counterparts who did not receive aid, and males who received aid scored 55.9 points lower on reading tests than their male counterparts who did not receive aid (Entwisle, Alexander, and Olsen 2007). This study shows that youth who receive free or reduced lunches have a disadvantage on educational assessments.

SATs and ACTs show a difference in student performance based upon SES. The SAT and ACT exams are not required for students to take, and these tests vary depending on the region of the United States. Male students from high, medium, and low income levels perform significantly better on the math section of the SATs than their female counterparts. Female students from high-income homes perform slightly higher than their male peers on the verbal section of the SAT. Male students from middle- and low-income homes perform slightly better than their female counterparts on the verbal section of the SAT. Males from high, middle, and low income levels perform better on the math section of the ACT than their female counterparts. Female students from high, medium, and low income levels perform better on the English section of the ACT compared to their male counterparts at the same income levels (Corbett, Hill, and St. Rose 2008).

Racial background can also influence student performance in education and on standardized tests. Carman and Taylor (2010) conducted research on the Naglieri Nonverbal Ability Test (NNAT) and found that minority students scored 8.1 points under students who were a part of the dominant culture, and students who received free or reduced lunches underperformed by 11.4 points on the NNAT. This research found that SES and racial background affect performance on the NNAT.

Gender, SES, and racial background affect performance on standardized tests and portfolio assessments. Supovitz and Brennan (1997) found that female students performed 1.46 points higher on standardized tests and scored 2.85 points higher on portfolio assessments than their male counterparts. Students of different ethnic backgrounds performed differently on standardized tests and portfolio assessments as well. White students performed "2.92 points higher on standardized tests and 1.44 higher on portfolio assessments" in the first grade compared to their African American peers

(Supovitz and Brennan 1997:489). Hispanic and African American students' scores on standardized tests and portfolio assessments did not significantly differ from each other (Supovitz and Brennan 1997). Different assessment methods can show differences in performance for gender, SES, and racial background.

Research studying the ISTEP+ exam and gender has been conducted, and Bremmer has conducted some of this research. Bremmer (2007) found that SES negatively affected student performance on standardized tests. Bremmer continued research with the ISTEP+ exam in 2008, finding that racial background and SES negatively affect youth performance on standardized tests.

In Indiana, the ISTEP+ test can be used to determine if a difference exists in performance between male and female students. In this study, the scores for grades 3–8 will be examined to determine how male and female students perform on the exam. SES and racial background of the student body of all school districts will also be analyzed to determine how male and female students perform on the English and math sections of the ISTEP+ exam. The data that is available provides the information to explore the following two hypotheses: (1) female student performance on the ISTEP+ exam is affected by race and SES, and (2) male student performance on the ISTEP+ exam is affected by race and SES.

Research Design

Data

The data used for this analysis were obtained from the Indiana Department of Education and include information for all public schools in the state of Indiana. The data include scores from the 2011 and 2012 ISTEP+ exam for students in grades 3–8 (Indiana Department of Education 2011a). The data set has additional variables to look at the percentage of students who passed the ISTEP+ test and each section of the test.

The number of students who received free lunches, received reduced lunches, or paid for their lunches will determine SES. Racial background will be analyzed by the percentage of students of diverse backgrounds in the school corporation. The data also include background information on all school districts, including total enrollment, white and non-white populations, and lunch status for all school districts. These variables are for all students in each school district for grades K–12. The data set also includes the percentage of all the variables for the background information; percentage will be determined by each variable divided by the total enrollment of each school.

Methods

For this analysis, descriptive statistics and multiple regression will be used to assess how race and SES affect female and male performance on the ISTEP+ exam. Multiple regression will be used to determine the impact of race on gender performance on the combined English and math sections of the ISTEP+ exam that are required for all students in grades 3–8. The independent variables for this analysis are the percentage of minority students and the percentage of students who received free or reduced lunches in

each school district. The dependent variables is the percentage of female students who passed the English and math sections of the ISTEP+ exam and the percentage of male students who passed the English and math sections of the ISTEP+ exam. The analysis will also use the following control variables: total school enrollment for each school corporation or district, 2011 and 2012 results (year), and social studies and science results. The file will be split by gender to determine how male and female student performance on the ISTEP+ exam.

Results

The descriptive statistics were analyzed to see how the data were distributed as a part of the regression model. Table 1 shows the descriptive statistics results. The variables used for this analysis include total ISTEP pass, total enrollment, percentage female enrollment, percentage free or reduced meals, year, total science pass, total social studies pass, and percentage of non-white students.

Table 1. Descriptive Statistics of Student Performance on ISTEP+ Exam by Gender

Gender		Mean	Std. Deviation	N
Female	Total ISTEP Pass	.7566	.07859	580
	Total Enrollment	3509.89	4300.482	580
	Total Science Pass	.7288	.10463	580
	Total Social Studies Pass	.6891	.11130	580
	Year	.50	.500	580
	Percentage of Non-White Students	.3132	.21361	580
	Percentage of Free or Reduced Meals	.4391	.14826	580
Male	Total ISTEP Pass	.7012	.08508	582
	Total Enrollment	3498.34	4297.582	582
	Total Science Pass	.7493	.10364	582
	Total Social Studies Pass	.7235	.11812	582
	Year	.50	.500	582
	Percentage of Non-White Students	.3125	.21421	582
	Percentage of Free or Reduced Meals	.4389	.14804	582

The hypotheses in this study were tested using multiple regression. Two models were used to predict gender, racial, and SES performance on the English and math sections of the ISTEP+ exam. The first model focused on only the control variables, and the second model included the control variables as well as the independent variables. The

results from model two are presented; the model shows the relationships between the dependent, independent, and control variables.

Table 2 shows the control variables that were used in this model. The control variables in model one explain 74.6 percent ($R^2 = .746$) of the variance of female performance on the English and math sections of the ISTEP+ exam, $F(4,575) = 423.267$, $p < .000$. When using the control variables in model two, 76.1 percent ($R^2 = .761$) of the variance of female performance is explained in the model $F(2,573) = 16.975$, $p = .000$. The control variables in model one explain 68.1 percent ($R^2 = .681$) of the variance of male performance on the English and math sections of the ISTEP+ exam, $F(4,577) = 308.224$, $p < .000$. When using the control variables, 71.4 percent ($R^2 = .714$) of the variance in male performance is explained in the model $F(2,575) = 36.590$, $p = .000$.

The second model illustrates relationships between the percentage of students who passed the English and math sections of the ISTEP+ exam, the percentage of non-white students, the percentage of students who received free or reduced lunches, and the control variables. Table 3 illustrates the relationships between the dependent variable, independent variables, and the control variables in model two of the analysis.

For female students, the significant relationships include total social studies pass ($\beta = .418$, $p = .000$), percentage of students who passed the science section ($\beta = .375$, $p = .000$), percentage of students who received free or reduced lunches ($\beta = -.155$, $p = .000$), and percentage of non-white students ($\beta = -.100$, $p = .016$). For male students, the significant relationships include total science pass ($\beta = .389$, $p = .000$); total social studies pass ($\beta = .319$, $p = .000$), and percentage of students receiving free or reduced lunches ($\beta = -.266$, $p = .000$).

The analysis shows that race and SES do have an impact on how male and female students perform differently on the ISTEP+ exam. From the regression analysis, we see that female and male students are affected differently by race and SES. Race and SES negatively affect female student performance on the ISTEP+ exam. Male student performance is affected by SES but not by race on the ISTEP+ exam.

Limitations and Future Research

Limitations exist in all studies, and the limitations with the ISTEP+ data provide an opportunity for future research. Three limitations are apparent in this study. First, the ISTEP+ exam does not test all subjects every year. English and math are tested every year for students in grades 3–8. Science is tested in grades 4 and 6, and social studies is tested in grades 5 and 7 (Indiana Department of Education 2011b). Second, the ISTEP+ results were compared as a composite score for all students who participated in the exam for each school. Scores for students in grades 3–8 were added together as one score for each section of the ISTEP+ exam. Third, the enrollment information used in this analysis was for students in grades K–12, whereas the ISTEP+ results are from grades 3–8. It will be helpful for future research to have the enrollment information for students in grades 3–8.

Table 2. Coefficients for Female Performance on the ISTEP+ Exam

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-Order	Partial	Part	Tolerance	VIF
(Constant)	0.391	0.024		16.003	0					
Total Enrollment	-2.400E-008	0	-.001	-.058	0.954	-.210	-.002	-.001	0.81	1.235
Total Science Pass	0.282	0.024	0.375	11.808	0	0.788	0.442	0.241	0.414	2.413
Total Social Studies Pass	0.295	0.022	0.418	13.209	0	0.799	0.483	0.27	0.418	2.394
Year	0.01	0.006	0.066	1.661	0.097	0.048	0.069	0.034	0.263	3.806
% of Non-White Students	-.037	0.015	-.100	-2.416	0.016	-.148	-.100	-.049	0.243	4.117
% of Free or Reduced Meals	-.082	0.017	-.155	-4.746	0	-.729	-.194	-.097	0.39	2.561

Note: Dependent Variable = Total ISTEP Pass

Table 3. Coefficients for Male Performance on ISTEP+ Exam

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Correlations			Collinearity Statistics	
	B	Std. Error	Beta			Zero-Order	Partial	Part	Tolerance	VIF
(Constant)	0.359	0.026		13.977	0					
Total Enrollment	9.639E-007	0	0.049	1.967	0.05	-.156	0.082	0.044	0.802	1.246
Total Science Pass	0.319	0.028	0.389	11.464	0	0.764	0.431	0.254	0.428	2.335
Total Social Studies Pass	0.229	0.024	0.319	9.547	0	0.753	0.37	0.212	0.442	2.264
Year	0.001	0.007	0.007	0.163	0.871	0.045	0.007	0.004	0.269	3.711
% of Non-White Students	-.001	0.018	-.002	-.042	0.967	-.118	-.002	-.001	0.25	4.006
% of Free or Reduced Meals	-.153	0.018	-.266	-8.404	0	-.706	-.331	-.186	0.493	2.03

Note: Dependent Variable = Total ISTEP Pass

Implications and Conclusion

Male and female students perform differently on the ISTEP+ exam, especially when race and SES are taken into account. This study has implications for the ISTEP+ exam, school corporations/districts, and higher education.

The ISTEP+ exam could be adapted for equality for all students who take the exam. The test should contain content that is gender and background neutral so that all students have an equal chance at showing their true achievement on this test. All students may not have the same experiences growing up, and a student's experiences may help or hinder achievement on standardized tests. For example, the reading comprehension examples should interest both male and female students so that the test can accurately assess reading comprehension skills of the student, and the vocabulary could be difficult for some students to understand because they might not have experience with what is being discussed.

School corporations/districts and teachers could also help to prepare all students for the ISTEP+ exam. They could create ISTEP+ exam preparation for the students to participate in at school, and this program could provide additional practice materials to help students prepare for the exam. Additional resources and materials could be provided for curricula to develop skills for all students.

Teachers could also further help to improve performance on the ISTEP+ exam. Classroom structure could also be used to assist with learning across genders, racial backgrounds, and SES. For example, teachers could use ability grouping and cooperative learning in the classroom. Ability grouping is a structure that allows for integration of high-achieving learners with low-achieving learners to work together in a group, and within-class groups would allow for students of various learning achievements to work together in a class for a specific content area (Slavin 1990:471). In cooperative learning, students of diverse backgrounds participate in class projects in teams, and the team's combined effort receives a reward once the task is complete (Slavin 1980). These examples are two possible ways to start to reduce the gender gap shown by the ISTEP+ exam; cooperative learning has implicated that students from diverse backgrounds could improve in the classroom.

Higher education institutions should be aware of the gender gap in education, and they should help to develop the skills of students. Most colleges and universities have math, science, and English/writing skill centers to assist students with their coursework. The help centers could be made mandatory for a certain amount of time for freshman-level courses that all students are required to take, and the skills would be beneficial to the students throughout their college careers.

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