

K-8 Standardized Test Scores: Does Gender Impact Test Scores?

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Abstract: *The purpose of this study was to conduct a literature review to determine the gender has on standardized test scores. Then the researchers compiled data on standardized test scores in Georgia to determine if the scores supported the literature review findings. The literature review indicated that female students tended to score higher in English and reading on standardized tests, while males tended to score higher on math and science. The investigators gathered and analyzed data from the 2013 and 2014 Georgia Criterion-Referenced Competency Test (CRCT) for grades 3, 5, and 8. The data gathered consisted of test scores in 5 different subjects (Reading, English/Language Arts, Math, Science, and Social Studies). The results for both years indicated, there were a lower percentage of females that did not meet the state standard in all grades for all subject areas, indicating more females meet the state benchmarks. However, the 2014 data included overall average test scores which showed males had a higher score in science and social studies for grades 5 and 8.*

Keywords: *k-8 students, standardized test scores, gender differences, female standardized test scores, male standardized test scores*

1. LITERATURE REVIEW/INTRODUCTION

For several decades, researchers have investigated gender patterns and academic performances, especially performances on high-stakes tests. Consistently, females have outperformed males on reading assessment tests and males have outperformed females on math assessment tests (Coley, 2001; Corbett, Hill & Rose, 2008). To explain this gender phenomenon, investigators have explored other factors that may impact gender disparities such as, socioeconomic, environmental, teacher-student relationships, and racial/ethnic issues. One seminal research findings is that of Steele (1997).

Steele theorized that societal stereotypes about groups could influence the intellectual functioning and identity development of said groups. Steele postulated that a situational threat—a threat in the air—in general form, could affect the members of the group about whom the negative stereotype exists. When this occurred, the negative stereotype threat could frustrate these groups' identification with certain aspects of school achievement. Through a series of test-taking experiments with women and African Americans groups, Steele confirmed his theory. If the groups were told that the test was not ability-based, the groups and their white counterparts performances were similar; the opposite effect occurred when groups were told the test was ability based (Steele, 1997). Other researchers' inquiry also supports Steel's theory. Corbett, Hill and Rose (2008) suggested that there may be the possibility that culturally-shared stereotypes

influence poor performance of certain groups, when made prominent in a context involving the stereotype, disrupt performance of an individual who identifies with that group.

Comparable results happened when the assumed stereotype was gender-based--males excel in math and females excel in language/literature. Steele and his colleagues recruited college sophomore female and male students, both strong in math and viewed themselves as such. The groups were administered an advanced General Records Examination (GRE), and the researchers assumed the students' math skills would be frustrated. As expected, women significantly underperformed in relation to qualified men. In another experimental setting, the test was an advanced literature tests, and the women performed equally to the men. The researchers reasoned that this happened because women are not stereotype threatened in this area (Steele, 1997).

In addition, a significant amount of literature has confirmed that there are gender-based differences of teacher treatment in the classroom (Baker, 1994; Krieg, 2005; Dee, 2004; Dee, 2007; Whitmire & Bailey, 2010). For example, The American Association of University Women (AAUW) reviewed over 1,300 gender studies led to a critical supposition; reviewers concluded that girls and boys received a different quality and quantity of education (Dyer, 2001). The AAUW conclusions, and other researched results that followed, reported similar behaviors of teachers' gender-based patterns in the classroom:

- Teachers tend to pay more attention to boys, asking them more questions and allowing more response time; teachers also tend to encourage boys to take risks more than girls.
- When girls are speaking, teachers interrupt more often than when boys are speaking; teachers also allow boys to interrupt girls.
- Teachers communicate higher expectations to boys' performances in math than to girls.
- Teachers tend to place boys in high ability groups than girls.
- Teachers tend to recall the names of boys more often than the names of girls.
- Teachers provide more feedback and make more eye contact with boys (Baker, 1994; Krieg, 2005; Dee, 2007).
- Gender-biased classroom practices have been shown to negatively impact the performance of females in science (Amelink, 2009).

Researchers' analysis of gender patterns' impact on academic achievement were most often drawn from key assessments used by the National Assessment of Educational Progress (NAEP). National trends revealed mixed results; however, differences by gender in performance persist. For example, Corbett, Hill & Rose (2008) examined gender equity trends since the 1970s with data from two key NAEP assessments. The NAEP long-term trends (NAEP-LTT) assessment, given every two to five years since the 1970s, allowed investigators to compare students' achievement from year to year and decade to decade because the assessment has remained essentially unchanged since its first administration. The investigators used the NAEP-LTT to evaluate on differences among girls and among boys by race/ethnicity and family income level (Corbett, Hill & Rose, 2008).

Thus, both girls and boys have been performing better on NAEP assessments since the 1970s, especially in math. But, boys continue to outscore girls on math tests by a small margin, and girls continue to outscore boys on reading tests by a larger, but still relatively small, margin. However, important variations by race/ethnicity and family income level may mask these trends. Girls from higher- income families scored higher on average than did lower-income girls in both math and reading in all three grades and all years evaluated. In addition, while disparities by race/ethnicity and family income level were not increasing, the gaps were not closing at an acceptable rate. Large differences remained among students by race/ethnicity and family income level. Gender differences occurred within all groups but appeared to be larger and more consistent among white students. Nevertheless, even among white students, gender differences were small in relation to gaps by race/ethnicity and family income level (Corbett, Hill & Rose, 2008).

In addition, Coley (2001) used NAEP assessments to compare K-12 males and females within racial and ethnic groups. The summary of Coley's investigations revealed:

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- Females scored higher than males in NAEP reading, across all racial/ ethnic groups.
- Females scored higher than males in NAEP writing, across all racial/ ethnic groups.
- Black and Hispanic eighth-grade females scored higher in NAEP civics than Black and Hispanic males. Twelfth-grade Hispanic females also outscored Hispanic males.
- Differences in NAEP science were most apparent for White and Hispanic students, where males scored higher than females.
- White fourth-grade males scored higher in NAEP mathematics than female fourth-graders in 1992 and 1996. For all racial/ethnic groups, any gender differences in grades 8 and 12 disappeared by 1996.

Coley's comparative study showed more similarities than variations in gender differences among racial/ethnic groups. On most measures, gender differences did not vary much from one racial/ethnic group to another, although some differences were found. In addition, few trends were noted. This study further confirmed females are outperforming males in some respects, and in others, males are outperforming females (Coley, 2001).

Moreover, researchers have explored gender gaps in science, technology, engineering, and mathematics (STEM) fields. Amelink (2009) utilized NAEP assessments that measured mastery of content to investigate gender trends in STEM fields. Also, assessment data from The International Mathematics and Science Study (TIMSS) report was included in the study.

The NELS' longitudinal study included several waves of data collection (1988, 1990, 1992, 1994, 2000, and 2004). The investigator focused on the 2004 cohort and disclosed a limited influence of gender on science achievement whereas previous years revealed significant differences by gender on performance in science. *The Nation's Report Card* assessments have been conducted among a nationally representative sample since 1969 in reading, mathematics, science, writing, history, geography, and other fields. Exploring the 2005 cohort for grades 4, 8, and 12, results indicated that males outperformed females in science achievement at all three grade levels for the third year in a row; however, results were not analyzed for statistical significance by gender (Amelink, 2009).

In addition, the investigator examined the TIMSS report; the report covered data on the mathematics and science achievement of U.S. students compared to that of students in other countries for 1995, 1999, 2003, and 2007. The content domains covered at grade four were life science, physical science, and earth science. At grade eight, the content domains were biology, chemistry, physics, and earth science. The 2007, 2003, and 1999 results were analyzed by overall score differences by gender. In 2007, males and females showed no measurable difference in their average science performance. Although not statistically significant, by content areas males outperformed in one content area: *earth science*. There was no measurable difference detected in the average scores by gender in either the *life science* or *physical science* domains. And, males outperformed females overall in science in 2003, which was also the case in 1995. Lastly, these trends show that differences in science achievement between males and females in K-12 education have narrowed over time; however, differences by gender in performance, as measured by multiple assessments, remain (Amelink, 2009).

2. PURPOSE

The purpose of this study was to conduct an extensive literature review on academic standardized tests in grades K-8 to determine if gender has an impact on the scores. The researchers then examined the 2013 and 2014 Criterion-Referenced Competency Tests (CRCT) results from the state of Georgia to determine if the test results support the literature review findings. The researchers gathered data on CRCT scores for grades 3, 5, and 8 in following subjects; Reading, English/Language Arts, Math, Science, and Social Studies.

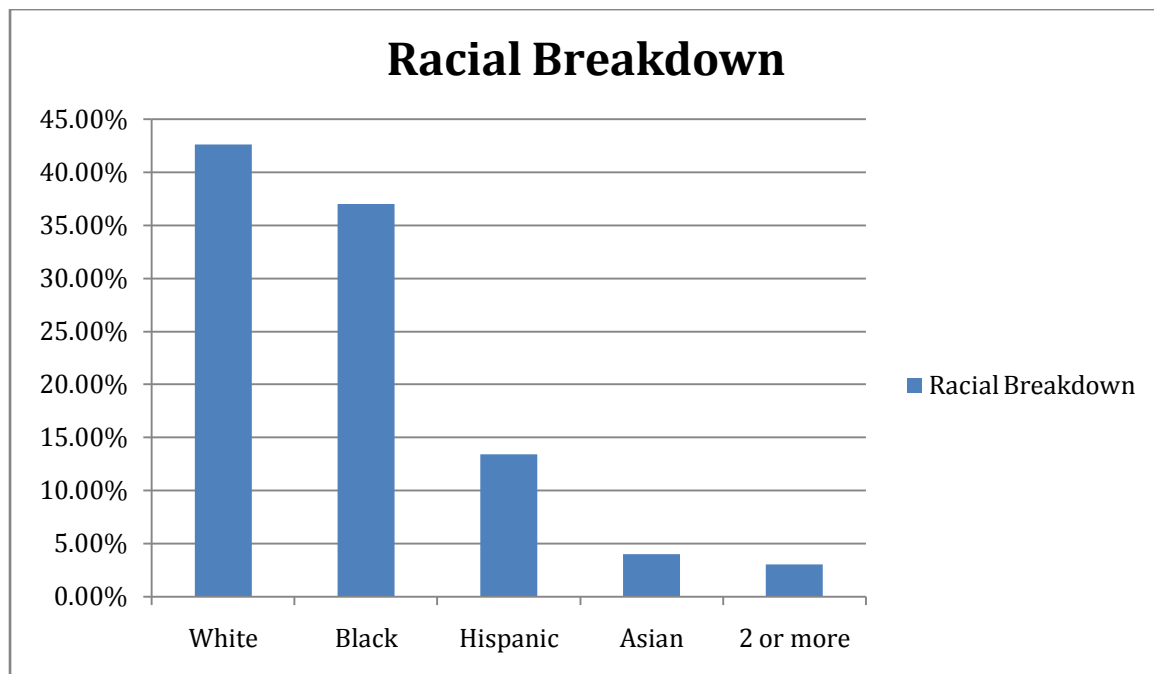
3. METHODS

3.1 Participants

There were no specific/identified participants tested or observed in this study. The overall 2013 and 2014 CRCT scores for 3 grades (grades 3, 5, and 8) from the state of Georgia were collected

and analyzed to gather data for this study. The data was obtained from public information available from the GA Department of Education and the Georgia Governor's Office of Student Achievement. Therefore, IRB permission was not needed to complete this study. The 2013 CRCT scores were collected from the Georgia Governor's Office of Student Achievement, <http://gosa.georgia.gov/report-card> (Georgia Governor's Office, 2014). The 2014 CRCT scores were collected from the Georgia Department of Education website, <http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Pages/default.aspx> (Georgia Department of Education, 2013)

The following are the demographics for the students in the public school system of Georgia. The gender breakdown is: 838,195 (49%) females and 878,710 (51% males). The following chart shows the racial makeup of the students;



In addition, 62.16% of students meet the criteria for free/reduced lunch. This criterion is based on family size and yearly household income; for example a family of four who have a household income below \$31,005 meet the free lunch criteria and with an income below \$44,123 meet the reduced lunch criteria (GADOE, 2014).

3.2 Materials

The only materials needed for this study were internet access to compile the 2013 and 2014 CRCT scores and Excel statistical tools to analyze the scores collected. All data was collected from the Georgia Department of Education (public domain) and the Georgia Governor's Office of Student Achievement and inputted into Excel in order to observe and analyze.

The Criterion-Referenced Competency Test (CRCT) is a state-required assessment for the state of Georgia, amended by the A+ Education Reform Act of 2000. Implemented in spring 2000, the CRCT is designed to measure how well students acquire the skills and knowledge described in the state mandated content standards (Georgia Performance Standards, GPS and Common Core Standards, CCGPS) in reading, English/language arts, mathematics, science and social studies. Students in 1st through 8th grade take the CRCT in the content areas of reading, English/language arts, and mathematics. Students in 3rd through 8th grade are assessed in these same content areas, with the addition of science and social studies. The assessments yield information on academic achievement at the student, class, school, system, and state levels. This information is used to diagnose individual student strengths and weaknesses as related to the instruction of the state standards, and to gauge the quality of education throughout Georgia (GADOE, 2014).

3.3 Procedures

CRCT scores from 2013 and 2014 were collected for the entire state of Georgia (public school system) for grades 3, 5, and 8. The CRCT scores are available to the public from the Georgia

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Department of Education Website and the Georgia Governor's Office of Student Achievement. We recorded scores for males and females for each grade (3, 5, and 8) in 5 subject areas (reading, English/language arts, math, science, and social studies). The following scores were recorded for 2014; mean score, percent that did not meet the standard, percent that meets the standard, and the percent that exceeded the standard. The data available for the 2013 scores were the percentages that did not meet the standard, percent that meet the standard and the percent that exceeded the standard.

3.4 Data Analysis

The 2013 results collected for the state of Georgia included the percent that didn't meet the standard, the percent that met the standard, and the percent that exceeded the standard for 5 subjects (Reading, English/Language Arts, Math, Science, and Social Studies) in 3 grades (grades 3, 5, and 8). The scores (category of meeting the standard) were compared based on gender. In other words, all scores/results were compared between males and females. For the 2014 results, CRCT mean scores and percent that didn't meet the standard, percent that met the standard and percent that exceed the standard were collected for 5 subjects (Reading, English/Language Arts, Math, Science, and Social Studies) in 3 grades (grades 3, 5, and 8) for the state of Georgia.

4. RESULTS

The 2013 Georgia CRCT data includes the percent scores in 3 different categories (did not meet the standard, met the standard, and exceeded the standards) for grades 3, 5, and 8. The CRCT percent categories are broken down in the following; a score below 800 does not meet the standard, a score between 800 -849 meets the standard, and a score of 850 or more exceeds the standard. See tables I-III for the 2013 results.

The 2014 Georgia CRCT data includes the average score and the percent scores in 3 different categories (did not meet the standard, met the standard, and exceeded the standard). These scores were compared based on gender (male and female) and in 5 different subject areas (reading, English/language arts, math, science, and social studies). Table IV shows the results from the 2014 CRCT scores for Georgia broken down by gender.

Grade 3

The 2013 CRCT results for grade 3 indicated, less females than males fell into the does not meet the standard category for all 5 subjects. In English 9% of females did not meet the standard, where 15% of males didn't meet the standard. In math, 20% of females didn't meet the standard and 23% of males didn't meet the standard. This same pattern was seen in reading, where 4% of females didn't meet the standard and 6% of males didn't meet the standard. In Science and Social Studies, less females didn't meet the standard than males (Science; 20% females and 24% males; Social Studies; 15% females and 18% males). This indicates that in grade 3 there were more females that met and exceeded the standards for all five subject areas.

The 2014 results for grade 3 showed similar findings to those in 2013, females scored higher on all subject areas and had a lower percentage in the does not meet the standards category. In English 6% of females didn't meet the standard, where 9.3% of males didn't. In Math, 8.7% of females didn't meet the standard and 14.2% of males didn't. The same was seen in the results from reading; 18% of females and 20.5% of males didn't meet the standard. Again, Science and Social Studies results indicated that females outperformed males (Science; 20.9% females didn't meet the standard and 24.8% of males didn't meet the standard; Social Studies; 14.8% of females and 17.7% of males didn't meet the standard). This indicates that more females than males met and exceeded the standards in all 5 subject areas in grade 3. In addition, the average score was recorded for 2014 and as can be seen by Table IV, females had an overall higher average score in all 5 subject areas. This indicates that not only did more females meet or exceed the standards, but they also had a higher overall average score.

Grade 5

In grade 5 data from 2013, the same results were seen; less females than males did not meet the standard for all five subject areas. Meaning more females met or exceeded the standards than males. In English 4% of females didn't meet the standard, where 8% of males didn't. In Math, 6%

of females didn't meet the standard and 8% of males didn't. The same was seen in the results from reading; 3% of females and 4% of males didn't meet the standard. Again, Science and Social Studies results indicated that females outperformed males (Science; 18% females didn't meet the standard and 22% of males didn't meet the standard; Social Studies; 19% of females and 20% of males did not meet the standard).

The grade 5 score results from 2014 for the most part feel in line with the findings from 2013. In English 4% of females didn't meet the standard, where 6.3% of males didn't. In Math, 3.5% of females didn't meet the standard and 7% of males didn't. The same was seen in the results from reading; 10.6% of females and 14% of males didn't meet the standard. Again, Science and Social Studies results indicated that females outperformed males (Science; 16.4% females didn't meet the standard and 19.7% of males didn't meet the standard; Social Studies; 19.3% of females and 19.3% of males did not meet the standard). There is a shift starting to take place in grade 5 when you look at the overall state average score. Females scored higher in reading, English/language arts and math (English/language arts; females, 844.40; males, 837.80; Reading, females 842.11, males 838.44; Math; females 845.57, males 843.06). However, males had a higher average score in science and social studies (Science; males, 838.07 and females, 837.57; Social Studies, males 830.38, females 826.92). This means that although the average score was higher for males in grade 5 science and social studies, more females met or exceeded the standard.

Grade 8

In grade 8 data from 2013, the same results were seen; less females than males did not meet the standard for all five subject areas. Meaning more females met or exceeded the standards than males. In English 3% of females didn't meet the standard, where 8% of males didn't. In Math, 10% of females didn't meet the standard and 13% of males didn't. The same was seen in the results from reading; 1% of females and 3% of males didn't meet the standard. Again, Science and Social Studies results indicated that females outperformed males (Science; 25% females didn't meet the standard and 26% of males didn't meet the standard; Social Studies; 21% of females and 23% of males did not meet the standard).

The 2014 CRCT results for grade 8 showed that when looking at the percentages of students that did not meet the standards, again females were less in all 5 subject areas. In English 1.9% of females didn't meet the standard, where 4.2% of males didn't. In Math, 3.5% of females didn't meet the standard and 7.4% of males didn't. The same was seen in the results from reading; 16.7% of females and 20.1% of males didn't meet the standard. Again, Science and Social Studies results indicated that females outperformed males (Science; 20.8% females didn't meet the standard and 23.4% of males didn't meet the standard; Social Studies; 18.1% of females and 20.7% of males did not meet the standard). However when looking at the overall average score, the 2014 grade 8 results followed the trend in grade 5, males scored higher on Science and Social Studies (science; males, 826.13, females, 825.05 and social studies; males, 833.19, females, 833.18) While, females scored higher in reading, English/language arts and math and had a lower percentage of not meeting the standard in these 3 subject areas, indicating that more females met the standard in these 3 subject areas.

5. DISCUSSION

The results from the 2013 and 2014 CRCT scores indicate that more females consistently meet or exceed the standards set forth for all 5 subject areas (reading, English/language arts, math, science, and social studies) in grades 3, 5, and 8 in the Georgia public school system. Females had a lower percentage of not meeting the standards in all subject areas in all grades, except social studies grade 5 in 2014, where the same percentage (19.3%) of males and females did not meet the standard. So, you can conclude that females met or exceeded the standard on all grade levels and all subject areas at a higher rate than males on the 2013 and 2014 CRCT scores.

However, as reported in the results section when you take into account the overall average scores (which were available for 2014) you can see that males scored higher in science and social studies in grades 5 and 8.

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The findings from this study are not entirely in line with the findings from the literature review. The literature review found an overall theme that boys outscored girls in math and girls outscored boys in reading (Corbett, Hill, & Rose, 2008). Which when looking at the percentage of students that didn't meet the standards for math and reading you will see that girls outperformed boys in both math and reading. A study that looked at the NAEP assessments for K-12 indicated that girls scored higher in reading and writing but boys scored higher in science and math (Coley, 2001). Another study conducted by Steele indicated that college age female students underperformed in math when compared to their male counterparts (Steele, 1997). This was not supported by the findings from our data results. Most of the literature that looks at standardized tests scores and compares males and females included students from grade 5 and above. We started to see males score higher in science and social studies starting in grade 5. Our findings for males in higher grades science and social studies support the findings by Amelink (2009). He found that males outperformed females in science in grades 4, 8 and 12. This leads one to believe that the more rigorous the work gets in these particular subject areas (the higher the grade); you will see males scoring higher on standardized testing in the subject areas of science and social studies. The literature also leads one to believe that you will see the same trend with math scores.

Implications for Profession

The findings from this study did not entirely support previous research in the area of gender differences in standardized test scores. Our findings indicated that females were consistently at lower rates of not meeting the expectations in all 5 subject areas in all 3 grades. Indicating that more females than males met the standards (passing the grade specific benchmarks). This may indicate that males need more instruction or attention at these grade levels in the core subject areas. The teaching profession needs to find a way to assist males in meeting the standards on standardized tests at lower grade levels. Many times at this age level it may not be the subject matter but the ability to concentrate and take standardized tests. Therefore, more resources need to be placed in the school to identify students that may need extra assistance in test taking skills and concentration.

6. CONCLUSION

As has previously been discussed females outperformed males in the 2013 and 2014 CRCT testing for the state of Georgia when you concentrate on the percentage of students that did not meet the expectations for the 5 subject areas in all 3 grade levels (3, 5, and 8). However, it is interesting to point out that when you look at the overall average scores in the 2014 results you see an upward trend where males are scoring higher in science and social studies in grades 5 and 8. These findings indicate that the literature tends to cater toward the higher grades and in fact the findings from this study do support the literature where males outperform females in science and social studies (Amelink, 2009; Coley, 2001). On the other hand the majority of research indicates that males outperform females in math and we did not see this trend in our findings for grades 3, 5, and 8. This may be because of the demographics of the public school system of Georgia (see participants section) or that the upward swing of male's scores in the math section is not seen until later grades. Therefore, we feel that additional research in the higher grade levels 9-12 in the areas of math and reading in the state of Georgia should be performed to see if this theory has any merit.

7. LIMITATIONS

These results are specific to the state of Georgia. Different states have different school curriculum and testing and therefore these results are specific to this state and the public school system of Georgia. In addition, the student demographics for the public school system of Georgia will differ from other states and impact the standardized test scores. This study did not look into ethnicity or socioeconomic factors, but they have all been shown to play a role in standardized test scores. Therefore, further research into this area is needed to better determine all disparities in standardized test scores for K-12 students.

Table I. 2012/2013

3rd Grade CRCT Scores- Based on Gender

Subject	Gender	Does Not Meet (%)	Meets Standards (%)	Exceeds Standards (%)
		GA Avg	GA Avg	GA Avg
English/LA	F	9	52	39
English/LA	M	15	55	30
Math	F	20	36	44
Math	M	23	34	43
Reading	F	4	42	54
Reading	M	6	45	49
Science	F	20	45	35
Science	M	24	42	34
Social Studies	F	15	55	31
Social Studies	M	18	51	31

F= Female

M= Male

GA Avg. =Average scores for the entire state of Georgia

Table II. 2012/2013

5th - Grade CRCT Scores- Based on Gender

Subject	Gender	Does Not Meet (%)	Meets Standards (%)	Exceeds Standards (%)
		GA Avg	GA Avg- Lee	GA Avg
English/LA	F	4	51	45
English/LA	M	8	57	35
Math	F	6	46	48
Math	M	8	46	46
Reading	F	3	59	38
Reading	M	4	63	33
Science	F	18	44	38
Science	M	22	37	40
Social Studies	F	19	59	22
Social Studies	M	20	53	27

F= Female

M= Male

GA Avg. =Average scores for the entire state of Georgia

Table III. 2012/2013

8th- Grade CRCT Scores- Based on Gender

Subject	Gender	Does Not Meet (%)	Meets Standards (%)	Exceeds Standards (%)
		GA Avg	GA Avg	GA Avg
English/LA	F	3	48	48
English/LA	M	8	56	36
Math	F	10	57	32
Math	M	13	56	31
Reading	F	1	50	49
Reading	M	3	56	41
Science	F	25	56	19
Science	M	26	49	25
Social Studies	F	21	47	32
Social Studies	M	23	42	35

F= Female

M= Male

GA Avg. =Average scores for the entire state of Georgia

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Table IV. CRCT 2014 Scores (By Gender)

3rd Grade- Georgia Average Scores

Subject	Gender	N	Avg. Score	% not	% meet	% exceed
Reading	F	62,291	846.55	6	43.9	50.1
Reading	M	64,351	840.18	9.3	49.0	41.8
Eng/LA	F	62,376	838.16	8.7	54.0	37.2
Eng/LA	M	64,555	830.62	14.2	58.2	27.6
Math	F	62,560	843.51	18.0	37.6	44.4
Math	M	64,857	842.03	20.5	35.9	43.6
Science	F	63,187	831.74	20.9	42.4	36.7
Science	M	66,365	828.98	24.8	39.9	35.3
Social St.	F	62,955	834.10	14.8	49.9	35.3
Social St.	M	66,075	833.93	17.7	45.7	36.6

5th Grade- Georgia Average Scores

Subject	Gender	N	Avg. Score	% not	% meet	% exceed
Reading	F	61,181	842.11	4.0	51.9	44.1
Reading	M	62,370	838.44	6.3	54.3	39.4
Eng/LA	F	61,206	844.40	3.5	52.8	43.7
Eng/LA	M	62,264	837.80	7.0	58.2	34.8
Math	F	60,854	845.57	10.6	44.3	45.1
Math	M	62,049	843.06	14.0	43.3	42.7
Science	F	62,410	837.57	16.4	42.7	40.9
Science	M	64,729	838.07	19.7	36.9	43.4
Social St.	F	62,222	826.92	19.3	56.7	24.0
Social St.	M	64,471	830.38	19.3	50.9	29.7

8th Grade- Georgia Average Scores

Subject	Gender	N	Avg. Score	% not	% meet	% exceed
Reading	F	62,394	851.17	1.9	39.7	58.4
Reading	M	63,731	843.93	4.2	47.6	48.2
Eng/LA	F	62,374	848.64	3.5	46.4	50.1
Eng/LA	M	63,535	839.73	7.4	54.0	38.6
Math	F	61,988	834.74	16.7	48.6	4.7
Math	M	63,165	832.50	20.1	46.4	33.5
Science	F	63,218	825.05	20.8	56.2	23.0
Science	M	65,610	826.13	23.4	49.7	27.0
Social St.	F	62,998	833.18	18.1	47.0	35
Social St.	M	65,263	833.19	20.7	41.9	37.5

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