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A Study of Gender Differences in Academic Performance in a Rural County in Tennessee.

Olivia Joy Sparks-Wallace
East Tennessee State University

A Study of Gender Differences in Academic Performance

In a Rural County in Tennessee

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by

Olivia Sparks-Wallace

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Dr. Scott Beck, Chair

Dr. Martha Copp

Dr. Wendell Hester

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ABSTRACT

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This thesis analyzes differences in academic performance measures of males and females in a rural county in Northeast Tennessee. A transcript review was performed for the graduating classes of 1993, 1998, and 2003. Overall GPA and individual math, science, and English grades were recorded. Comparisons of females and males enrolled in AP English, Advanced Math, and Advanced Science courses were also recorded and analyzed.

Findings revealed that females performed better than males in every subject. In 1993 the advantage is slight and is not statistically significant. However, in 1998 and 2003 the advantage is much more pronounced. In 1993 slightly more males took advanced Math and Science courses; however, by 2003 more females were enrolled in such courses than their male counterparts. The reasons for the differences noted in this study are largely because of sociological factors.

DEDICATION

This thesis is dedicated to: my parents, Donna and Robert Sparks, for their endless love, encouragement, and support throughout my life; my children, Ayrianna, Zebulon, and Isabella, because their curiosity and wonder challenge me to continue asking questions and seeking answers; and to my companion and spouse, Chris, for his help with formatting text and tables, his patience, and his devotion.

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I would like to thank the rural county in Tennessee that allowed me to study its graduating population. I especially thank the principal and the director of schools for allowing me to conduct the study.

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CHAPTER 1

INTRODUCTION

Academic performance differences between males and females at the high school level have become apparent in recent years. Females have steadily out-performed males in academic subject areas. The differences between male and female academic performance in secondary education are readily noticeable at the national level. If the focus were narrowed and performance differences were studied in a much smaller locale, one wonders if the same results would be found. In particular, how do male and female students in a rural, economically depressed area academically compete with each other? How does an environment where traditional gender roles prevail affect male and female performance in school? These are the questions addressed in this thesis.

Significance of the Problem

That females generally perform better in school than males is a significant happening. In a world where males are commonly viewed as possessing superior characteristics over females in most aspects of performance, specifically physically and intellectually, females earning above the level of males in academic settings is quite noteworthy.

Beyond the scope of traditional stereotypes and beliefs, this difference in performance makes us ask ourselves, "What are we doing as parents, teachers, communities, and as a nation to produce unequal achievement levels among male and female students? Why are girls doing better than boys, and what are the ramifications for male and female youth?"

Review of Relevant Research

Research shows females get better course grades than males even in traditionally male content areas, such as physics and math, but males score higher on ability tests in these subjects (Kimball 1989; Wentzel 1988). The 1996 McGraw report is based on a study of high school students when they were leaving school in Sydney, Australia. This study showed that in 1991 males were over-represented at the high and low spectrums of the Tertiary Entrance Ranks, while females mostly comprised the middle ranges. By 1996 this had drastically changed, with females being over-represented in all the high Tertiary Entrance ranks and males even more over-represented at the bottom. Results of 2005 (ACT 2005) test scores in the United States showed that females consistently outperform males in English and Reading and they are only slightly behind males in math. The once large gap between males and females in ACT test scores is narrowing (ACT 2005).

In a time when our nation is mourning overall low math and technical scores, it seems that one group has improved its performance. When sex is controlled, a significant decline is apparent in school performance, especially among minorities and students from low-income families. While every other group, in terms of race and social class, had declined in performance levels, females actually improved in the area of math and technology as reflected in classroom performance. Females are now much more likely to take advanced math and science classes and to perform competitively with their male counterparts (Halpern 2000). Current research shows a common trend of females performing better than in the past. Women are also making strides in fields that involve math and science that were at one time overwhelmingly dominated by males. For

instance, the medical school class of 2007 at Harvard University is made up of 51% females (http:www.hms.harvard.edu/jbm/welcome.htl).

Studies have shown that females have better memory in general than males, and this includes all types of memory: episodic, spatial, short-term, visual, and specific memories such as odor and early memories (Halpern 2000). This may help explain why females perform better in school than males. Males are three to five times more likely than females to have stuttering, dyslexia, and other language disorders (Bannatyne 1976; Gordon 1980; Sutaria 1985). This may help explain why males, as a group, do not achieve superior scores in language tests. But it does not explain why males, on average, outperformed females so convincingly in the past.

Research Site

I chose to study students' academic performance in a rural county in northeastern Tennessee because of the demographics of the area. In this rural county in northeastern Tennessee the median annual income per family in 1999 was $23,067, with an average household size of 2.35, while in Tennessee as a whole the median income per family in 1999 was $36,360, with an average household size of 2.48. In 2000 the percentage of adults who had a high school degree in this county was 58.4 %, while across the United States the percentage was 80.4 %. In this rural county in northeastern Tennessee in 1999 the proportion of people below poverty was 22.6 %, while in the state of Tennessee it was 13.5 % (US Census Bureau 2000).

In this study academic achievement is measured by a number of different variables. Overall GPA is one of the indicators of achievement. Also, the percentage of males and females who are enrolled in upper level math and science courses is another

indicator of academic achievement. Additional variables will be defined and used in hypothesis testing for this thesis.

Research Design

The research design is based on the use of student transcripts. After doing the necessary training and obtaining permission from the Principal of a Rural County High, I conducted a transcript review of seniors who graduated in 1993, 1998, and 2003. I compared the academic performance among males and females during these years. I looked at total GPA differences, math GPA differences, science GPA differences, and English GPA differences. I also measured the enrollment for all AP courses as well as upper level math and science courses. I will provide further details in Chapter 3.

CHAPTER 2

SEX DIFFERENCES IN ACADEMIC PERFORMANCE

There has been much debate and research on the topic of which sex is more intelligent. However, intelligence tests are not good indicators of which sex is smarter because they are carefully developed so that no sex is favored and so there will be no average overall difference between males and females (Brody 1992). Also, school achievement is not an appropriate way to determine which sex is smarter because many factors other than intellectual ability have an impact on grades (Adelman 1991; Willingham & Cole 1997).

There do not appear to be significant differences in intelligence between males and females, but there are some sex-related cognitive ability differences that are consistently found. It is important to remember that these are generalizations for males and females and they do not apply individually to all males and females (Halpern 2000).

Females earn higher grades than males, and some possible explanations have been proposed by researchers. The reasons proposed are both biological and environmental. In carefully controlled studies of learning disabilities, males have been found to have more learning disabilities than females by a ratio of two to one (Henning-Stout and Close-Conoley 1992). Males are classified as emotionally disturbed at four times the rate of females (Henning-Stout and Close-Conoley 1992). Some researchers have estimated that males are 10 times more likely to exhibit stuttering, a language problem (Starkweather 1987). There are four to five times more males who are dyslexic than females (Stein 1994). Of course, one is taking a leap of faith to assume that learning disability testing is not biased by sex stereotypes as well. Males also display a greater

amount of negative social behavior than females in the classroom and this is thought to play a role in their academic performance (Downey and Yuan 2005).

Socially, boys do not fare as well as girls, at least in part because they are encouraged to challenge social norms as an expression of masculinity (Fine 1987). This researcher asserts that boys are more willing to take risks and are less compliant than girls, who have also been taught, and rewarded, for compliant behavior (see Sadker and Sadker 1982, 1995; Thorne 1993). Many males associate good grades at school with being girl-like, and, therefore, they do not want to make good grades (Halpern 2000).

According to the National Center for Education Statistics (2000), girls are now taking biology and chemistry at a higher rate than boys; in 1998, more girls took Algebra II and Geometry than in 1990, and the percentage of females taking Pre-calculus has jumped from 31% to 44 % over the last decade.

Traditionally, girls did not take as many math and science courses as boys, and environmental factors certainly played a role in this (National Science Foundation 1994). Girls and young women are closing the gender gap, and a reason for this is because there are more programs that help students become interested in math courses while removing the preconceived fear of math, and also, perhaps, removing the gender stereotype that math is for boys, not girls.

There may be some biological reasons for females traditionally avoiding math courses. Researchers have consistently shown a difference in math performance between males and females. Males perform better in visual-spatial abilities than do females (Wilmingham and Cole 1997). Males are more apt to use imagery to solve problems, especially problems that involve moving objects (Richardson 1991). Males also excel at

solving problems that use physical concepts such as pulleys (Stumpf 1995). Studies with computer simulated mazes have shown that males perform more accurately and more quickly on these mazes than females (Astur, Ortiz, and Sutherland 1998). Females do, however, excel in memory for location (Halpern 2000). The point is that despite these neurologically-based differences in math-related abilities, more and more females are succeeding in advanced math courses.

Studies with college students show that no significant overall differences were seen in quantitative abilities, but sex differences were revealed on specific subtests. Females did much better than males on the tests of mathematical sentences and mathematical reasoning, while males scored significantly higher than females in geometry, measurement, probability, and statistics (Halpern 2000). These differences may be attributed to female superiority in verbal strategies and male superiority in visual-spatial strategies. On average, males outscore females on the quantitative portion of the SAT by about 40 points (College Entrance Examination Board 1997). One important thing to remember when looking at the reports of sex differences in quantitative abilities is the failure to take into account that until recently males were disproportionately represented in advanced mathematics courses. The best predictor of scores on tests of mathematics is the number of mathematics courses an individual has taken (Jones 1984). It is odd to note that even though females have many verbal or language advantages, males consistently show higher scores than females on the verbal portion of the SAT. This may be because males do very well on analogies and they make up a large portion of the verbal section of the SAT (Halpern 2000).

Females tend to excel in language production, synonym generation, word fluency, all types of memory, anagrams, and computation. Males excel in mathematical problem solving, verbal analogies, mental rotation, spatial perception, and tasks that require visual images (Halpern 2000).

One generalization about males as a whole is that their cognitive abilities appear to be much more variable than females. There are more males at the very high and low ends of the scale than there are females (Hedges and Nowell 1995). Females usually score higher on written measures than they do on multiple-choice questions, and the reverse tends to be true for males (Hedges and Nowell 1995). Many tests have also shown that females are superior at fine motor manipulations (Kimura 1993). Males are better with motor skills that involve throwing a projectile or aiming at a target (Hall and Kimura 1995). One could make the argument that this is social conditioning.

Females tend to have an overall better memory than males. Females also seem to have better memories for spatial locations, as was seen in the Eals and Silverman (1994) study. They believe that their finding is evolutionary in origin reflected in hunter-gatherer societies where females needed a good memory for plant locations. Females also appear to have a better associative memory than males (Birenbaum, Kelly, and Levi-Karen 1994). A study by Herlitz, Nilsson, and Baeckman (1997) found that females also excel at episodic memory. Mullen found that females report their earliest memories at a younger age than males do. The mean age for female's first memory is 37.8 months, and the mean age for males is 43 months (Mullen 1994).

There are numerous reasons why girls now generally earn better grades in school (starting in elementary school and continuing into high school). The reasons include

neurological differences that produce somewhat different cognitive capabilities but also include socially determined factors. The central focus here, relevant to the sociological perspective, is change in the performance of girls and boys in school settings over time. Such changes have nothing to do with neurological differences or genetic changes but rather with social changes in families, communities, and our nation. The essential question posed in this thesis is whether female-male differences in school performance variables have changed over time in a rural Tennessee high school.

CHAPTER 3

METHOD AND ANALYSIS PLAN

To obtain the material needed to determine whether boys or girls perform better in school it was decided to perform a transcript review. In order to analyze transcripts of Rural County High school students I spoke with both the school Principal and the Rural County Director of Schools. After presenting a signed letter that stated the purpose and legitimacy of the proposed thesis, I was granted permission to analyze the transcripts on the condition that no student's identity would be revealed. All students in the data are identified by number only. Information was to be analyzed on site to preserve confidentiality. It was decided to use three different classes spaced five years apart. The purpose for this is so that changes over time can be measured. The sample used in this transcript review consists of graduating seniors from the classes of 1993, 1998, and 2003. The two more recent years (1998 and 2003) were analyzed at the high school, while information concerning the earlier year (1993) had to be gathered at the central office of education of Rural County.

The transcripts contain scores for achievement throughout all four years of high school. There were particular pieces of information in the transcripts that were assumed to be essential in the comparison of academic achievement. GPA's of each student were recorded and whether or not the student took advanced math or science courses was also recorded. Whether the student took advanced English was also observed, and the combined math, combined English, and combined science grades were averaged for each student, whether courses were advanced or not.

Definition of Variables

The two independent variables for this study are sex and graduation year. Sex is defined as whether the student is a male or a female, with males being coded "0" and females coded "1." The variable year has three categories that are coded in the following manner: 1993 = "1," 1998 = "2," and 2003 = "3."

There are numerous dependent variables in the study, and they are defined as:

TOTGPA is the variable for total GPA of graduating seniors over their four-year school career. It is measured on the scale 0-4.

ENGGPA is the variable for the combined English course grade average throughout all four years of high school. Course averages are measured from 0-100.

MATHGPA is the variable for the combined math course grade average throughout all four years of high school. Course averages are measured from 0-100.

SCIGPA is the variable for the combined science course grade average throughout all four years of high school. Course averages are measured from 0-100.

APENG is the variable that denotes whether or not a student enrolled in A.P. English and/or A.P. History. The number "1" indicates that the student was enrolled in one of these courses. HIMATH is the variable that signifies whether or not a student enrolled in a higher level math or science course. The number "1" indicates that the student was enrolled, while the value "0" indicates the student did not take upper level math and science courses. For purposes of this thesis, upper level math and science courses are defined as pre-calculus, calculus, A.P. calculus, physics, and chemistry.

Hypotheses

There are many hypotheses that can be generated for these variables based on findings of previous research. The following research hypotheses are proposed:

1. Girls will have a higher overall GPA (TOTGPA) than boys, both across all three time periods and also for each time period.
2. Girls will have a higher combined English course GPA (ENGGPA) than boys across all three time periods and also for each time period.
3. A higher proportion of females will enroll in A.P. English or A.P. History (APENG) than males across all three time periods and also for each time period.
4. The proportion of males and females enrolled in higher level math and science courses will favor males in 1993 and shift to a higher proportion of females than males by 2003.
5. Boys will have a higher combined math course grade average (MATHGPA) than girls in 1993 and 1998, but this will reverse so that by 2003 the MATHGPA for girls will be higher.
6. Boys will have a higher combined science course grade average (SCIGPA) than girls in 1993 and 1998, but this will reverse so that by 2003 the SCIGPA for girls will be higher.

Statistical Analysis Strategy

Two statistical techniques are used to analyze the data collected for this thesis. When working with a categorical independent variable and a categorical dependent variable, cross tabulations are used and the chi-square statistic determines whether there is a significant difference between variables. When analyzing a categorical independent

variable and an interval dependent variable, a difference of means test is used, and the t-score determines statistical significance.

CHAPTER 4

DATA ANALYSIS

The three graduating classes (1993, 1998, and 2003) of Rural County High School were found to have varying class sizes. As shown in Table 1, in 1993 there were 127 graduating seniors, 69 were females and 58 were males. In 1998 there were 100 graduating seniors, 62 were females and 38 were males. In 2003 there were 126 graduating seniors, 70 were females and 56 were males. In all three groups there are noticeably more females than males, an indirect indication of a greater dropout rate among male students in this county.

Table 1. Frequency and Percentages of Males and Females in 1993, 1998, and 2003 in the Graduating Class at Rural County High School.

	1993		1998		2003	
	frequency	Percent	frequency	Percent	frequency	Percent
female	69	54.3	62	62	70	55.6
male	58	45.7	38	38	56	44.4
total	127	100.0	100	100.0	126	100.0

Hypothesis 1

The first hypothesis states that girls will have a higher overall GPA (TOTGPA) than boys, both across all three time periods and also for each time period. In 1993, 1998, and 2003 this is the case, and also for all years combined. Also notable in Table 2 is the higher GPA across periods, which holds for both females and males. Whether this is a grade inflation trend at the high school or actual improved performance by students is not known.

Table 2. Overall GPA of Graduating Students by Year and Sex in 1993, 1998, and 2003.

	All years		1993		1998		2003	
	female N=201	male n=152	female n=69	Male n=58	female n=62	male n=38	female n=70	Male n=56
Mean	2.88	2.53	2.45	2.26	3.02	2.46	3.19	2.86
S.D.	.655	.654	.585	.603	.575	.661	.567	.562
t-score	4.99		1.82		4.41		3.27	
p-value	(.000)		(.034)		(.000)		(.001)	

Hypothesis 2

The second hypothesis proposes that girls will have a higher combined English course GPA (ENGGPA) than boys across all three time periods and also for each time period. In 1993, 1998, and 2003 this hypothesis is supported, and also for all years combined as shown in Table 3.

Table 3. English Course Grade Average of Students by Year and Sex.

	All years		1993		1998		2003	
	Female N=200	male n=152	female N=68	male N=58	female n=62	male N=38	Female n=70	Male n=56
Mean	87.53	82.45	85.53	81.98	89.66	82.61	87.60	82.83
S.D.	6.150	6.332	6.201	6.482	5.566	6.449	6.027	6.178
t-score	7.583		3.134		5.783		4.368	
p-value	(.000)		(.002)		(.000)		(.000)	

Hypothesis 3

The third hypothesis asserts that a higher proportion of females will enroll in A.P. English or A.P. History than males across all three time periods and also for each time period. In 1998 and 2003 this is the case, and also for all years combined. As shown in Table 4, in 1993 more females than males took an A.P. English or A.P. History course, but relying on the Chi-square test, this difference is not significant.

Table 4. Percentage of Students by Year and Sex Who Took AP English or AP History.

	All years		1993		1998		2003	
	frequency	percent	Frequency	percent	frequency	percent	Frequency	percent
female	77	38.3	18	26.1	29	46.8	30	42.9
male	32	21.1	10	17.2	9	23.7	13	34.1
χ^2, df	12.075, 1		1.435,1		5.331, 1		5.340, 1	
p-value.	.001		.231		.021		.021	

Hypothesis 4

The fourth hypothesis proposes that in 1993 and 1998 a higher proportion of males will enroll in higher level math and science courses (HIMATHSCI) than females; however, by 2003 this will reverse, with a higher proportion of females enrolled in higher level math and science courses than males. The data in Table 5 did not support this hypothesis. In 1993 there were more males in higher math and science courses, with 12 males and 10 females. This difference is not statistically significant. In 1998 more females took higher math and science than males, with 15 females and 2 males enrolled, and this difference is significant. In 2003 more females took higher level math and science courses than males, with 26 females and 17 males. However, based on Chi square, this difference is not significant.

Table 5. Percentage of Students by Year and Sex Who Took Advanced Math Courses

	1993		1998		2003	
	frequency	Percent	frequency	Percent	frequency	percent
Female	10	14.5	15	24.2	26	37.1
Male	12	20.7	2	5.3	17	30.4
χ^2, df	.845, 1		5.984, 1		.637	
p-value	.358		.014		.425	

Hypothesis 5

The fifth hypothesis states that boys will have a higher math course grade average (MATHGPA) than girls in 1993 and 1998, but this will reverse so that by 2003 the

MATHGPA for girls will be higher. The results in Table 6 show that the average is higher for females in each of the years but the difference is only significant in 2003.

Table 6. Math Course grade average of students by Year and Sex

	1993		1998		2003	
	Female	Male	Female	Male	Female	Male
mean	83.09	82.19	85.45	83.24	87.35	84.22
Std. Deviation	7.38	8.24	7.63	7.51	8.05	7.15
t- score	.652		1.414		2.277	
Sig.	.516		.161		.024	

Hypothesis 6

The sixth hypothesis states that boys will have a higher science course grade average (SCIGPA) than girls in 1993 and 1998, but this will reverse so that by 2003 the SCIGPA for girls will be higher. The data shown in Table 7 do not support this hypothesis. In all three years, females had a higher SCIGPA than males, and all differences are statistically significant.

Table 7. Science Course Grade Average of Students by Year and Sex

	1993		1998		2003	
	Female	Male	Female	Male	Female	Male
Mean	87.69	84.50	90.77	85.73	90.70	86.99
Std. Deviation	6.59	7.91	6.24	6.87	5.77	5.38
t- score	2.468		3.777		3.698	
Sig.	.015		.000		.000	

Summary

It is apparent through the collection of data and the statistical tests performed on the data that there is a definite difference in the academic performance of males and females at Rural County High School who were graduating seniors in the years 1993, 1998, and 2003. In many cases this was not a change over the course of the years studied but a phenomenon sustained throughout 1993-2003. There is also indirect evidence that

a larger percentage of males drop out during high school than do females. Because those who drop out are generally students who perform poorly, only measuring the performance of graduating seniors is likely to minimize the sex difference. Thus, even in this small, rural high school there is evidence that teenage girls have been outperforming teenage boys.

CHAPTER 5

SUMMARY AND DISCUSSION

Data consistently supported the general hypothesis that girls outperformed boys in almost every academic measure in this rural county in Northeast Tennessee among the graduating seniors of 1993, 1998, and 2003. More research needs to be done concerning this issue. Rural areas elsewhere in Tennessee and other states should also be studied. It may be beneficial to look at data earlier than 1993, or perhaps to study performance differences between males and females at earlier ages.

Halpern (2000) asserts that females and males are simply better at different subject areas, and this is why females do better in English classes and humanity courses. However, this does not explain why females are outperforming males in areas where Halpern states that males are superior, such as mathematics, upper level mathematics, and advanced science courses.

The question remains as to why girls outperform their male peers in high school. We know that boys are "about where they were 30 years ago, but the girls are just on a tear, doing much, much better" as stated by Tom Mortenson, a senior scholar at the Pell Institute for the Study of Opportunity in Higher Education in Washington (Lewin 2006). Several sociological answers to this question may have some merit.

Recently, dozens of interviews with college students were conducted at Dickinson College, American University, and the University of North Carolina at Greensboro; a common theme appeared in both male and female students' interviews. The students agreed that the "slackers" were mostly males, and that the "fireballs" were females (Lewin 2006). Many of the students believe that women have more opportunities

available than in the past, now that they are no longer confined to staying at home and working without pay as a mother, housekeeper, and cook. Students reason that since the women's movement, leaving home to pursue a career is socially acceptable for women (Lewin 2006). If college students' attitudes about studying are similar to high school students, then one explanation for females outperforming males in high school may be that they now have a reason to invest their energy in academic success, rather than become homemakers who have little need for good grades.

Though this may shed some light on some of the changes seen in academic success, there are also other factors that play a role. In the course of the college student interviews, many males spoke of spending a great deal of time playing video games, to the point that some bragged about spending many hours a day playing games and showing up for class only part of the time. They also boasted that they studied less than females and that the only time they did study was the night before a test—just enough to pass. It is cool not to study if you are a male (Lewin 2006).

If females' future career expectations have an influence on their academic performance, then what are males expecting to do? In a small rural county, such as the one studied in this thesis, males may not academically perform as well as their female counterparts in high school because traditional jobs for males that do not require a college education are likely to pay better than most jobs in the region that do require a college education. In this area a large proportion of males work as construction workers, usually making around $30,000 a year after about two years. Of course they could aim to become a doctor, lawyer, or a banker, but that would require four years of college and extensive, possibly expensive education beyond a bachelor's degree. Dropping out of

high school at age 16 to work in construction and make $30,000 per year by age 18 may prove far more appealing than to stay in school and be "uncool" by studying harder (based on the author's personal communication over the years with several males from this county between the ages of 18 and 52).

Continuing gender inequality in pay and the differential value assigned to female-typed and male-typed occupations, females cannot expect to earn a living wage by dropping out of high school. If a female drops out of school and looks for employment in this northeast Tennessee rural county, the best she can do is gain employment as a cashier at a convenience store, fast food restaurant, or grocery store earning $18,000 per year, at best. However, if a female does well in high school and decides to go on to college she can do a little better financially. If a female goes on to study in a traditionally female field such as teaching elementary school, she can earn around $30,000 a year with benefits, the same as a male high school drop out who becomes a construction worker after two years. Nurses earn around $35,000 a year with benefits starting out. The fact that females have to work much harder than males just to be able to make an amount close to what males might make as high school dropouts may be a powerful reason that males slack off in school and females work harder than ever before. Although construction work may offer an immediate financial incentive to males, the downside is that they have opted for an occupation that offers little long-term stability in comparison to teaching and nursing occupations.

Another possible factor relates to how students are treated in school. Some researchers have recently explored the idea that boys, particularly those who are poor or racial/ethnic minorities, are singled out for harsher treatment in school by their teachers

and school administrators, while upper class boys, primarily white, receive more lenient treatment (Ferguson 2000). At the same time, other researchers examining differential treatment by teachers have found girls acting well-behaved and following instructions (so as to earn the designation of being "good girls"). Ironically, while the researchers argue that good behavior makes females invisible compared to more rambunctious, attention-getting male classmates (Sadker and Sadker 1995), girls' rule-following pattern of behavior may provide a greater long-term payoff in the form of earning higher grades than boys.

There may be some biological factors contributing to females performing better than their males in high school academics. Males are more likely to have cognitive and learning impairments. Such an explanation for male's lower academic success presents some problems, though. If the biological argument holds merit, then why did males outperform females until the last 20 years? Medical advances have improved the survival rate for both male and female infants and children, so why would the "biological vulnerability" argument hold more merit today than in the past? Or, perhaps the lifting of overt academic discrimination against females in schools has only now revealed this hidden explanation for males' poorer performance. However, with their increased survival rate and reduced chances for suffering cognitive impairments, males today should be performing better academically than males in the past. Further support for a social rather than a biological explanation can be found by reviewing the finding that except for females' scores, average math and technology scores have declined (Halpern 2000).

It is likely that several explanations hold merit. It is important for teachers and parents to encourage their children, regardless of their sex, to learn and to spend time both studying and playing. There are social implications that will take time and education to solve. The pay inequality between males and females and the gender segregation of jobs needs to be reevaluated and amended, as jobs and pay are connected to schools' retention of students.

The results for this rural county in Northeastern Tennessee correspond with national data that report females doing better in academia than males (Kimball 1989; Wentzel 1988). Future research needs to be conducted concerning what guidance counselors are doing to encourage high school students to succeed in high school and beyond. It would also be interesting and useful to know how many of the sample studied in this thesis went on to college and the comparison between males and females. It is also significant to realize that the only tangible measurement used in this study was grades of different students. There was no measure of social rewards of activities deemed important such as underage drinking, drug use, and risky behaviors. These social rewards can play a major role in high school performance beyond simply choosing to do these activities instead of concentrating on school performance since these behaviors also can harm school performance.

It is asserted here that males will continue to perform below the level of females until some social changes take place at the root of the problem--the home. Parents will have to encourage both their daughters and sons to excel in school. The structure of schooling, even as early as grade school, will have to be improved. There will have to be a single role of student, not female student and male student. Parents and educators will

have to encourage and support all students to do their best in school regardless of their sex. Positive examples from both men and women will be necessary to break down pre-existing attitudes about the importance of academic performance. Hopefully, environments that can encourage both boys and girls to try to succeed in school and to stay in school can be developed.

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VITA

OLIVIA J. SPARKS-WALLACE

Personal Data:	Date of Birth: March 15, 1975
	Place of Birth: Fort Belvoir, Virginia
	Marital Status: Married
Education:	Tazewell High School, Virginia 1993
	B.S. Sociology, East Tennessee State University, Johnson City, Tennessee 2000
	M.A. Sociology, East Tennessee State University, Johnson City, Tennessee 2007
	Currently pursing a BSN at East Tennessee State University with an expected graduation date of December 2007
Professional Experience:	Graduate Assistant, East Tennessee State University, College of Arts and Sciences, 2004-2005
	Adjunct Instructor, East Tennessee State University; Johnson City, Tennessee, 2005-2007