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A STUDY OF ACADEMIC ACHIEVEMENT DIFFERENCES BETWEEN THE
GENDERS

by
Marissa L. Housman

A Thesis

Submitted in partial fulfillment of the requirements of the
Masters of Arts Degree
of
The Graduate School
at
Rowan University
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Thesis Chair: Roberta Dihoff, Ph.D. and John Klanderman, Ph.D.

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ABSTRACT

Marissa L. Housman

A STUDY OF THE ACADEMIC ACHIEVEMENT GAP BETWEEN THE GENDERS
2009/2010

Roberta Dihoff, Ph.D. and John Klanderman, Ph.D.
Master of Arts in School Psychology

This study seeks to explore the academic achievement gap between male and female students by comparing grade point averages across genders. Specifically, the researcher hypothesized that such gap exists and that females would academically surpass their male counterparts in the classroom. Participants consisted of 300 students in grades 5, 8, and 11 from a public school district in suburban New Jersey. Grade point average (GPA) was generated by converting letter grades into numbers (4.0–0.0) and then averaged. A two-way between-groups analysis of variance (ANOVA) confirmed the hypothesis that females have a higher average GPA than males, as a whole (all three grades combined), as well as within each grade itself. The implications of these findings extend past the scope of this article to the educational setting itself. Given that an achievement gap exists, teachers and school administration need to work together with students to close the gap and maximize each student's academic potential.

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CHAPTER I

Introduction

Need of the Study

In today's world, women are gaining more and more academic recognition with each passing day. Women are no longer staying at home giving birth to child after child and sewing the family's clothes. They are obtaining advanced degrees, receiving higher-level jobs, and earning more money than ever before. Although equality of the two sexes has not yet been achieved, women are coming closer to this goal. In order to understand why women are increasingly becoming prominent figures in society, standing tall among their male counterparts, it is important to look at early influences in a girl's education. It is vital to understand this change from a statistical and empirical point of view.

By studying academic achievement differences between males and females, one can formulate a better idea of what is occurring cognitively during the school ages and what (if any) relationship exists between the two. In the past, the term academia was synonymous with males and domestic with females. Now, there has been a shift towards androgyny in terms of the work force as well as domestic life. Females are making significant strides towards becoming powerhouses in the labor force and males are taking on more household related chores than in the past. The aim of this study is to investigate possible disparities between males and females in relation to academic achievement in an attempt to gain insight into the aforementioned shift in gender roles and responsibilities.

The researcher first became interested in this field of study upon attending an all-female high school as a freshman. It was then that achievement differences between the

genders became of significant interest to the researcher. Ultimately, the relationship between academics and gender that was intensified throughout the researcher's high school career resulted in the intent for conducting this study.

Purpose

The purpose of this study is to examine academic achievement differences between males and females by statistically comparing grades earned (GPA) in school. In order to do this the researcher collected academic data from a random sample of public elementary, middle, and high school students residing in a suburban town of middle socioeconomic status in New Jersey. By comparing the subjects' GPAs from grade to grade (fifth, eighth, and eleventh) and from gender to gender, this study serves to highlight significant differences throughout the data. The goal of this study is to investigate students' academic abilities in comparison to that of the opposite gender. It is the researcher's intent to provide others with scientific knowledge of academic achievement according to gender and how differences among males and females manifest in an academic setting.

Hypothesis

The goal of this study is to consider whether a gap in academic achievement exists between the two genders and, if so, which is the higher-achieving gender. It is hypothesized that academic achievement differences exist between males and females throughout elementary, middle, and high school. Specifically, females consistently achieve higher academically than their male counterparts throughout their schooling. The researcher developed two hypotheses to examine this idea. The first null hypothesis is non-directional in orientation and states that academic achievement differences do not

exist between genders. Likewise, the first alternative hypothesis states that there are academic achievement differences between genders. The second null hypothesis is directional and assumes that females are not higher academic achievers than males. Lastly, the second alternative hypothesis states that females are higher academic achievers than males.

History

In the past it has been assumed that males were more capable academically than females. This can explain why men hold the majority of upper level occupations and positions. This is changing, however. As the diversification of the United States continues to increase, the feminization of the workforce and society becomes undeniably clear. There are more women in the workforce now than ever before, accounting for 62 percent of the net increase in the civilian labor force between 1990 and 2005 (Sue & Sue, 2006). The percentage of married women in the labor force has more than doubled, going from 25 percent in 1950 to 58 percent in 2006 (Sue & Sue, 2006). Furthermore, a greater number of women are obtaining positions in the workforce now than ever before, as evident by today's statistics. This is one of the greater implications of the increasing academic achievement in females.

By looking at early influences in a girls' education, one can attempt to gain a more complete understanding of the factors behind female advances and accomplishments in today's society. It has been found that due to girls' adaptability and receptiveness to changes in their learning environment, girls have become higher achievers in school than boys (Bong, 2005). This malleability can be attributed to girls' higher levels of self-efficacy, which increases their drive and will to academically

achieve (Nauta & Epperson, 2003). Researchers Duckworth and Seligman (2006) assert that girls earn significantly higher final grades than boys and that achievement test scores under-predict female GPA.

Another study important to the history of academic achievement between genders indicated similar results that girls receive higher grades in reading, spelling, and writing, both in school and on achievement tests. Boys have seldom been found to, as a whole, outperform girls in terms of grades in math and science; girls often outperform boys in these areas as well. Girls are excelling in not only stereotypically feminine areas, but in stereotypically masculine areas as well (Pomerantz, Altermatt, & Saxon, 2002). Another group of researchers found clear evidence that girls achieve higher grades in school, across all subjects (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006). The reoccurring notion that girls are higher academic achievers than boys is present throughout many studies and suggests that females are just as, if not more, capable of receiving the same jobs and positions as their male counterparts.

Definition of Terms

The explanation of terms is necessary for understanding certain ideas discussed throughout this study:

Academic Achievement: The level of success obtained through formal schooling. For this study, academic achievement is measured by GPA (see below) and includes all academic areas of study

Achievement Tests: Tests that are designed to measure what a student has learned (academically) and is scored by comparing the individual's score to that of the population's; in this case, they measure a student's

proficiency, or the amount of grade appropriate knowledge and skills a student has acquired up to the point of testing

Attrition Rate: A decrease or reduction in sample size, usually due to students moving out of the district of study

Between Subjects Design: Used when comparing groups consisting of different participants in each of the groups

Grade Point Average (GPA): used in schools to report students' overall success in all areas of study; a numerical sum of the grade earned in each course; ranges from 0.00 to 4.00

Outlier: a statistical term to describe a data point that is out of the normal range

Validity: The degree to which a measure or study assesses what it is designed to assess

Variance: Measure of variability; obtained by squaring the average deviation a number is from the mean (average of all data points)

Assumptions

It is important to recognize possible difficulties one could encounter while designing a study. Although several factors may threaten the validity of a study, researchers can make certain assumptions that serve to minimize this risk. In this particular study, the researcher assumed that all students received an equal level of education, had the same academic experience throughout their years at school, and all were exposed to the same quality of instruction. It is also assumed that all subjects were provided with opportunities for growth, success, and support in school. If a student needed additional help or support, it is assumed that he/she received it. Another assumption of this study is that the teachers are not biased towards one gender or the

other and graded their students' academic success fairly and evenly. The researcher also assumed that if factors are interfering with any of the students' academic success or potential, they are affecting both genders equally in type, intensity, and outcome. Finally, it is assumed that an equal distribution of learning disabled/special education students exists in both male and female populations.

Limitations

Few research studies are completely lacking of any limitations whatsoever. With this being said, certain areas of this study maintain slight limitations that are worthy of deliberation. First, the attrition rate in this study may be higher than in others due to students moving out of the school district during data collection, causing the sample in this analysis to be varied somewhat due to the missing data. To account for the rate of depletion in the sample, researchers could contact the child's new school district and ask for assistance in transferring their records. This will take much more time, money, and effort but will account for the unavoidable attrition rate.

Limitations also arise with the random sampling: learning disabled/special education students are not excluded from the sample, which can lead to outliers that sway the data. The subjects of one gender may include more learning disabled/special education students than the other, which will give the latter an unfair advantage when it comes to comparing academic achievement differences. This leads to the larger limitation of generalizability. Due to the aforementioned variability (among others), it is somewhat difficult to generalize the results of this study to the entire population of students. It is important to keep this in mind when considering the results of this study and comparing it

to all students. This is not to say, however, that the results gleaned from this study do not shed light on the academic differences between the genders.

Summary

This Chapter serves to provide the reader with general background information about the nature of academic achievement and the reasoning behind further consideration. Next, Chapter II will outline previous research on this topic. It will explore the various indicators of higher academic achievement in female students, the underlying factors that contribute to achievement differences, the drawback of the advance of academic achievement in females, academic achievement limitations in males, and will conclude with the limitations and gaps in the literature reviewed. Chapter III consists of the design of the study, including the sample and measures, analysis, and summary. Chapter IV will analyze and interpret the results reported in Chapter III. Finally, Chapter V will summarize the preceding Chapters, draw general conclusions from the results, and discuss the overall impact of this study.

CHAPTER II

Literature Review

The zeitgeist of the 21st century is undoubtedly marked by the advancing of women in the work force, academia, and society as a whole. The role of the woman has shifted from domestic to some combination of domestic *and* occupational. Aside from the early influences of society and culture on a woman, there are certain academic qualities females possess that provide them with an edge over their male counterparts. Despite the fact that complete equality of the two sexes has not fully been achieved (i.e., equal pay in the workforce), many women are actively pursuing this goal. In an attempt to gain insight into this phenomenon, it is important to consider early influences in a girls' education that serves to narrow the academic achievement gap between the genders. It has been suggested that due to females' receptiveness and adaptability to changes in their learning environment, girls have become higher achievers in school than boys (Bong, 2005). This notion is supported by findings that suggest this malleability can be attributed to girls' higher levels of self-efficacy, which increases their drive and will to academically achieve (Nauta & Epperson, 2003).

Indicators of Higher Academic Achievement in Girls

In the past, it has been assumed that males were more capable academically than females. This can help to explain why men hold the majority of prestigious occupations and positions. This is changing, however. Many studies have shown that girls perform better in school than boys in all major subjects (e.g. Epstein et al., 1998; Wong et al.,

2002) and that they graduate from high school with higher grade point averages (GPAs) than their male counterparts (Perkins et al., 2004). Furthermore, the phenomenon that girls academically outperform boys is global: researchers in the USA (e.g. Epstein et al., 1998), Asia (e.g. Wong et al., 2002), and Europe (e.g. Van Houtte, 2004) have all reached statistically concurrent conclusions.

One study, which examined eighth-grade students from a socioeconomically and ethnically diverse magnet public school in a city in the northeast (USA), found that girls earn significantly higher final grades than boys and that achievement test scores under predict female GPA (Duckworth & Seligman, 2006). Another study indicated similar results with a sample of elementary school children in two lower to middle-class school districts in the midwest showing that girls received higher grades in reading, spelling, and writing, both in school and on achievement tests. Boys have seldom been found to, as a whole, outperform girls in terms of grades in math and science; girls often outperform boys in these areas as well. Girls are excelling in not only stereotypically feminine areas, but in stereotypically masculine areas as well (Pomerantz, Altermatt, & Saxon, 2002). Another study sampled students from three school districts in Illinois and also found clear evidence that girls achieve higher in terms of their grades in school, across all subjects (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006). The reoccurring notion that girls are higher academic achievers than boys is present throughout many studies and suggests that females are just as, if not more, capable of pursuing the same careers and positions as their male counterparts.

Authors Matthews, Ponitz, and Morrison (2009) studied gender differences in relation to the nature and sources of cognitive and social development during the

transition from preschool to elementary school. The subjects in this five-year longitudinal study consisted of 268 first-time kindergartners (139 females and 129 males) from southeast Michigan. The specific focus of this study was to assess children's self-regulatory (goal-orientated) behaviors for academic outcomes (Matthews et al., 2009). Self-regulation skills, as defined by the researchers, help children direct and control their attention and behavior, and are crucial for successful school performance and adaptation (Matthews et al., 2009). Self-regulation depends on cognitive skills, including working memory, attention control and switching, and inhibitory control.

To measure achievement (specifically applied math skills, general academic knowledge, literacy, vocabulary, and sound awareness), researchers administered subtests of the Woodcock-Johnson III Tests of Cognitive Ability to the participants (WJ-III; Woodcock et al., 2001). Researchers also used the Child Behavior Rating Scale (CBRS; Bronson et al., 1995), an observational instrument designed to assess children's classroom goal-orientated behaviors and strategies used to regulate behavior in academic and social situations (Matthews et al., 2009). The final measurement the authors used to test their theory was the HTKS or "Heads-Shoulders-Knees-Toes" task (their version of the "Head-to-Toes" tasks which requires children to respond to prompts in the opposite manner: for example, when told "Touch your head", the correct response would be to touch one's toes, and so on).

The results of this study indicate that, statistically, girls outperformed boys on both HTKS and CBRS assessments. Boys had more variable HTKS scores, including a number of consistently low performers, in comparison with girls who had a tight cluster of high performers and very low performers (Matthews et al., 2009). Boys began

kindergarten at a significant disadvantage in self-regulation as compared to their female counterparts, and although they improved, they did not catch up by the end of the school year (Matthews et al, 2009). Their results also indicated that the boys' self-regulatory skills at the end of the kindergarten year were equal to that of the girls' in the beginning of the year – the boys were a whole year behind the girls in terms of self-regulatory skills. Furthermore, the bottom ten percent of boys scored considerably worse on the HTKS than the bottom ten percent of girls. This low group of boys also showed fewer gains on the HTKS task over the course of the year compared with all other students; thus, it is imperative that future research in the early elementary grades incorporate a specific focus on poorly regulated boys and their achievement outcomes in kindergarten (Matthews et al., 2009). Another study, the High/Scope Perry Preschool Project, randomly assigned children whose parents had applied to a preschool program in Ypsilanti, Michigan to receive the program or not. Researchers found that age at 19, the individuals who had attended the preschool program had higher graduation rates than the individuals in the control group – however, this graduation rate effect was limited to females (Bracey & Stellar, 2003). Another preschool program experiment, the Abecedarian Project, found similar results: at age 21, the individuals who participated in the Abecedarian Project completed more years of school than the controls (21.2 versus 11.6). Again, this was only evident in the females who were part of the experimental group (Bracey & Stellar, 2003). The two aforementioned preschool program studies yielded significant results, as regardless of whether or not children were exposed to preschool, only the subgroup of females who attended the programs had favorable academic outcomes.

Although no significant gender differences were found regarding academic achievement, researchers found that both of their self-regulation measures predicted the same two achievement areas (math and phonological awareness). Freeman (2004) suggests that although gender differences exist in early elementary school, performance on assessments in general knowledge, overall reading, and overall mathematics is similar between boys and girls in kindergarten and the first grade. It would be necessary to see at exactly what point (year in school) academic achievement scores between boys and girls begin to statistically deviate. Another explanation for insignificant findings is that the gender gap is often not prevalent in standardized test scores, which were used in this study (WJ-III; Woodcock et al., 2001), but in grades and daily classroom work (Duckworth & Seligman, 2006). Therefore, future studies should take into account not only standardized test scores, but school grades and classroom performance as well (Matthews et al., 2009).

Researchers Steinmayr and Spinath (2008) examined sex differences in school achievement and some of the most important personality and motivational constructs in a sample of 342 11th and 12th graders attending a German school preparing for university (Gymnasium) located in a mid-sized town. Of that sample, 204 were female and 138 were male (mean age $M = 16.94$ years; $SD = 0.71$), and can be considered the typical population of this type of school. Achievement criteria in this study consisted of grade point average (GPA), and grades in Math and German. Intelligence was measured with the Intelligence Structure Test 2000 R (IST; Amthauer et al., 2001), a German multifactor intelligence measure. One's overall intelligence score on the IST is thought to measure reasoning as a higher order factor of intelligence.

Steinmayr and Spinath (2008) hypothesized that “girls achieve higher grades in school than boys after controlling for intelligence. This should be true for all German and Math as well as general school achievement (GPA)” and that “Variables related to school performance that show sex differences in means function as mediators for the effect of sex on school achievement”. After controlling for intelligence, researchers found that girls’ grades were significantly higher than that of the boys’. Although there was no significant difference in score on the IST, the girls’ did score higher than boys on many of the different subtests. Steinmayr and Spinath (2008) concluded that personality and motivation play important roles in explaining sex differences in school attainment.

Van De Gaer et al., 2007 examined whether gender differences in language achievement were related not only to gender differences in attitudes towards schooling but also to the attitudes toward schooling of peers (i.e. peers in classes and in schools). The subjects were 4,072 students (2,061 females and 2,011 males) from the Longitudinal Onderzoek Secundair Onderwijs [LOSO; Longitudinal Research in Secondary Education] project, in which a cohort of 6,000 students were studied during and after secondary education in Flanders, Belgium (Van Damme et al., 2002). The researchers used the students’ scores on a Dutch achievement test (DUTCH2; created by LOSO) administered at the end of eighth grade (age 14). Results of this indicated that girls scored significantly higher in language and grammar than did the boys at the conclusion of eighth grade. Girls felt more socially integrated in the classroom, had better relationships with teachers, were more motivated toward learning tasks, showed significantly higher levels of well-being at school, and had a more positive attitude toward homework than boys (Van de Gaer, et al., 2007). Overall, girls also had a more positive school-related

attitude than did boys. The researchers were then able to conclude that girls performed better than the boys in language partly due to those aforementioned findings (girls felt more socially integrated into the classroom, had better relationships with teachers, etc.). They also found that the girls were more attentive in the classroom than the boys, and that the small percentage of boys who were attentive equally achieved as well as the girls in language (Van de Gaer et al., 2007). These findings suggest that the boys' inattention in the classroom plays a role in the academic achievement discrepancy between the two genders.

Researchers Kuhn and Holling (2009) used 1,098 seventh through tenth grade students (516 females and 582 males) in Germany as subjects in their study. They noted the consistent finding in the literature that girls generally receive better school grades than boys (Duckworth & Seligman, 2006; Pomerantz et al., 2002) and went on to hypothesize that the direct positive effect of female gender on school grades is partially mediated by reasoning ability (Kuhn et al., 2009). Their findings indicated that the girls in their study were higher achievers in language and grammar than the boys. Their results also suggested that the girls in the gifted program received higher school grades in science than the boys in the gifted program (Kuhn et al., 2009).

Underlying Factors That Contribute to Achievement Differences

When evaluating this occurrence, it is important to consider the reasons why females are able to achieve greater academic success than males. Girls tend to be more self-disciplined than boys, allowing them to accomplish more academically and thus achieve more in the end. For example, eighth grade girls devote an average of one hour per day on homework, almost twice the time that their male classmates spend on

homework. Girls also begin their homework about 20 minutes earlier in the day (Duckworth & Seligman, 2006). The fact that women are becoming more assertive also contributes to this rise of achievement. Self-report measures of American college students reveal that a positive correlation exists between assertiveness under normal conditions and socioeconomic status: the more assertive a woman is the higher socioeconomic status she will reach. Women's scores on assertiveness have changed over the decades, as most of the correlations between year and individual assertiveness measures are now significant. This change is a social one and is internalized in girls in the form of a personality trait. This is not the case for males, thus explaining one of the many reasons why women are gaining an edge on academic achievement (Twenge, 2001).

Some researchers have chosen to examine the high levels of self-efficacy found in high school girls that has been found to initiate motivation. Girls who demonstrate feelings of positive self-efficacy are more likely to achieve goals that they set in high school due to the motivation that stems from such feelings of self worth. This motivation to reach goals makes it easier for women to be successful, as they will work very hard to do so (Nauta & Epperson, 2003). Indeed, girls are more motivated than boys. This is supported by the fact that girls are more willing to alter their perceptions of their learning environment throughout the school year. Girls are more adaptable and receptive to changes in the classroom than boys, making it easier for them to adjust their own personal motivations however they see fit. Researchers predict that girls will continue modifying their impression of the learning environment whenever it should change; therefore, it will be easier for girls to redirect their academic motivation at any given

time, making it easier for them to continue holding a higher level of academic achievement (Bong, 2005).

Despite the fact that there are usually no sex differences in general cognitive ability, boys and girls differ in more specific intelligence factors: adolescent girls perform better in perceptual speed and some verbal tasks, whereas boys outperform girls in mental rotation or some mathematical facts (Steinmayr & Spinath, 2008). This finding could shed some light on the academic achievement gap, specifically in regard to sex differences in means of predictors. Duckworth and Seligman (2006) found that self-discipline mediated the relationship between sex and grades in a sample of eighth grade students. Therefore, girls' higher academic performance in school might, at least partially, be explained by the girls' higher self-discipline at that age.

The tendency for girls to outperform boys can be traced back to another difference in the classroom: the way in which schoolwork is approached. It has been found that two of the key reasons why girls are higher academic achievers than boys are that they adopt mastery over performance goals and tend to refrain from engaging in disruptive behavior. Girls adopt mastery goals over those of performance when they work hard in order to show the teacher they are smarter than the other students in the class or feel successful in any given subject when they do better than their classmates. Girls' ability to draw on effective learning strategies in their classroom (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006) based upon the status of such learning environment at any given time enables females to slowly but surely become higher achievers than their fellow male classmates (Bong, 2005).

Drawbacks to the Advance of Academic Achievement

Although girls perform better in school, it does not come without a price: girls experience greater internal distress than do boys. Girls who are doing poorly in school are more vulnerable to such distress than boys who are doing poorly. Furthermore, girls who are doing well academically still seem to experience more internal distress than boys (Salmela-Aro et al., 2008). Researchers found that girls, both on an academic and vocational track, experienced a higher level of academic burnout, exhaustion, cynicism, and inadequacy) than boys. Girls also shower higher achievement than boys (Salmela-Aro et al., 2008). This again indicates the general role of school burnout and is in line with the findings that girls' social roles expose them to more stress than boys (Kessler & McLeod, 1984; Matud, 2004; Turner et al., 1995), while they perform better at school than boys (Dwyer & Johnson, 1997; Pomerantz et al., 2002) and attribute greater importance to academic achievement compared to boys (Berndt & Miller, 1990; Murberg & Bryu, 2004). In conclusion, even though girls achieve more academically, their edge is somewhat lost when the degree of internal distress they experience is factored in (Pomerantz, Altermatt, & Saxon, 2002).

Academic Achievement Limitations of Males

In a study of elementary and middle school students from all over the United States, the majority of boys indicated that their classroom activities were not very interesting or enjoyable. Girls, on the other hand, reported these same activities to be exciting and pleasurable. Boys across all grade levels invariably perceive their classroom activities to be consistently less enjoyable than females. Due to the fact that boys have

little interest in many academic activities, they are less likely than girls to be motivated to get involved and therefore achieve (Gentry, Gable, & Rizza, 2002).

A study that examined focus groups with public school students across three continents (UK, Australia, and the USA) isolated common themes in each country in regard to the academic achievement gap between the genders (Clark et al., 2008). Researchers found that all three levels (international, national, and local) support an educational culture where girls as a group are attaining greater academic success than boys as a group. This was indicated by a variety of measures, including grades, enrollment in rigorous academic coursework at the high school level, high school graduation rates, enrollment and completion of college, and even the enrollment and completion of graduate school. Boys had a significantly higher number of discipline referrals, were disproportionally represented in special education placements, had higher high school drop out rates, and enrolled in and graduated from college at a lesser frequency than do girls (Clark et al., 2008).

In a study that addressed concerns about boys' underperformance on literacy tasks compared to girls, 142 (51 female and 91 male) ninth and tenth grade students' responses to narrative texts were measured. Achievement orientations, including goals, self-efficacy, and self-handicapping, as well approach and avoidance factors, were measured. Results indicated a small but significant overall relationship between achievement orientation and gender: female students engaged in more approach behaviors towards reading the two narrative texts. Conversely, male students participated in more avoidance behaviors during the narrative reading tasks. Girls were also found to have a significantly higher overall mean topic interest rating than boys (when these scores were combined,

girls were more interested in the topics of the two narratives than the boys). In conclusion, the female participants yielded higher scores on task goals and self-efficacy measures (Graham et al., 2008).

Students from four inner-city public schools in the Southeast indicated that boys' perceive popularity according to the tendency to participate in deviant behaviors. Boys obtain the acceptance of their peers by exhibiting aggressive behaviors. Due to this view that deviant behaviors promote popularity, boys see violence as a way of achieving (Xie, Li, Boucher, Hutchins, & Cairns, 2006). While girls are focusing on adapting to changes in their learning environment, boys are engaging in deviant behavior. This aggressive nature of boys in school takes their focus off their class work, affording girls the opportunity to get ahead.

During the past decade, there has been an increasing gender achievement gap with male students lagging behind their female counterparts on a number of important indicators of school success (Clark et al., 2008). Evidence supports middle school as a time when the gender achievement gap widens (Graham & Hardy, 2006; Tyre, 2006). Clark, Flower, Walton, and Oakley (2008) reported that data analysis in their district showed gender differences at the middle school level with significantly higher numbers of girls than boys earning grade point averages (GPAs) that were "B" or higher, and significantly more boys than girls earning GPAs of "C" or lower. Also, discipline referrals were significantly higher for boys than for girls. Researchers noted that these aforementioned gender differences were shown across Caucasian, African American, and Hispanic students. This supports the notion that the academic achievement gap between genders is global.

In a longitudinal national survey of a group of U.S. 12th graders over the course of a decade, researchers found that girls not only reported coursework as more meaningful and interesting than boys did, but the girls also saw the importance of their schoolwork in relation to their future more often (NCES, 2005). The authors also found that many boys are more oriented in the present than in the future, and that academic achievement may not be a priority when compared with social and physical status, particularly with regard to peers (Clark et al., 2008). They suggest having well-articulated and visualized positive selves within the academic domain can be a position of strength for boys. Taking a strengths-based approach, counselors can use an analogy from a boy's interests and talents such as sports, music, art, and specific academic areas to point out how one typically does not become talented immediately, but instead must practice consistently to improve. Their data also provides ways to help increase academic achievement in male students: helping males to envision the future with positive roles and outcomes for themselves, teaching and reinforcing organizational and study skills, examining the learning environment, promoting positive role models, and grouping students by gender in small group settings (Clark et al., 2008).

Another male drawback to achieving is the tendency of boys to engage in disruptive behavior. Researchers have found a positive correlation between disruptive behavior and decreased grades: boys disrupt the learning environment at a greater frequency than girls and subsequently earn lower grades. Girls, on the other hand, are less likely to engage in such unruly behavior in the classroom and thus earn better grades. While boys are acting out, girls are paying attention and making an effort to comprehend the material (Kenney-Benson, Pomerantz, Ryan, & Patrick, 2006). These studies

delineate the learning techniques girls utilize, enabling them to take greater strides forward in the classroom. Girls are academically more motivated than boys and therefore thrive better in an academic setting.

Limitations and Gaps in the Literature

Few research studies are completely lacking of any limitations whatsoever. With this being said, a few of the studies maintain slight limitations that are worthy of deliberation. In one study, the attrition rate was 11% due to children moving out of the school district, causing the sample for each analysis to be varied somewhat due to the missing data (Pomerantz, Altermatt, & Saxon, 2002). To account for the rate of depletion in the sample, researchers could send a copy of the self-evaluation to the student, asking for the assistance of their new school district. This will take additional time, money, and effort but will account for the unavoidable attrition rate. Limitations also arise in the study on girls' motivation and perceptions of their learning environment as it only examined change during a single school year (Bong, 2005). A longitudinal study, spanning multiple school years, would be more beneficial to clearly demonstrate the impact of changed perceptions of the environment on girls' ongoing motivation.

Although few gaps exist in the literature on academic achievement differences between boys and girls, it is important to note the conflicting outcomes of self-efficacy that were found in two different studies. According to some researchers, the high levels of efficacy girls possess is beneficial as it makes them more motivated thus allowing them to achieve more (Nauta & Epperson, 2003). Another study, however, found that the low levels of self-efficacy that exists in girls contrarily works against them academically and can explain why they do not do as well on achievement tests as boys (Kenney-

Benson, Pomerantz, Ryan, & Patrick, 2006). Most of the research suggests that self-efficacy is a crucial component of the female plight toward academic superiority. With belief in one's self comes motivation, which pushes one to work hard and thereby reach higher levels of academic achievement. Researchers could further investigate the level of self-efficacy in girls to determine if they really do possess higher levels than boys or if self-efficacy simply varies from person to person, regardless of gender. By doing so, the defining variables of self-efficacy would determine whether or not self-efficacy leads to achievement or failure.

CHAPTER III

Methodology

Chapter Three details the methodology used in this study to empirically consider the effect gender has (if at all) on students' GPAs throughout three different years in school (fifth grade, eighth grade, and eleventh grade). The purpose of this present study is to determine whether one gender achieves higher academically as a whole, as well as in each of the three school years. Again, the hypothesis states that gender differences do exist in the school setting and that females are higher academic achievers than males. It is anticipated that, upon collecting data and running statistical analyses, the null hypothesis will be rejected, subsequently failing to reject the alternative.

Participants

The participants in this study consist of 300 students (150 females and 150 males) from the South Norman* school district in a suburban town in New Jersey. 100 of the students were in fifth grade (50 males and 50 females), 100 were in eighth grade (50 males and 50 females), and 100 were in eleventh grade (50 males and 50 females). The researcher had no contact with the students – the archival data collected in this study remained anonymous. Data was received (final letter grades, year in school, and gender) from Maurice Elias, PhD at Rutgers University. He collected this data for his own study throughout the 2005–2006 school year and granted the researcher permission to access and analyze it for this present study.

* name of school district changed for reasons of confidentiality

Design

A 2×3 between subjects design was used in this study. The independent variables for this experiment were the gender of the student (male or female) and the year in school (fifth grade, eighth grade, or eleventh grade). The dependent variable was the students' GPAs for each of the three school years being measured: fifth grade GPAs, eighth grade GPAs, and eleventh grade GPAs. This was measured by converting the letter grades (A+, A, A-, B, etc.) from archival data (conducted in the past for research on this population of students by Maurice Elias, PhD) into numerical GPAs.

Given the nature of this measure – the recording of archival data – this design is relatively reliable. If someone were to replicate this study using the same students, they should be recording the same letter grades and gender for each student. This is assuming, however, that the letter grades themselves are reliable and that students are graded fairly and evenly. Since the students are all from the same school district and have the same grading system, much of this is controlled for. However, it is still important to note the possible variation in the teachers' assessments of their students regarding final grades for each subject area. The validity of this measure is also high: letter grades and gender were originally obtained from the district's official school transcripts. Again, the validity of the teachers' discretion of final grades could be questioned, but it is assumed that minimal bias exists in regards to grading students. Finally, with a between-subjects design, sphericity is assumed. This means that the variance between any two groups of participants measured in this sample is assumed to be the same as the variance would be of any two groups being compared in the entire population itself.

Materials

Materials included Dr. Elias' data (final letter grades, year in school, and gender) from his research and a laptop computer to statistically analyze the data using the computer program *SPSS 18.0* for Mac. No other materials were needed for this study.

Procedure

Three separate conditions were employed in this study to compare GPA across three different grade levels. In the first condition, Condition 1, the letter grades for each fifth grade student were converted into numbers and then averaged to yield their GPA. An 'Outstanding' (O) was changed to a 4.0, 'satisfactory' (S) to a 3.0, 'progressing' (P) to a 2.0, and 'needs improvement' (N) to a 1.0. An 'A' was also changed to a 4.0, a 'B' to a 3.0, a 'C' to a 2.0, a 'D' to a 1.0, and an 'F' to a 0.0. The majority of the grades were coded as an O, S, P, or N, with only a few being the traditional A–F (the later form of grading was used primarily in Social Studies). Each fifth grade student had an average of 250 grades over the course of four marking periods, which were converted into their respective numerical equivalent, added together, and then divided by the total number of grades to generate the GPA. This was done for the first 50 fifth grade males and the first 50 fifth grade females in the sample data. In addition to grade in school (fifth) and GPA, the respective gender of each student was also recorded. In this condition, three students were excluded due to incomplete data: the first, a female, for missing first quarter grades (it is assumed she transferred into the district at some time during the second marking period), a male who was missing first and second semester grades (again assuming he transferred into the district at or during the third marking period), and another male who

was given 'Incomplete' (X) for many grades (he was the only student in this sample who received incomplete grades and therefore was excluded from the sample).

In the second condition, Condition 2, a similar procedure as in Condition 1 was implemented. The letter grades of 100 eighth grade students were recorded, as well as their gender. The same scoring system was used: an 'A' was converted to a 4.0, a 'B' to a 3.0, a 'C' to a 2.0, a 'D' to a 1.0, and an 'F' to a 0.0. Unlike in Condition 1, none of the students in Condition 2 received an O, S, P, or N. Almost all eighth grade students had a total of 28 grades over the course of the four marking periods so, for reasons of consistency, students who did not have a total of 28 grades were excluded from this study. As in Condition 1, each of the 28 grades were converted into their corresponding numerical grades, summed, and then divided by 28 to yield the average number or GPA. Again, this was done for the first 50 eighth grade males and the first 50 eighth grade females in the archival data set.

In the final condition, Condition 3, 100 eleventh grade students' GPAs and gender were recorded. As in Condition 2, these students only had A–F grades and they were scored in the same manner: an 'A' was changed to a 4.0, a 'B' to a 3.0, a 'C' to a 2.0, a 'D' to a 1.0, and an 'F' to a 0.0. The average number of grades for all four marking periods combined was 29. Only one student was excluded from this condition, due to the fact that she only had three grades. Aside from that participant, the first 50 eleventh grade males and the first 50 eleventh grade females were measured. Again, each student's grades were converted into numbers, added together, and then divided by the total number to render the GPA.

300 different students were used throughout the three aforementioned conditions,

making this study a between subjects experimental design. Each student participated in one condition, and one condition only. An advantage of this type of design is that each individual score (of GPA and gender) was independent of the other scores and was not influenced by another of the other scores in the data set. A disadvantage of the between subjects design is that it is very difficult to control for individual (class) differences.

However, the three different conditions in this design can still provide insight into the extent to which a pattern exists in regard to the GPAs of males and females throughout schooling. The purpose of discriminating between the three separate conditions (year in school) is to explore the differences and similarities between the two genders, including whether the gender with the highest average GPA in fifth grade continues to have the highest GPA in eighth and/or eleventh grade as well.

Once all of the data was collected, a one-way between-groups Analysis of Variance (ANOVA) will be conducted to evaluate gender differences in regard to academic achievement. The first Independent Variable, gender, has two levels (male and female), and the second independent variable, year in school, has three levels (fifth grade, eighth grade, and eleventh grade). This study serves to explore two main effects and three simple effects. The main effects that will be analyzed are gender (regardless of year in school) on GPA and year in school (regardless of gender) on GPA. This will indicate two things: (1) which gender, as whole over the span of three different school years, has a higher average GPA, and (2) which year in school the students, as a whole, had the highest GPA. The three simple effects that will be considered are gender (male and female) at fifth grade, gender at eighth grade, and gender at eleventh grade. This will

suggest, for each year in school, which gender had a higher average GPA. This is the primary focus of this study.

Summary

In conclusion, the aim of this experiment is to measure students' GPAs in relation to gender and year in school to examine possible gender differences in the academic setting. This was accomplished by collecting archival data from researcher Maurice Elias, PhD, who possessed the statistics needed for this study. Gender will be looked at as a whole across all three years in school in relation to GPA and then each year individually. It is anticipated that statistically significant results will be found after running a one-way between-groups analysis of variance, which will support the hypothesis that females are higher academic achievers than their male counterparts. From there, implications and conclusions will be drawn concerning the sample in regard to generalizability.

CHAPTER IV

Results

It was hypothesized that academic achievement differences exist between males and females throughout elementary, middle, and high school. Specifically, females consistently achieve higher academically than their male counterparts throughout their schooling. As predicted, a one-way between groups analysis of variance indicated that there is a significant difference in average GPA scores for males and females in each of the three grades tested (fifth, eighth, and eleventh), $F(5, 295) = 11.09, p < .001$ (see Figure 4.1). A post-hoc Tukey test yielded a significant difference in means between fifth and eleventh grade males, $p < .01$: fifth grade males had a higher average GPA ($M = 3.08, SD = .35$) than eleventh grade males ($M = 2.69, SD = .74$). There was also a significant difference in eighth and eleventh grade males' GPA, $p < .001$: eighth grade males ($M = 3.21, SD = .68$) had higher GPAs than eleventh grade males ($M = 2.69, SD = .74$). No other significant differences were found between grade level and gender. A two-way between groups analysis of variance yielded a significant main effect of gender, $F(1, 298) = 19.63, p < .001$. As predicted, females had a higher average GPA (all three grades combined) than the males ($M = 3.27, SD = .46$). The average female GPA was $M = 3.27, SD = .46$, and the average GPA for males was $M = 2.995, SD = .65$. Furthermore, it is important to note that the power for this main effect was high: 97%. Figure 4.2 displays the average GPA for males and the average GPA for females (in all three grades combined).

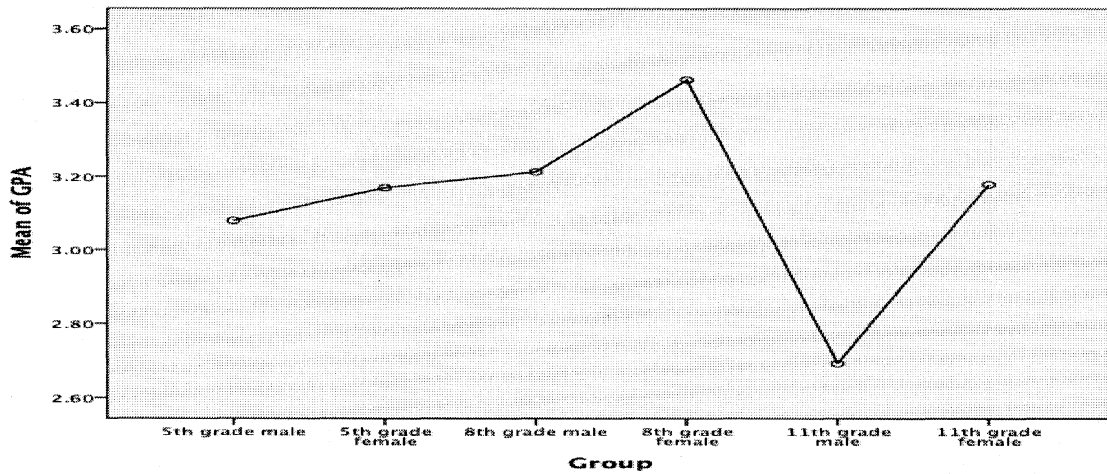


Figure 4.1 Average GPA for each Grade According to Gender.

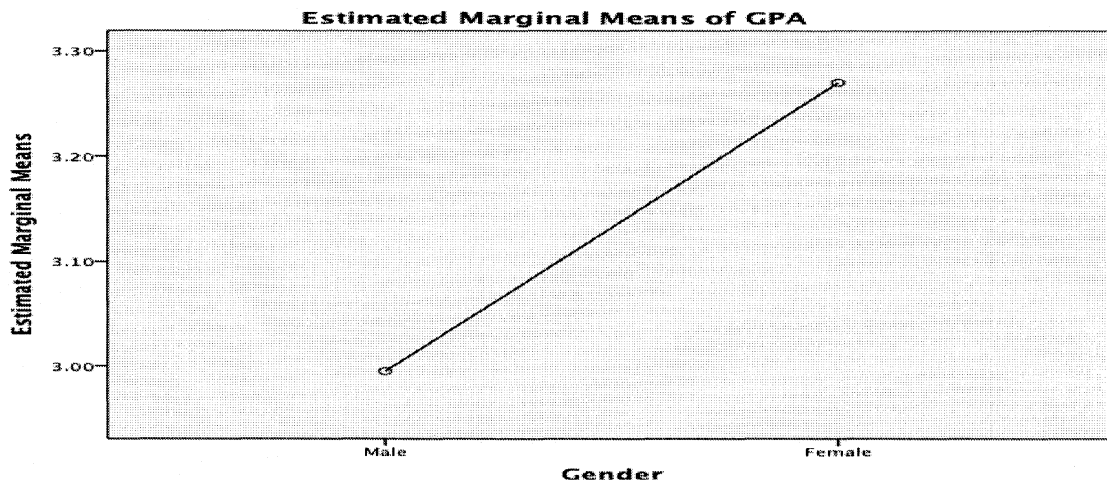


Figure 4.2 Estimated Mean GPA for Males and Females.

There was also a significant main effect of grade, $F(2, 297) = 14.02, p < .001$. Eighth grade students had a higher combined GPA than fifth or eleventh grade students ($M = 3.34, SD = .58$). Although this aspect of achievement was not included in the hypothesis, the significance between means is important to note. A post-hoc Tukey test reported that eighth grade students (males and females) had significantly higher GPAs ($M = 3.34, SD = .58$) than fifth ($M = 3.12, SD = .33$) and eleventh ($M = 2.94, SD = .69$) grade

students (power = 99%). There were no differences between fifth and eleventh grade students' GPAs. This difference can be seen in the graph below:

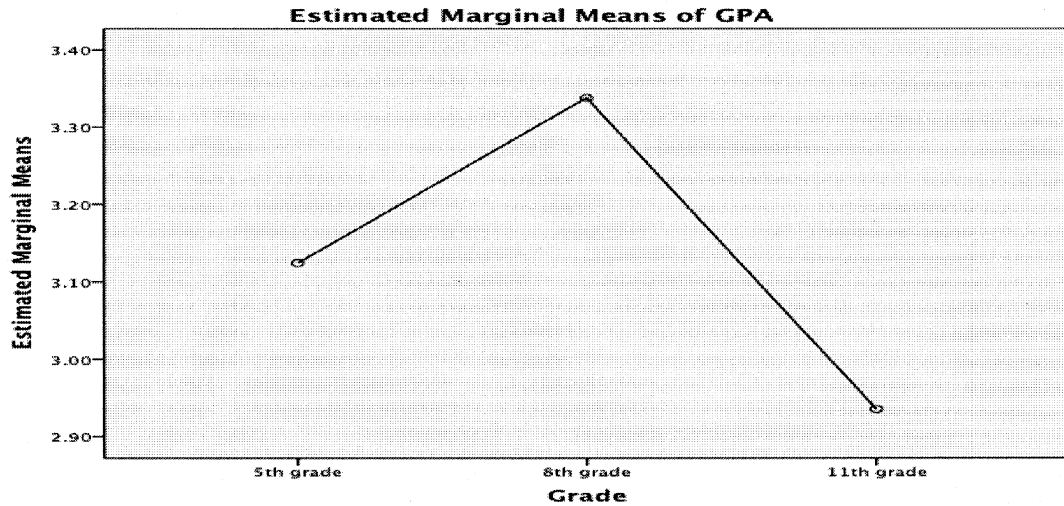


Figure 4.3 Average Mean GPA for Fifth, Eighth, and Eleventh Grade, regardless of Gender.

The following graph shows the estimated means of GPA for males and females in fifth grade, eighth grade, and eleventh grade. For fifth grade females, $M = 3.17$, $SD = .3$. For fifth grade males, $M = 3.08$, $SD = .35$. For eighth grade females, $M = 3.46$, $SD = .44$. For eighth grade males, $M = 3.21$, $SD = .68$. For eleventh grade females, $M = 3.18$, $SD = .55$. For eleventh grade males, $M = 2.69$, $SD = .65$. (All analyses were conducted using SPSS 18.0 for Mac).

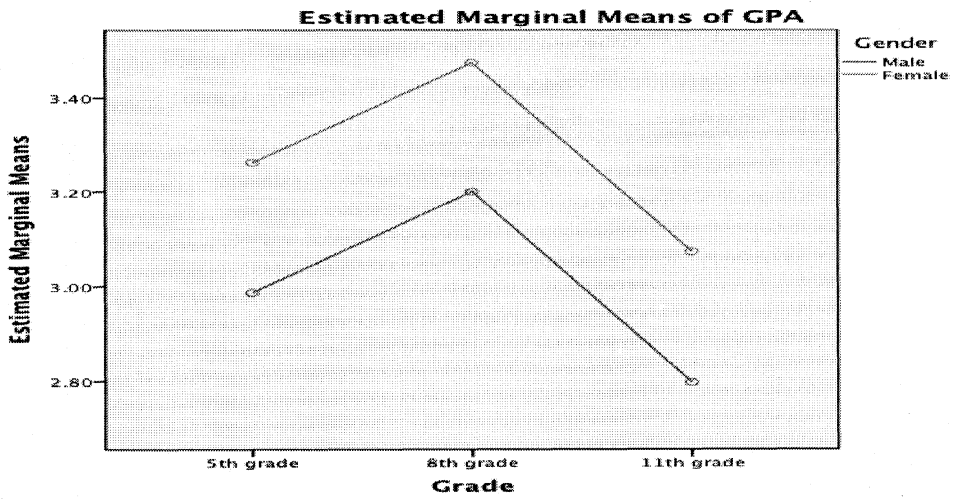


Figure 4.4 Average GPA for Males and Females According to Grade in School.

CHAPTER V

Discussion

Summary

The aim of this study was to explore the possible existence of an academic achievement gap between the genders. Specifically, if an academic achievement gap does exist, which gender does it favor and does the gap remain constant throughout multiple grades in school with regard to gender? This study provides a snapshot of the academic achievement gap in one public school district in a suburban town in New Jersey during the 2005–2006 academic school year. The grades from the four marking periods were converted into numbers in order to generate a GPA for each student. The GPAs were then compared according to gender to assess the achievement gap.

After collapsing the three conditions and comparing all of the females to all of the males in this study, as predicted, females had a statistically significant higher GPA than males. Furthermore, females had a higher average GPA in all three grades tested (fifth, eighth, and eleventh) than males. The results of this study indicate that an academic achievement gap does exist in fifth, eighth, and eleventh grade, supporting the hypothesis that females achieve higher educational attainment than males. As evident by their GPAs, the females in this study significantly surpassed their male counterparts in all three conditions. The statistical significance of these results should raise awareness in regard to educating the genders as two equally capable entities.

Limitations

This study provides a snapshot of one school district at one point in time. The sample size ($n = 300$) was large enough to lend significant power to this particular study; however, the ability to generalize the results to the entire American school system is vague. Therefore, the results cannot be generalized to all students in the United States or other countries with similar systems of education. Another limitation of this study is due to the different grading systems used between the elementary, middle, and high schools. Elementary school students were given letter grades, whereas middle and high school students received numerical grades. Therefore, the comparison between middle and high school students' GPAs was most likely more accurate than the comparison between those students and the elementary school students. Also, the average number of grades each student had varied in the elementary and high school students, yet was consistent in the middle school students: all middle school students had 28 grades from their 2005–2006 school year. The elementary and high school students had varying averages of total grades from all four marking periods of the school year. The degree to which the uneven number of total grades per student hinders the accuracy of the results (within and between the three grade levels measured) is debatable. However, it was interesting to note that the major conclusions of this study reflect that of previous findings. The general finding that females are higher academic achievers – and the existence of an academic achievement gap between the genders – are supported by not only this present study, but by a great deal of past research (as evident in Chapter II of this study).

Conclusions

The results of this study reiterate a gender gap with regard to educational attainment, specifically grade point average. Lower male GPA in fifth, eighth, and eleventh grade indicate that the academic achievement gap persists throughout schooling and is not isolated to one division (i.e., elementary) or another. The goal of this study was not only to explore the gender gap as a whole, but when it was broken down into specific components (elementary school, middle school, and high school). The fact that females had a higher average GPA in all three academic settings measured is not only interesting, but also significant. It suggests that this discrepancy is widespread and can potentially hinder (specifically male) students throughout their entire academic career. Age or grade in school did not seem to be a significant variable in this study in terms of GPA across genders. Grade in school did, however, significantly influence GPA when gender was no longer a variable and the two cohorts were collapsed. Then, eighth grade students surpassed both fifth and eleventh in terms of GPA, both genders combined. Although not the focus of the present study, this study is still worthy of mention and deliberation, and encourages researchers to consider possible influences or factors that contribute to the grade-wise academic achievement gap.

Implications for Further Study

In addition to suggesting the existence of an academic achievement gap, this study has important implications on society, namely education. These results will hopefully lead to an increased awareness in teachers, faculty, and school administration in regard to the achievement gap, and ultimately greater support for students and assistance in reaching their fullest potential. These adults also need to be cognizant of any

unintentional yet biased behavior they display which rewards one gender yet punishes the other, and strive for educational consistency. It is crucial for teachers to recognize gender differences and adjust their teaching style accordingly. This includes (but is not limited to) varying instruction, teaching to variety of learning styles, exploring all possible educational modalities, expanding and modifying curriculum, and increasing motivation.

The implications of this study extend beyond that of the classroom. Parents need to be aware of gender differences and avoid gender stereotyping. The origin of the academic achievement gap goes back to the age old “nature versus nurture” debate – are females higher academic achievers due to innate, biological advantages or are they conditioned via their environment to surpass males in the classroom? Given the fact that past research supports both notions, further investigation is necessary in order to gain a better understanding of achievement discrepancies from a psychoeducational viewpoint. In conclusion, the results of this present study alone warrant further research, testing, and study of the academic achievement gap between the genders.

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