

Assessing the Between Group Differences of White and Minority Male Students
Educated in Single Sex Settings in Student Performance When other Research Based
Indicators of Student Performance are Present.

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Abstract of Dissertation

Assessing the Between Group Differences of White and Minority Male Students Educated in Single Sex Settings in Student Performance When other Research Based Indicators of Student Performance are Present.

This study was conducted in an effort to determine if and to what extent between group differences exist between white and minority male students educated in a Single Sex (SS) environment. SS settings have only recently come back into the discussion as a potential venue for school reform as of 2006 following the reauthorization of No Child Left Behind (NCLB). Prior to this, SS settings were primarily only found in private settings where schools were not subject to public school rules and regulations. The research that exists in regard to SS schools has shown mixed results with the results primarily being null or insignificantly positive.

This study used Structural Equation Modeling to test the hypothesis. Models were created based on research based theory used to create three latent factors made up of 10 observed variables. These latent factors were representative of student and parent level factors around engagement in school and rigorous coursework as these have been shown to have a positive impact on student achievement. The models were not found to fit the data but some individual structural paths were found to have a significant impact on student achievement as well as overall engagement with school. This limits the applicability of these findings to the larger discussion. These relationships differed between races as further discussed with possible reasons why and how future research can further this work.

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Chapter 1: Overview

In the age of No Child Left Behind (NCLB), greater attention is being paid to the topic and value of single sex (SS) education. Accountability has increased for unsuccessful schools (i.e., high dropout rates, low standardized test scores, low graduation rates, frequent behavior problems) and accordingly, people begin to look for alternatives to traditional educational settings. As a practitioner, I have spent extensive amounts of time working with students who attend low performing schools and have witnessed the effect an underperforming school can have on the community both socially and economically. My professional position provides me the ability and power to implement school reform when needed, thereby demanding an in depth knowledge of school reform in order to effectively implement reform when needed.

School reform does not happen without resistance and difficulty; many researchers have investigated factors contributing to successful school reform, as well as the problems encountered during the process of reform. Thornburg & Mungai (2011) found several common themes when researching schools undergoing various types of reform in New York City. They found that teachers needed consistent leadership, more time to implement the reform initiatives, and an effective method to balance accountability and time to meet student needs. In addition to these factors, Datnow, Borman, Stringfield, Overman, & Castellano (2003) found educational reforms were for the most part successful; however, teachers' beliefs about student ability and demographics served as barriers to fully successful implementation of reform efforts. There are many different types of Comprehensive School Reform (CSR) reform efforts, e.g. small school reform efforts, individual campus reform efforts, and SS. The intent of

these reform efforts is to increase student achievement. For the purposes of this study, SS reform efforts are the focus.

Currently, a majority of public education takes place in a coeducational (CE) setting with most SS education occurring in large school districts on a limited basis or within private educational and charter school settings (Bigler & Signorella, 2011). With few exceptions, the United States Constitution and federal law generally limits education of separate genders in segregated classrooms. Several public schools systems have implemented optional SS classrooms and students and their families must choose to enroll in such settings. For example, South Carolina currently has a state wide initiative that provides parents the option to enroll their child in SS classroom settings or schools.¹ Similarly, Maryland has optional SS settings in their public schools. Maryland issued a report in 2007 investigating the results of a task force's findings related to the educational success of African American males. The report contained many recommendations, including the establishment of SS classrooms in schools with an African American majority student body, as their research found enough support for SS settings on academic outcomes. School districts in Pittsburgh, Pennsylvania and Vermilion Parish, Louisiana,² started similar reform initiatives, but have since abandoned them as a result of legal pressure. Similarly, some SS schools located in poor urban and rural areas have had to revert back to coeducational schooling to stay open (Younger & Warrington, 2006). Such reversal in school type and structure are largely due to economic reasons.

¹ <http://ed.sc.gov/agency/se/School-Transformation/SingleGenderInitiatives.cfm>.

² <http://www.aclupa.org/pressroom/pittsburghpublicschoolsagr.htm>

In spite of the challenges faced by specific school districts, the interest in pursuing SS educational settings continues to grow as there is a base of research supporting students being educated separately by gender under certain contexts. For example, Kessels and Hannover (2008) found that boys performed better when educated in subjects perceived as feminine (i.e., English and Language Arts), and girls performed better in subjects perceived as masculine (i.e., Science and Math) in a SS environment. In another study of SS schools, Spielhofer, Benton, and Schagen, (2004) found similar effects for girls. Although extant research has shown a positive correlation between SS settings and better achievement, critics have claimed that these settings perpetuate gender stereotypes and poorly prepare students to deal with social situations with the opposite sex after high school is over (Carlile, 2009; Thompson & Austin, 2010).

Educational researchers investigating the impact of SS schools and classrooms on academic achievement and socio-emotional development has found a mix of positive and negative results (U. S. Department of Education, [DOE] 2005). Although the research on SS schools and classrooms is largely inconclusive, our understanding is also limited by the disproportionate focus on use of SS education in private, predominantly white institutions (Billger, 2009; Marsh, 1989; Marsh, 1991). Research studies conducted in SS settings that are urban or largely African American do not always portray an accurate representation of the value of SS schools (Lake, 2008; Ravitch, 2010). The publicity surrounding schools such as Urban Prep of Chicago³ or Eagle Academy of New York⁴ highlighted African American and Latino students achieving academic success in a SS

³ <http://www.urbanprep.org/>

⁴ <http://www.eagleny.org/>

school context. The characterization and criticism surrounding such schools is defined by the use of strict behavior guidelines, entry requirements or other mitigating factors that weed out lower performing students, thus leaving the motivated and typically higher achieving students. In spite of such criticism, positive outcomes have been observed in contrast to research finding that minority males have a lower academic self-concept and achievement levels than their white or Asian-American counterparts (Lundy, 2003). This limited supply of research on the efficacy of SS settings as an avenue for school reform, particularly for serving minority boys, leaves a gap needing to be filled by more research.

School reform initiatives are not the only key to student success. Researchers have also studied factors specific to student and parent engagement and participation in school, as well as identified several indicators associated with student achievement. These factors include, but are not limited to, high levels of parent involvement (Addi-Raccah & Arviv Elyashiv, 2006; Hayes, 2011), involvement in extra-curricular activities (Camp, 1990; Shulruf, 2010; Thomson, 2005), and the presence of multiple factors predictive of increased academic ability (i.e., amount of exposure to higher-level courses) (ACT, 2009; ACT, 2010; Parke & Keener, 2011). Although we know that these factors uniquely contribute to student achievement, the collective impact of these factors when considered relative to different school settings (SS v. CE) has not been extensively researched. These factors have also not been extensively researched in consideration of their impact respective to their gender and racial implications. Accordingly, the purpose of this study is to explore the relation between parent and student-centered variables and academic achievement, and the moderating effect of SS school settings. An exploration of these relationships will contribute to a better understanding of the impact of these

factors within the context of a specific population of students and reform effort; namely, minority male students enrolled in single gender classrooms and school settings.

Minority Male Achievement

Research has shown that minority males have traditionally performed lower academically than students of other races and genders (Gordon, Iwamoto, Ward, Potts, & Boyd, 2009; Matthews, 2014; Roach, 2006; Toldson, 2008). Minority male academic achievement is not determined solely by race or gender; research has shown that many factors contribute to students' levels of achievement. All students' development of self-concept and understanding of who they are and who they are supposed to be are largely determined by their high school experience. Rosenbloom & Way, (2004) conducted a study investigating experiences of discrimination among different ethnicities at an urban high school and found the most damaging type of discrimination is perpetuated by adults. African-American students in the study experienced stereotypes harbored by teachers of a preference for Asian American students. This in turn led to lower expectations for the African American students and the African American students' resentment towards Asian American students. African-American students and Latino students perceived that many of their teachers did not care and just passed them through, ultimately leading to a poor grasp of subject material, poor standardized test performance and lower all around academic performance (Rosenbloom & Way; 2004). Pollard (1993) found similar results; specifically, she found psychological variables associated with academic success are the same for both African American and white students. However, the African American boys reported less academic support than the girls. These are just a few examples of the difficulties minority students face while in high school.

Researchers have found that African-American females perform better than African American males especially when transitioning to high school (e.g., Roderick, 2003). Roderick (2003) reported twice the number of females graduated compared to males. The four year graduation rate for African American males is less than 50% compared to their white male counterparts whose graduation rate is closer to 75% (Toldson, 2008). The Roderick study, as well as Tatum's study (2004), further supports the strong tie that perceptions of school, expectations of teachers, and peer relationships have on academic achievement. The measure of happiness about a student's life is the strongest predictor for academic achievement according to Toldson (2008). Research exists on all aspects of the minority high school experience, both male and female. While a substantial portion of research shows the plight and underachievement of minority males, there is research that shows positive trends and successful experiences as well (Archer-Banks & Behar-Horenstein, 2012; Cooper, 1996; Roach, 2001; Strayhorn, 2010; Tucker, Dixon, & Griddine, 2010).

Several researchers have found that SS settings can be beneficial for minority males (e.g., James, 2010; Singh, Vaught, & Mitchell, 1998). The research has been conducted in a variety of settings including middle school, high school and post-secondary settings. Gomez, Munte, & Sorde (2014) analyzed case studies to determine the impact of minority male community members in elementary school and found that negative cultural stereotypes decreased and the learning environment was safer as a result. The state of Maryland developed a task force to study and make recommendations for African American males in the state. The task force issued a report (2007) that contained support and recommendations for SS options to be available for African

American males. The report suggested that SS options be provided for African American males who had demonstrated academic difficulty, attendance problems, etc. Other researchers have found positive results supporting the task force's recommendations. Gordon, et al. (2009) conducted a study of a reform effort that focused on all male instruction, pro-social modeling, and cultural pride. The African American all-male group outperformed the control group in the traditional CE setting in the urban middle school where the reform effort was implemented.

This study will further explore the minority male high school experience and contribute to an understanding of the effect of SS on the schooling experiences and academic outcomes of minority male students. Significant research exists on the African American male high school experience and although unique, this study will focus on minority males as a collective (specifically, African American, Latino, and Asian).

Statement of the Problem

The problem exists in that while educators, policy makers, and families are constantly searching for effective methods of education, the SS reform effort has not been sufficiently researched to gain widespread credibility; particularly in public school. Additional research has to be conducted to accurately determine if SS education is a potential avenue for success for all students, not just minority males. This study will investigate a two-fold problem: (a) the research concerning SS environments and their efficacy or lack thereof is limited and inconclusive, and (b) minority males (namely, African American, Latino/Hispanic, and South Asian) have traditionally underachieved academically (Gordon, Iwamoto, Ward, Potts & Boyd, 2009; Matthews, 2014; Pollard, 1993; Roach, 2001; Toldson, 2008).

Our understanding of the value of SS in public schools is limited. Much of the research has been conducted on SS has occurred in private school settings (U.S. DOE, 2005). Less research on SS environments has emerged from public settings due to constitutional and federal statutory constraints on its use. The 14th Amendment to the U.S. Constitution mandates equal protection for sexes to eliminate any bias for one sex or the other. Absent a substantial government interest by means that are substantially related to that interest, The Equal Protection Clause and Title IX of the Educational Amendments Act of 1972 prohibits exclusion or discrimination based on sex. This makes it much more difficult for SS schools or classrooms to exist in public schools without violating this Act. Absent receipt of federal funding tying them to Title IX, religious and private schools are not required to comply with the equal protection clause or Title IX. As such, they may implement SS classrooms without legal concern. Researchers must explore implementation of SS classrooms in public school settings more extensively in order to accurately determine its efficacy for improving student achievement. Analyzing the relationship between parent involvement, student course enrollment, and extra-curricular activity involvement might help to better understanding the plausible differential effect of SS settings on student achievement. Without more research being conducted to lend credibility to this trend, it may never gain the legislative and empirical value it needs to be properly implemented.

Effect of single sex schools on achievement. A gap in the literature exists in several places, but one that is particularly lacking is the impact of SS setting on the academic achievement and social emotional development of minority male students when other research-based factors indicating increased student achievement are present. Further

investigation, when accounting for several pre-existing conditions of student success, may account for the selection effect that has contributed to the lack of generalizability of earlier studies. The use of more sophisticated means of analyzing data is also an area that could use further exploration. Many studies conducted on SS environments have been qualitative, and those that are quantitative in design are mostly limited in their analytic approach (U. S. DOE, 2005). According to the U.S. DOE report (2005), overall, the studies analyzed in the report lacked quality (few randomized experiments or correlational studies using appropriate controls). The number of studies reporting descriptive statistics or effect sizes was limited as well. More importantly, “few studies address important moderators, that is, variables that may have differential effects for single-sex schooling” (U.S. DOE, 2005, p. xvii-xviii). The proposed study will use SS to compare between racial groups when controlling for other variables reflective of higher student academic achievement.

Purpose of the Study

This study is being conducted to determine what, if any, benefit SS schooling has on male students’ academic achievement when other indicators affecting academic achievement are considered and further analyzing for between group differences for white and minority males. This study will add to the research that currently exists and provide additional insight on factors to be utilized when considering a SS school/classroom. The aim is to add controls not extensively studied previously to build on the results of studies that have been done in this area. The proposed study seeks to inform our understanding of the effect SS settings have on the relationship between

school- and parent-level factors and academic achievement for males attending public schools.

Research Questions

Research based factors that positively impact student achievement include student's participation in extra-curricular activities (Camp, 1990; Shulruf, 2010; Thomson, 2005), parent involvement in their children's schooling (Addi-Raccah & Arviv Elyashiv, 2006; Hayes, 2011), and the amount of exposure students have to higher-level classes (ACT, 2009; ACT, 2010; Parke & Keener, 2011). There are many other factors that contribute to increased student achievement; however, for the purposes of this study, the three formerly stated factors will determine their collective impact on student achievement. Once this relationship is established, the students who had attended SS schools will be compared amongst each other to determine the between group differences based on race. It is my hypothesis that when statistically controlling for family and school level factors and investigating between group differences, commensurate increases in academic achievement will be found when comparing white and minority males. This study is being conducted to investigate the following questions regarding student achievement, in conjunction with the setting in which students are educated:

- What is the effect of participation in extra-curricular activities, parent involvement, and enrollment in high-level classes on male academic achievement in a single-sex environment?
- What are the between group differences in academic achievement when comparing white male and minority male students educated in SS environments?

Statement of Significance

This study will examine the between group differences for white and minority males when controlling for family and school level indicators of academic achievement and school type. The passage of NCLB has allowed school districts more autonomy and variety in determining how to set up the options for academic environments for students in their public school districts as long as substantially equal opportunities were provided for the other sex. It is imperative that research continues to be conducted to investigate the efficacy of SS and other reform efforts in order to determine their impact and to consider the appropriateness of implementation for different groups of students. In an overview of school reform, Elmore (2004) wrote that school reform has typically little regard for efficacy and more attention paid to the latest trend. This underscores the need for more empirical research; research to be shared with stakeholders involved in school reform to ultimately impact student achievement.

States in the U.S. have constitutional mandates to educate all students of school age and all students of age are compelled to attend because of compulsory attendance laws. This makes it necessary to account for the different types of students that are educated by the system when making comparisons with research using American students. Not all students have the same ability or opportunities. Students come from a variety of backgrounds, ethnicities, races, socioeconomic statuses etc., reform efforts are not all encompassing and may not cater to the needs of all students (Elmore, 2004). In order for student needs to be met, appropriate reform efforts need to be implemented that take into consideration the makeup of the student population.

Traditionally, minority male students have not academically achieved commensurate with their counterparts of other races, particularly white and Asian (Pollard, 1993; Roderick, 2003; Toldson, 2008). There are many different factors contributing to this gap, such as expectations, stereotypes, socioeconomic status, etc. Minority males are more likely to be expelled or suspended from school and there has been a decline in African American male college enrollment since 1977 (Noguera, 2008; Watt, 2006). This study will analyze the differences in achievement between white and minority males when educated in a non-traditional setting (SS) and isolate the impact or lack thereof on minority males, thus providing a more accurate representation of a potential reform effort to benefit minority males. In order to provide an equal education for all students, appropriate reform efforts must be implemented to reverse this trend of underachievement.

Theoretical Context

A substantial portion of the settings where research has been conducted (i.e. private, elite, non-diverse) creates a gap in theoretical frameworks. The similar settings only allow for a few different types of theoretical frameworks to be applied. Feminist, Marxist, and other gender specific frameworks are just a few of the ones that can be used. If the studies completed had a more diverse base of participants for comparison, critical race theory (Gillborn, 2006), goal theory (Mansfield, 2010), and social structure theory (Risman, 2004), could be applied as theoretical frameworks. The value in looking at this information from different theoretical frameworks is that the researcher is able to use different lenses to analyze the data being presented, thus providing a conclusion that is more applicable across situations.

Critical race theorists contend that race not class or socioeconomic status is the primary method of oppression and dominance by a white society. This is not the only premise on which critical race theory was developed and is not a comprehensive explanation of it but it is a key contention to understand (Hill, 2009). In order to provide a viable academic venue for students of color, it is important to use such a lens to better understand the experience of the student. In the analysis of the student of colors' experience in education, critical race theory is often cited. For example, Aleman (2006) uses critical race theory to analyze inequality in school funding. He claims "school funding structures have been used to marginalize children of color" (Aleman, 2006, p.116).

Other studies have also explored African American students' experience of school. In a study of the independent school setting, Day-Vines, Patton, & Baytops found "[m]iddle-class African American students, in particular attend independent schools instead of public schools as a means of gaining upward mobility," (as cited in DeCuir-Gunby, 2007, p.26). In accordance with this line of thinking, it is necessary to see if there are other outlets for students of any color to achieve a more equitable education. It has been presented that SS schools can provide this for all students, in particular if set up properly can help students with their understanding of their own masculine or feminine identity (Marsh, 1989), this would be a potential secondary benefit not expressly explored in this study.

Social capital theory is another lens important to utilize in this discussion, Lin, (2001) states that, the idea behind social capital is an investment in people in hopes for returns in the marketplace. Traditionally African American, Hispanic, and Native

American students have been found to be underperforming in U.S. public school systems (Pollard, 1993). Research conducted by Pollard among others has found that the experience of these groups of students in school is a more positive one when success is achieved. This success is usually accompanied by high expectations, respect for cultural norms, and exposure to rigorous academic coursework. This begs the question of how to more effectively educate these students. The numbers of students other than white males is not decreasing anytime soon, so as a society it is imperative that we develop more effective ways of educating them. According to social capital theory, a failure to invest in these members of our population will ultimately have a negative impact socially, economically, and culturally (Helliwell & Putnam, 2007; Lin, 2001). It is unethical to continue to educate these groups in an ineffective manner.

The combination of a critical race theory and social capital theory will be used to help frame the study and in an effort to truly understand the minority school experience and attempt to determine if a SS environment can be beneficial to the students and how. The use of these theories allows for the inequity experienced by minority students to be highlighted and hopefully explore a way for the mitigation of these experiences by the utilization of the SS environment. The combination of an understanding of the minority high school experience along with the philosophical foundations for inherent racism, as well as how investment in people can produce positive results will lead to an outcome that can produce better educational environments for not only minority male students but for all students in general.

Summary of the Methodology

This quantitative study was conducted utilizing data from the Education Longitudinal Study (ELS) 2002/06, and subsequent follow ups, in an effort to determine the relationship between the dependent variable, academic achievement of minority males, and the independent variables (a) participation in extracurricular activity and to what extent, (b) level of parent involvement in students education, and (c) level of exposure to higher-level coursework, as well as the between group difference (race/ethnicity) within the SS environment. Structural Equation Modeling (SEM) was used to create and test to determine whether or not a causal relationship existed between the dependent and independent variables and to what extent. ELS 2002/06 is a nationally representative data set that was intended to monitor students as they progress through high school and follow them after high school as they went either to college/post-secondary education or the world of work. The participants were interviewed repeatedly over time; however, for the purpose of the proposed study cross-sectional data was used in the subsequent analyses.

Delimitations

This study was delimited to a sample from a database (ELS 2002) that was constructed from a nationwide study investigating many different aspects of education with feedback from students, educators, and administrators. The data from the ELS 2002 study were pared down based on their alignment with the factors being used for the purposes of this study. This study was conducted to investigate the impact of a SS setting on minority males when other indicators (as mentioned previously) of academic achievement are present. This study recognized the importance of other factors such as

post-secondary achievement and socio-emotional development in regards to SS but did not investigate them as they fall outside of the scope of this study, data collected in the original data set was not sufficient to create variables for these factors. This study is also delimited in that it is focusing specifically on minority males and the SS reform effort and its implications. SS reform efforts have impacts on students of all races and demographics, for the purposes of this study, the comparison will be made between white males and minority male's academic achievement.

The post-secondary aspect or result of SS schooling also has had a limited amount of research conducted. The scope of this study does not address the post-secondary implications but that is not to discount their value. It is important to maintain follow up and longitudinal studies into SS education because ones' education does not stop at high school graduation. Learning continues into post-secondary education as well as the work force, further emphasizing the need for a focus on the long term effects of such an education (SS).

Limitations

This study is limited in that it is using a secondary data set not designed specifically for this study. The secondary data set was chosen for its representative sampling of students and the large number of variables available to create latent factors for the study. The researcher is limited in the ability to design a model by the intentions of the original researchers design. The design of the latent factors could have been constructed using other variables as well. The researcher chose the observed variables based on the scope of the study but that does not preclude the possibility of other observed variables making up similar latent factors, possibly leading to different results.

Definition of Key Terms

Single sex – For the purposes of this study, either a classroom or an entire school campus consisting of only one gender.

Minority – For the purposes of this study, any student who identified themselves as Amer. Indian/Alaska Native, non-Hispanic; Asian, Hawaii/Pac. Islander, non-Hispanic; Black or African-American, non-Hispanic; Hispanic, no race specified; Hispanic, race specified; More than one race, non-Hispanic. (ELS 2002/06)

Higher-level coursework – For the purposes of this study, students who have completed at least a year of Biology, Calculus, or Chemistry.

Summary

In summation, the purpose of this study is to explore the relationship between parent and student level variables and their impact on student achievement. Further, this study will investigate between group differences between white and minority males educated in SS environments. This study is theoretically based on critical race theory and social capital theory and was developed viewing the issue through these lenses. The following chapter provides more in depth context, by way of a critical literature review, to the overarching concepts and themes presented in Chapter 1.

Chapter 2: Literature Review

Overview

The current existing body of research on single sex (SS) reform efforts and their efficacy has found largely inconclusive results. Researchers have found positive, negative, and inconclusive results regarding SS reform efforts and their impact on academic achievement. This chapter will serve as an in-depth exploration of the different components that make up this study. The chapter will be organized by first looking at the legal implications involved when considering SS schooling, followed by a section on different types of school reform, followed by a section specific to SS reform. The section on SS reform will encompass issues of efficacy, gender learning differences, and the psycho-social implications of SS environments. The next section will look specifically at the minority high school experience, focusing on the male experience, followed by a section investigating factors related to academic achievement and concluding with the conceptual framework used for this study.

The research reviewed in this study was primarily obtained using several online databases including the Education Research Information Clearinghouse (ERIC), Academic Search Complete, JSTOR, ProQuest Research Library Plus, SAGE Publications, and The George Washington University library. Fairfax County Public School research librarians also gathered some studies. Professional books from the fields of education, social science, business, and leadership were also used. The primary terms used when searching to develop this base of literature were “single sex”, “African American”, “minority”, “student achievement”, and “school reform”. Other terms used were “African American high school experience”, “minority male high school

experience”, “academic ability”, “critical race theory”, “parent involvement”, “participation in extra-curricular activity”, and “social capital (structure) theory”. Once initial search results returned articles, the articles were further pared down and individual articles were selected based on publication date (1986 to present), relevance to the study, and whether or not they were peer-reviewed.

Single Sex Schools and Legal Implications

Throughout the past thirty years, several different types of legislation have been passed and modified at various legislative levels outlining the foundation for the applicability of SS schools and or settings. Initially the legislation was more restrictive in that it limited the options for creating SS settings out of the fear of gender discrimination. The Equal Protection Clause of the 14th Amendment protects students from discrimination on the basis of sex. Congress furthered protections from discrimination with enactment of its Discrimination Based on Sex or Blindness provisions in the Elementary and Secondary Education Act (ESEA) 20 U.S.C. §§ 1681 – 1688 (hereafter “Title IX”). The U.S. Department of Education promulgated regulations consistent with Title IX to prohibit discrimination on the basis of sex in any education program or activity that receives federal financial assistance, 34 C.F.R. Pt. 106. In more recent years, in response to funding opportunities suggested for use with SS classes in No Child Left Behind [NCLB], 2001, and in response to research finding some positive benefits to SS settings, the U.S. Department of Education promulgated regulations on its determination for the constitutionality of SS classes (34 C.F.R. § 106.34). In order for SS education to take place, the setting must first pass constitutional muster under the promulgations of the 14th Amendment. Further, the setting must also comply with Title IX and the regulations

laid out in 34 C.F.R. § 106.34. The signing of NCLB authorized local education agencies (LEA) to develop SS schools or classrooms provided that, within 120 days of opening, guidelines were issued by the LEA, regarding compliance with law that applies to SS schools/classrooms.

14th Amendment to the U.S. Constitution and the Equal Protection Clause.

Section one of the U. S. Constitution's 14th Amendment provides:

All persons born or naturalized in the United States and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws. (U.S. Const. amend. XIV, § 1.)

The Court's opinion in the case of *Craig v. Boren* held that based on classifications derived from previous cases "classification by gender must serve important governmental objectives and must be substantially related to achievement of these objectives" (*Craig v. Boren*, 429 U.S. 190 (1976)). The Amendment and corresponding clause have been interpreted many times and refined with each new legal case. The most prominent and earliest of these cases was *Brown v. Board of Education* in 1952. In this case, the Supreme Court overturned the "separate but equal" doctrine, established from the *Plessy v. Ferguson* case. The *Brown* case was unique in that it was the first case to interpret that although separate facilities may be equal in quality, the intangible component of being separated from your peers solely because of your race was not equal treatment. This would not be the last time that this Amendment would be used as the reason for a court

case to be brought before the Supreme Court and other courts. With each case, the precedent for interpretation becomes more refined.

The Third Circuit Court of appeals has applied the 14th Amendment to a case involving gender segregation (*Vorchheimer v. Philadelphia*, 532 F2d 880 (3d Cir.1975)). This case was decided without using either the intermediate scrutiny or the strict scrutiny test. In this case, the plaintiff was a female student who wished to attend Central High School in Philadelphia, PA. Central was a high performing academic high school with access restricted to male students. Initially, a district court found that the schools admission policy violated the Equal Protection Clause. The Third Circuit Court reversed this decision, finding that (a) the SS school policy did in fact display a substantial relationship to the school board policy, and (b) the school board offered an equal educational opportunity at the Girls High School (academic high school restricted to females). Although the *Brown* case had previously found separate educational facilities to be inherently unequal, this standard was not applied in this case because gender segregation had not yet been termed a “suspect classification” (Carr, 2007, p.414).

The U.S. Supreme Court considered the 14th Amendment’s application to gender segregation in *Mississippi University for Women v. Hogan*, 458 U.S. 718 (1982). In this case, Hogan accused the Mississippi University for Women of being in violation of the Equal Protection Clause based on the University policy of excluding him from admission solely based on his sex. This case differed from previous cases regarding gender discrimination because the Court relied on the intermediate scrutiny test to determine constitutionality, which requires “that (1) the state must show an ‘exceedingly persuasive justification’ for discriminating based on gender and (2) that the discrimination must

“serve important governmental objectives,” and employ means “substantially related to the achievement of those objectives” (Carr, 2007, p.415). Specifically, the Hogan case is different from previous cases in that it applies a more stringent test to the case but does not address the separate but equal issue argued in earlier cases. There was no equal all male university offering the same program, thus limiting this case’s applicability when discussing the legality of SS classes; however, it introduced a higher level of scrutiny to the interpretation of the clause. Additional cases have been brought before courts addressing separate but equal, which has further contributed to an even greater level of scrutiny of the 14th Amendment and Equal Protection clause.

United States v. Virginia, 518 U.S. 515 (1996) established an even higher level of scrutiny to be applied to the interpretation of this Amendment and clause. In United States v. Virginia, a female high- school student argued that the Virginia Military Institute (VMI) was violating the Equal Protection Clause by having an all-male admissions policy. As with previous cases, Virginia was not able to pass either prong of the intermediate scrutiny test, nor was it able to offer an “exceedingly persuasive justification” for the SS segregation. Virginia even offered a remedy, the Virginia Women’s Institute for Leadership (VWIL). VWIL was found to be inferior to VMI in facilities, faculty, and alumni just to name a few. This decision was met with some controversy, as Chief Justice Rehnquist took issue with the modified interpretation of the scrutiny test. Previously the Court had based the test on whether or not defendants could pass the test based on the relationship their case had to important governmental objectives. In Unites States v. Virginia, the Court found that Virginia could not prove exceedingly persuasive justification for discrimination based solely on gender, hereby

adding an additional way for the test to be interpreted, which Chief Justice Rehnquist felt was closer to strict scrutiny (Carr, 2007). Justice Scalia dissented with the Court's finding. He felt that the Court used the wrong test of scrutiny, i.e. strict instead of intermediate. He felt that strict scrutiny was to be reserved for issues dealing with race or national origin or affecting fundamental rights. Justice Scalia wrote:

Only the amorphous “exceedingly persuasive justification” phrase, and not the standard elaboration of intermediate scrutiny, can be made to yield this conclusion that VMI’s single-sex composition is unconstitutional because there exist several women (or, one would have to conclude under the Court’s reasoning, a single woman) willing and able to undertake VMI’s program. Intermediate scrutiny has never required a least-restrictive-means analysis, but only a “substantial relation” between the classification and the state interests that it serves. (*United States v Virginia et al.*, 1996)

The aforementioned Court cases were instrumental in defining how courts would apply the Equal Protection Clause in cases involving segregation of students based on both sex and race. Courts and federal legislation would make additional modifications over the years to federal and state laws redefining public education from state to state. One such landmark Act was the Elementary and Secondary Education Act, first issued in 1964 and later reauthorized eight times, specifically the 1972 reauthorization including Title IX with regards to sex segregation.

Title IX of the Elementary and Secondary Education Act of 1972. Congress enacted Title IX, 20 U.S.C. §§ 1681 – 1684, in an effort to reach gender equality throughout educational institutions receiving funding from the federal government. The establishment of Title IX took several Presidents and multiple Executive Orders before it was refined and approved by Congress. It started with President Kennedy in 1961 and

ended up being signed into action by President Nixon in 1972. Title IX prohibits discrimination based solely on sex for anyone wishing to participate in or benefit from any education program receiving federal funds, 20 U.S.C. § 1681. It provides: “No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance,” 20 U.S.C. § 1681. The U.S. Department of Education promulgated regulations for the implementation of Title IX, 34 C.F.R. Pt. 106. The DOE’s Office of Civil Rights (OCR) oversees implementation of Title IX and its accompanying regulations. The OCR is the entity with responsibility for the termination of funding for any entity receiving federal funds that is non-compliant with the statutes and regulations.

The Title IX regulations made it illegal to have any type of SS class or school, however, under limited circumstances, it was permissible, e.g. contact sports, classes dealing with sexuality, choruses based on vocal range. In 2002, amidst a renewed interest in school reform, Secretary of Education, Roderick Paige, thought that more flexibility should be given to schools to design reforms including SS (Kiselewich, 2008). In November 2006, the U.S. DOE promulgated revised regulations, allowing new flexibility for schools to establish SS classes or campuses. The reasoning behind this dramatic shift was that when the regulations were issued in 1972, gender discrimination “was ‘widespread’ so at that time limiting single-sex conditions as much as possible was used to limit opportunities for discriminatory practices as much as possible” (Kiselewich, 2008, p. 227). It was also argued that the legislation should reflect changes in the educational landscape which span over 30 years.

No Child Left Behind and relevant case law. The new modifications to the Title IX regulations allowed SS classes to be developed provided they were based on the objectives of improving educational achievement via diverse opportunities, and second that the class meets the specific educational needs of the students involved (34 CFR § 106.34). The classes must be offered to both sexes equally, anything offered to one sex must be offered to the other, this extends beyond academics into extracurricular activities as well. Schools must also continually self-evaluate to ensure that the SS environment is substantially related to the intended objective. Enrollment in any SS class must be completely voluntary and students who choose not to enroll must be offered an equal coeducational class to enroll in (Nondiscrimination on the basis of sex in education programs, 2006). These modifications to the regulation allow for SS classes to be offered in such a way that it is done evenhandedly and with the best intention of the students in mind.

There have been several cases brought before different courts, post-NCLB, regarding SS schools and whether or not they were in violation of the 14th Amendment and the Equal Protection Clause. The findings have been varied, thus further supporting the notion that the Constitutionality of SS schools has not been fully explored nor has the research around the topic created a justification for their existence or extinction.

In 2011, the United States Court of Appeals for the Fifth Circuit heard *Jane Doe v. Vermilion Parish School Board*, 421 F. Appx. 366 (5th Cir. 2011). In this case, Doe claimed that SS classes were taking place in Vermilion in violation of the 14th Amendment among other federal regulations. During the 2009-2010 school year, Doe had two daughters enrolled at Rene A. Rost Middle School in the Vermilion Parish. Both

daughters were enrolled in SS classes at the beginning of the school year; however, in September, the younger daughter was moved into a CE class. In determining whether or not the daughters had standing to file suit, it was determined that the older daughter, Joan, did have standing because she was enrolled for the duration of the school year, but the younger daughter, Jill, did not have suit as she was enrolled in a CE class therefore she was not harmed by the practice of SS taking place. As a result the court held that the case relating to Joan was moot as she had already graduated and thus would not benefit from a favorable ruling. In regards to the Constitutionality of the setting, the court denied the plaintiff's injunction because, although the rationale and research for the SS setting in this particular situation was poor, there was no intentional discrimination. Vermilion was found to be eligible to continue with the SS classes provided they were able to justify them under the 2006 DOE regulations and subsequently the district court must determine if they meet the standards.

The United States District Court for the Southern District of West Virginia heard *Doe v. Wood County Board of Education*, Civ. Action No. 6:12 – cv – 04355 (Aug, 29, 2012). This case took place at Van Devender Middle School (VDMS) in Wood County, W.V. During the 2010-2011 school year, VDMS implemented SS classes for sixth graders in core academic classes. Doe had three daughters in 6th grade during the 2010-2011 school year therefore they attended their core academic classes in a SS setting. The school assigned students to their school of attendance based on where they live. The essential claim in this case was that the classes were not “completely voluntary.” This particular school had sent home Opt-out forms to families requiring the family to request that their child was placed in a CE class. The plaintiffs sought a preliminary injunction

against the school never allowing them to implement SS classes as they felt they would never withstand scrutiny under the Constitution. The court felt this went too far, granting in part and denying in part the plaintiff's injunction. Under the terms of this decision, the school was to cease SS settings for the remainder of the 2012-2013 school year; however, if the school system could design a SS program and implement it within the boundaries of the Constitution and Title IX, it would be permissible.

There have also been cases involving charter schools as the laws and regulations apply to them as well. In May 2014, the United States District Court for the District of Delaware issued an Opinion in *Reach Academy for Boys and Girls, Inc. v. Delaware Department of Education*, 8 F. Supp. 3d 574 (D. Del. 2014). Reach was requesting an injunction so that the defendants would have to renew the school's charter which was set to expire at the end of the 2013-2014 school year. At the time of the case, Reach was the only all-girls public charter school in the state. The state had decided earlier not to renew the charter for the school because of its poor academic performance and the DOE's designation of the school as failing. In addition to the request for a preliminary injunction, the plaintiffs filed suit against the Delaware D.O.E. and then Secretary Mark Murphy. The plaintiffs claimed that:

(1) Deprivation of their constitutional right to equal protection under the Fourteenth Amendment and 42 U.S.C. § 1983; (2) a discrimination action under Title IX of the Educational Amendments of 1972, 20 U.S.C. § 1681; (3) a violation of their right to due process under the Fourteenth Amendment and 42 U.S.C. § 1983; (4) violations of Delaware law relating to 14 Del. C. § 506; and (5) violations of Delaware law relating to 14 Del. C. § 514A. (*Reach Academy for Boys and Girls, Inc. v. Delaware Department of Education*, 2014)

After hearing arguments the court granted the preliminary injunction and granted in part and denied in part the Defendants' Motion to Dismiss (denied claims 3-5). The court found that the Plaintiffs first two claims were plead sufficiently as they stood to gain relief from them, and so those two claims would continue to be heard. The preliminary injunction was granted to the Plaintiffs because the timing of the case without an injunction would preclude the school from recruiting students or staff. The school would have closed, thereby denying current students the option to attend a SS school for girls, while boys would still be provided that opportunity via the state's other all-boy public charter school, Prestige. This would have been a violation under the Equal Protection Act and Title IX. Therefore, the preliminary injunction required the Defendants to renew the charter for one additional year. Within this time frame, Reach would be allowed to continue to operate under conditions to be determined by the Defendants under the law.

The aforementioned cases further illustrate the uncertainty of the constitutionality of SS schools and classes and the ever evolving landscape of SS education. Constitutional Amendments and Congressional Acts continue to be brought before the highest courts in the country in an effort to determine whether or not this is even a legal way to educate students. Legal scholars over the course of the history of American education have debated this topic with opinions falling on both sides of the argument. As the ebb and flow of litigation continues in regards to SS it remains to be determined with finality the constitutionality of SS settings.

Favoring the constitutionality of SS. The constitutionality of SS schools and classes has been called into question many times over the past 40 years, most critically

since Title IX of the ESEA of 1972. In its essence, the Constitution mandates that equal protection is given to all and no rules can be established to maintain a bias over one sex for another (Burgin, 2007). As case law evolved over the years and after the passage of NCLB of 2001 it was determined that SS classes and schools were legal under 20 U.S.C. § 7215 (a) (23) under Local Innovative Education Programs provided they shall be (1) tied to promoting challenging academic achievement standards; (2) used to improve student academic achievement; and (3) part of an overall education reform strategy (20 U.S.C. § 7215 (b) (1-3)). The SS settings as intended were to consider the learning needs of the students involved and are not to reinforce gender stereotypes and to consider the learning of the students in question when being designed.

One legal scholar has argued that “classrooms conforming to the new DOE regulations should be valid because they do not contradict the antisubordination underpinnings of the Constitution or Title IX” (Carr, 2007, p.411). According to Carr (2007), there are four basic characterizations drawn from previous Supreme Court cases that will be brought into play when future cases are brought before the court, (a) the Court will apply a heightened intermediate scrutiny test to programs segregated by gender, (b) “exceedingly persuasive justification” will be required, (c) an antisubordination policy will be enforced, and (d) the *Brown* case is not likely to be considered as long as the facilities, faculty, and resources provided are equal. Lastly, Carr presents several options for possible SS venues, the most likely to be Constitutional being a setting that offers SS classes with equal CE classes offered as well. There are multiple ways to offer SS settings but the comprehensive offering that considers students’ needs and does not reinforce gender stereotypes is most likely to be found to be legal.

The city of Philadelphia has several public SS schools and schools with SS classes offered. Victory schools (a private for profit education management company) operates several public schools in Philadelphia that either are completely SS or offer SS classes (Vanze, 2010). Professional development on teaching methods and student development was given to the staff of these schools prior to their opening and on a continual basis. Vanze (2010) goes on to analyze the constitutionality of the schools with SS offerings in Pennsylvania and comes to similar conclusions as Carr (2007) and Burgin (2007). Vanze states that the SS schools in Pennsylvania would likely pass the question as to whether or not the school is related an important governmental objective as school improvement is a typical agenda item for all levels of government and the reason for the implementation of these schools is to improve achievement. As far as to whether or not the SS setting is substantially related to the government objective, it is not likely that this would succeed as there are other ways of improving student achievement. Ultimately Vanze (2010) finds that the constitutional status of the SS schools in Pennsylvania is unclear. Until research provides a broader base of support for SS schools, it is likely that their status will continue to fluctuate as case law continues to define the topic.

Disfavoring the constitutionality of SS. Legal scholars have also written about the disfavor towards the constitutionality of SS schools and settings. While the fact remains that SS schools can be legally implemented, provided they operate under the confines of the law, scholars continue to debate their appropriateness and how we arrived at our present state. The primary components of the debate over the constitutionality are whether or not SS is a form of segregation and if it reinforces negative sex stereotypes. It is difficult to provide an “exceedingly persuasive” justification for SS when a large

portion of the research is unclear and therefore relies on generalizations about the sexes (Salomone, 2000; Vanze, 2010). Salomone (2000) also brings to light the fact that one of the most difficult aspects of arguing for SS settings is the close relation they have to gender segregation and in turn racial segregation. Racial and gender equality have been historically emotionally charged debates involving the entire country making it an especially sensitive topic.

Williams (2004) has written about the importance to consider the historical components of sex segregation and gender roles when debating SS. According to her, “Single-sex schools helped construct “true” masculinity and femininity as white, while constructing Black masculinity and femininity as deviant” (Williams, 2004, p.78). This is based on the fact that SS was primarily found in private white elite institutions up until NCLB issued the new guidelines allowing for SS to exist in publicly funded schools. Further, many of the more recent SS schools have been established in an effort to turn around poor performing schools frequently found in poor urban areas. This would lead one to believe that by African American students attending SS schools which have traditionally been attend by white students, they are attempting to gain white acceptance (Williams, 2004). This is an important perspective to consider as reinforcing sex and race stereotypes is a large part of the argument against SS. Transgender students must be considered in the debate as well. Turner (2013) wrote about the effect that SS schools would have on transgender students. She wrote that “forcing transgender students to attend classes corresponding to their sex rather than their gender identity discriminates against those students” (Turner, 2013, p. 232). Although SS schooling is considered optional, if a transgender student wishes to attend a SS setting, the environment and its

design would be contradictory to either their gender identity or their biological sex depending on whether they attended an all-male or all-female setting.

The arguments stated here are just some of the considerations that come into play when debating the constitutionality of SS. The history of race and sex segregation, continuation of sex stereotypes, possibilities for improved academic achievement via other reform methods, and the lack of conclusive research are all things that must be considered when attempting to design a SS setting and make sure it is legal. SS education is a possible venue for successful school reform. In this age of accountability, every effort is being made to develop effective schools and develop students capable of producing great things. This is not to say that SS education is the only type of reform that should be studied but just that it may be an effective one. The actual gap exists in that if this body of research is not solidified by quality research studies conducted across a broad spectrum of environments, using sound methodologies, the true potential of this particular reform effort may never be realized.

School Reform

School reform is an ever changing landscape with more attention given and research being conducted in this age of greater accountability. Reform is not limited to schools with predominately minority urban students, as there are low performing majority white rural schools as well. SS reform has been found effective in a variety of settings not limited to minority males. For the purposes of this literature review, several different types of reform will be explored as well in an effort to gain a more comprehensive view of reform.

Comprehensive school reform. Comprehensive school reform (CSR) can be defined as a type of school reform that focuses on reforming the entire school as opposed to several smaller specially designed initiatives (Borman, Hewes, Overman, & Brown, 2003). A few popular examples of CSR are Success for All, High Schools that Work, and Accelerated Schools. Shippen, Houchins, Calhoun, Furlow, & Sartor (2006) compared the effects of two different comprehensive school reform (CSR) models on reading in public middle schools located in urban areas. The effects were measured based on forty-four African American students with disabilities, and who are two or more years below grade level in reading. Sixty-four percent of the participants were male and thirty-six percent female. Of the forty-four participants, twenty-three of them received instruction in the direct instruction (DI) model and the other twenty-one received instruction in the success for all (SFA) model. No significant difference in growth was found as a result of the implementation of either CSR model in the public urban middle schools used in the study. In today's current education arena, NCLB legislation places a heavy burden on standardized testing of students in different subjects, especially reading and math. The study findings having significant implications for administrators, teachers, and students alike in public urban middle schools who have a high number of children with or without disabilities performing below grade level. The two methods were not effective, which may be due to the short period of time they were in place. Further, Shippen et al (2006) report the assessment needed to be modified to accurately assess progress. There are many different types of reading instruction programs available to schools and it's just a matter of finding the one that fits the school's needs.

The validity of this study can be strengthened in future research by testing more students from a number of schools, forty-four students from two different middle schools with a combined enrollment of 1350 students is not very representative of a large urban district. The sample was also very biased; the numbers were approximately two thirds male and one hundred percent African American. A diversified sample with people of different races and not so much male biased would have produced a more valid sample. Research has not only been done in urban schools but also in schools where there is a very diverse culture to look for commonalities.

Datnow, Borman, Stringfield, Overman, & Castellano (2009) conducted a four-year case study investigating how comprehensive school reform (CSR) was implemented in thirteen elementary schools with culturally and linguistically diverse backgrounds. School involvement (the level at which the school body implemented the principles of the reform) in the CSR was labeled as low, medium, or high. Many of the schools who were noted as having low to moderate participation dropped the reform entirely at some point in the study. Schools with high percentages of Limited English Proficient students, low income students and a high percentage of minority students all dropped the programs at roughly the same rate. Some of the schools involved in the study maintained a moderate or high level of implementation of the reform. It was determined based on the data that the schools where the reforms were sustained stayed that way because of continuity of leadership, commitment to the reform and the culture of the school. At the end of the study only five of the initial thirteen schools were maintaining the CSR reforms (Datnow et al., 2003).

Significant test score improvements were noted for the schools who had utilized Success for All, Core Knowledge, or the Comer School Development Program. These results are aligned with the results of the levels of implementation among schools. The schools that maintained moderate to high levels of implementation for two or more years had been using one of these three types of CSR. The combination of the two resulted in statistically significant differences in test scores.

The results of the testing showed that the schools where CSR was in place scored slightly higher than that of their control group counterparts. “The findings of this study reveal that implementing CSR models in multilingual, multicultural school contexts can be both a rewarding and challenging enterprise” (Datnow et al., 2003, 162). Success for All was the only program that provided guidance to implementing the program for ELL/LEP students. The rest of the CSR reforms had to be adapted by the staff using them. The reforms showed that if an educator had some sort of multicultural goals these programs could help them meet those goals. This study and Shippen et al. (2006) haven’t touched the subject of reform at the high school level.

Little (2002), completed a two year qualitative study of math and English from urban high schools to determine how teacher community is used as a resource for teacher development and school reform. The researcher conducted a multi-level case study focused on conditions of teacher learning and commitment of teachers of math and English in two separate urban public high schools. The researchers posit that in order for whole school reform to be successful they must embrace PLC and continue to focus on whole school staff development. In contrast, however, Little (2002) posits it is not feasible to expect success when focusing on both teacher development in regard to

reform and subject-matter discipline. Overall, the researcher determined that abandoning departments or failing to maintain their upkeep will result in a problematic approach to school reform. Future studies might add to the discourse in an examination of successfully implemented whole school reforms initiatives; looking for commonalities between the schools to determine what characteristics are essential to successful whole school reform. For example, the Kahne, Spote, Torre, and Easton (2008), case study of one school district.

Kahne, et al. (2008), completed a case study researching the impact of four years of small school reform in a large urban city. The sample only consisted of schools that had been converted from a large local school into several small autonomous schools. Kahne et al. (2008) found teachers at schools where school reform has taken place, report their schools to be much more desirable to teach in as opposed to other schools in the same school system that have not undergone small school reform. They discovered teachers in the reformed schools do not participate in any more professional development than teachers in non-reform schools, thus instructional practice was not significantly impacted. Further, there was no significant difference in student achievement measured during the eleventh grade, by school reform; nonetheless the schools were more desirable to teach in according to the teachers surveyed.

Freshman year focused reform. Another important area for reform is the idea of the freshman year. Freshman year is one of the most critical years for students. The highest percentage of dropouts occurs freshman year; nearly one third of the students who fail ninth grade for the first time, never make it to tenth grade (Patterson, Belyukova, Berman, & Francis, 2007). Patterson et al. (2007) conducted a mixed-

methods study to look at the initial steps taken by an urban high school in Ohio to address the high level of failures among freshman. Specifically, they conducted a case study of a group of fifty incoming freshman randomly selected to take part in a pilot Freshman Academy program. The researchers found students in the academy had improved not only their attendance but also their attitude towards school. Consistent with existing research, the study found positive relationships to be the first step in making a school successful. For example, Ochoa, Lopez, and Emler's (2007) study reinforced the importance of relationships between teachers, parents and students. Across nearly every category analyzed to determine the relationship between violent behavior in school and the quality of interactions and relationships in school and at home, a significant correlation was found linking positive behavior with positive relationships for the students in the study.

The Ochoa et al. and Patterson et al. studies provide a good foundation for future studies focused on the freshman year, especially with the increased interest in Freshman Academies and other similar projects aimed at reducing the dropout and failure rate. The success of such academies is spurring new research. However, more studies focusing on different types of academies would also be valuable in identifying the common characteristics of successful freshman programs. Aside from reform studies already discussed, some have looked at other areas such as the professional development of teachers and its impact on student achievement. Professional development is an important component of school reform. Teachers need to be properly trained on how to implement reform in order for the desired outcomes to be achieved (Fischer & Hamer, 2010; Lewis, 2002).

Professional development. Shulman & Armitage (2005) completed a five-year case study of a two part project designed to improve the achievement of students in urban middle schools in New York, NY. The first part of the project was focused on the professional development of their teachers. The second part of the project was the implementation of college students to function in the school as tutors or “teaching scholars” (Shulman & Armitage, 2005). The tutors worked in the classroom about fifteen hours a week doing a variety of activities supporting the teachers.

The researchers identified a series of outcomes based on the implementation of the project. First, school attendance started to improve. Second, between the years 1999 to 2003, students’ scores on standardized tests and grades improved. Teachers involved in the project reported being more energized about teaching and felt the project was effective. Through an analysis of the interviews, it was noticed that teachers’ expectations of students steadily increased as the project continued.

Professional development is instrumental in any type of successful school reform; SS reform is no exception to this. Wills, Kilpatrick & Hutton (2006) conducted a case study in an effort to investigate the school community’s perception of the SS classes within the CE school. Findings from this study reflected generally positive results in terms of community perceptions of academic achievement levels and student behavior. The researchers concluded that these results were due to teachers who were committed to the SS model, received adequate professional development and shared their knowledge in the larger faculty community. Spielhagen (2011) found similar results when conducting a mixed-methods study investigating teacher’s perception of middle school SS classes. Similar to Wills et al., Spielhagen found professional development to be a critical

component of SS classes' success. Teachers must also be supportive of the SS method and must be properly trained in order for the reform attempt to be successful.

Single Sex Schooling

This section will look specifically at SS schooling and explore in depth all of the different components of SS reform. As stated earlier in the review, research on the effect of SS schooling on student achievement has remained largely inconclusive. When conducting research on SS, there are many different variables that must be controlled for in order to determine the unique effect of SS schooling. Controls such as (a) prior achievement, (b) motivation, (c) socioeconomic context, (d) age, (e) self-esteem, and many others are essential to understand impact.

Clark (2004) published a polemic article that investigated the impact of SS schooling on the social, spiritual, and moral development of boys and their academic performance. He also focused on the impact of SS schooling on girls' self-esteem and performance. The article was a meta-analysis of current common hypotheses that exist in regards to SS schooling and how research findings reflect on these ideas. Clark found students' background (specifically, academic achievement and parental and sibling input) had a greater impact on performance as opposed to school type (SS vs. CE). This was true regardless of gender (Clark, 2004). However, SS settings were found beneficial to improving girls' self-concept. According to Clark (2004), "girls are more willing to engage in non-gender stereotype subjects in single-sex environments" (p.11); girls in SS settings reported more confidence and willingness to engage in traditional male stereotypic behavior in non-academic activities as well. Further, girls benefited from more time spent productively interacting with the teacher; girls in CE settings reported

lower self-esteem, and as a result lower motivation and productivity in traditional male dominated subjects such as math and science. Such findings are not limited to this article; for example, they are consistent with Sullivan, (2009) and Van de Gaer, Pustjens, Van Damme, & De Munter, (2004). These researchers found that SS schooling had the impact of reducing the gender gap in academic self-concept, i.e. girl's self-concept in masculine subjects increased in SS settings and boy's academic self-concept increased in feminine subjects in SS settings.

Younger and Warrington (2006) conducted a qualitative analysis of SS schooling in the United Kingdom (UK). They analyzed current and historical research on SS schools, undergirding theoretical assumptions, asked questions of students and teachers on their perspectives on SS schooling, and analyzed data relevant to performance in both SS settings and CE settings on standardized testing. Younger and Warrington argued that in order for any of the SS settings to be determined effective a gender relational theoretical framework must be utilized upon implementation. One of the devaluing aspects of the research on SS settings is that many of the studies conducted used SS settings where gender and socialization were not effectively considered in the implementation of the SS settings (e.g. Herr & Arms, 2004) Many SS research studies only looked at the SS implementation process from either the male or the female perspective and did not effectively utilize both (e.g. Younger & Warrington, 2006). The lack of a holistic perspective contributed to the research being skewed. Many studies focus on the fact that SS is being implemented in large part to rectify the under achievement of boys in CE settings (e.g. Gibb, Fergusson, & Horwood, 2008; Hartnell-Young, 2009; Herr & Arms, 2004).

To conduct the research, the researchers conducted three case studies of schools in the UK where SS settings were implemented in CE schools under the umbrella of the Raising Boys Achievement (RBA) Project. The study took place over a three year time period via a questionnaire delivered to a group of 24 boys and 24 girls both of whom were taught in a SS setting. The questionnaire was focused on “students’ perceptions of the learning atmosphere in single-sex classes, on their own behavior and quality of work in these classes, and on their own willingness to participate in such lessons” (Younger & Warrington, 2006, p.586). In addition to the student interviews, the researchers also interviewed eight teachers, three different times and a lead teacher in each setting to determine teacher perceptions on the strengths and weaknesses of the model and the support they received as well as the lead teachers’ rationale for the implementation.

The findings of this study, similar to studies conducted prior (Marsh, 1989; and Spielhofer, Benton, & Schagen, 2004), were deemed inconclusive. The range of responses from the participants involved varied from setting to setting and no conclusive trend or relationship was established. Within each setting, the researchers’ findings differed, as well from class to class, gender to gender, and role to role. The one thing that was established through this study was that in order for SS settings to succeed for both male and female students, the paradigm for implementation must be reflective of the needs and challenges of both genders. One common theme that emerged was the opinion that the boys are harder to teach than the girls. The researchers hypothesized that this could be as a result of a male desire to not be an outcast, thus behaving like the larger group, not wanting to be perceived as weak for acting as teachers would expect. Some participants also said that the SS settings were less beneficial for males because the CE

setting included girls which helped to socialize the boys more. Looking from a larger perspective, the researchers found that in order for SS settings to be successful, the SS setting and framework cannot be isolated to a single classroom. Support must be given from the top down including professional development and ongoing monitoring and evaluation of the program. There are few clear cut results from this research thus opening the door for further research to be conducted to get more specific and valid results thus able to be widely generalized. This article is reflective of the larger discourse and research on SS as a whole; again that reflection being inconclusive. The article was completed effectively using appropriate methods and did ultimately shed some perspective on the importance of establishing an appropriate paradigm prior to implementation.

A common argument in the field is that girls in particular benefit from being educated separately (Spielhofer, Benton, & Schagen, 2004). In an attempt to investigate such a claim, Spielhofer et al. (2004) conducted a study of the impact of SS schooling and school size on student progress using a variety of statistical techniques and found results suggesting that SS classrooms benefit girls in CE schools and conversely boys in selective schools. Similarly, other researchers (e.g., Daly, 1995, 1996; Harker, 2000; Young, 1994) have found that after prior attainment and social background have been accounted for, there is no significant impact from SS education (as reported in Spielhofer et al., 2004, p. 136). While these findings show no significant findings that does not rule out the existence of any impact.

Spielhofer et al., (2004) found results consisting of but were not limited to (a) medium sized schools obtained better results than large or small schools, (b) boys of low

prior attainment performed better than boys of similar attainment levels in CE settings and, and (c) boys in SS grammar settings outperformed boys in CE settings on standardized achievement (Spielhofer, et al. 2004). These results are not unique to this study. Further, other significant control factors must be considered in order to achieve results that are able to explain the variability in the outcomes. The studies discussed here are by no means exhaustive of the SS research conducted but provide insight into the trends and limitations. Additional research is needed to attain an efficient SS reform approach that is able to be applied on a larger scale. Aside from SS situations, there are many other approaches to reform that should be considered when attempting to apply a large reform model in a school system.

Efficacy of single sex settings. In a review of literature, Clark (2004) conducted meta-analyses to investigate the factors that seem to contribute to success in SS settings. Based on his analysis, Clark (2004) found that SS settings do benefit students in settings where they are educated separately in the subjects considered either masculine or feminine. He also found that the background variables that students bring to the setting (e.g., prior achievement, parental involvement) are more impactful than the SS reform effort itself. Clark (2004) is not alone in his findings; Gibb, Fergusson, & Horwood (2008) conducted a longitudinal study from birth to age 25 of 1265 individuals to measure their achievement, the gender gap in student achievement, and also post-secondary education. They chose individuals from both CE and SS settings and tracked them up to age 25 and found similar results. Although their results showed a greater narrowing of the achievement gap for boys, it nonetheless supports the argument for SS.

Marsh (1989) and Gordon et al. (2009) found similar results to Clark (2004) and Gibb et al. (2008) when researching students in the middle years of school. Marsh's research found no significant effect resulting from SS settings on students during the critical times of sophomore through senior year in high school. The measured effects include academic achievement, attitudes concerning academic self-concept, and sex stereotype among others. Nonetheless, no outstanding statistical significances resulted. Gordon et al. however found greater academic achievement as well as academic attachment. Overall, this again reinforces the common theme in SS research of inconclusive findings.

Single Sex & Psycho-Social Implications

Research has also been conducted to examine the impact of SS education on self-esteem, self-identity and other socialization measures outside of academic achievement. This component of SS education is important as it adds to the broader discussion of the value of SS educational settings. These studies have been conducted to either refute or validate the claim that SS schooling causes inappropriate socialization of the students involved. Some have hypothesized that SS education can reinforce sex stereotypes for both males and females (Carlile, 2009). It is hypothesized that this happens due to several reasons. When males are educated without the presence of females, they act in a very gender stereotypic fashion (Carlile, 2009). This could include horseplay, ostracizing of the weaker males, and not wanting to be seen as subservient to the teacher (Younger & Warrington, 2006). It has also been hypothesized that when females are in SS situations they are forced to reexamine their roles as females, and tend to embrace the male

dominated way of society leading to a negative self-concept of being female (Watt, 2006).

The research shows a positive correlation between SS schools and males and females students' self-concept in subjects that are considered more masculine for females and more feminine for males (i.e., Math and Science for females and English for males) (Kessels & Hannover, 2008). The literature and research that exists is far from being considered comprehensive and shows inconclusive results overall. For the purpose of this study, psycho-social implications will not be investigated as they are beyond the scope of the study.

Single Sex Settings and Gender Learning Differences

There is a case to be made for the differences in the learning styles of boys and girls as well. Research has been conducted to discover the differences in the learning styles and to discover the most effective methods of educating the sexes regardless of whether it takes place in a SS or a CE setting. King and Gurian (2006) conducted a study that looked at a public suburban elementary school where there was a significant achievement gap in literacy (13%) between the boys and girls. In response, after some research into learning styles, the school implemented some boy friendly teaching strategies. Strategies such as task oriented instruction, physical involvement and physical changes to the classroom helped to contribute to a 24 percentage point gain for the boys and a 19 percentage point gain for boys and girls combined after just one year of implementation. Research such as Hartnell-Young, (2009), and Bravo, Gilbert, & Kearney, (2003), further support this approach to sex specific teaching strategies. Hartnell-Young found that through the implementation of the Boys Education Lighthouse

Schools (BELS) Project, financial support, and professional development for teachers, gains were experienced by the boys in the schools in the areas of engagement, innovation, shared knowledge and imagination. BELS is a research-based project with professional development designed based on teacher request for teaching tools specific for boys in their respective school. Bravo et al. found interventions developed to address gender stereotypes regarding the use of technology by students were successful in reducing stereotypes and promoting equitable use of technology between genders.

Factors Related to Academic Achievement: School Culture

The impact of culture on the success of a school is an area that has been widely researched in an effort to determine what aspects of culture impact school success and how. Research has shown that there is a connection between school culture, community culture, and academic success (Buxton, 2005; Lynch, Lerner, & Leventhal, 2013). For the purposes of this research study, the relevant literature in this section has been separated into five categories; school culture as it pertains to (a) school policy and governance, (b) behavior and academic achievement, (c) parent involvement, (d) student involvement in extra-curricular activity, (e) and exposure to higher-level courses.

School policy & governance. School/administrative aspects such as the rate of suspension can have a significant impact on the school culture. Schools with low suspension rates have rated their school climate as positive as often as 100% of the time as opposed to schools with high suspension rates where the rating of climate was only 27% positive (Christle, Nelson, & Jolivette, 2004). Other aspects of school culture, such as dress code policies, have increased in frequency and have been found to be a less than effective policy. A study conducted in 2005, showed that from a random selection of

handbooks that were analyzed, 84% were using dress codes as a way to combat violence, up from 41% ten years earlier (Workman & Freeburg, 2005). Despite the increase in use, data has not validated the use of such a policy.

Research has shown the culture of a school to have a large impact on school success. Quinn, Poirier, Faller, Gable, & Tonelson (2006) found schools with positive school culture have several characteristics: (a) rules are equitably enforced, (b) rules are fair, (c) students and staff members are treated with respect, and (d) staff members are flexible. Their study was only reflective of alternative school programs, thus contributing to a limited understanding. Osher & Fleischman (2005) also support similar aspects of positive school culture. They found schools that nurture social emotional skills in students, develop caring connections between teachers and students, and utilize positive behavioral supports are more likely to see positive student behavior and increased academic achievement.

Behavior and attitudes/dispositions. The behavior of students and its relation to the school culture has also been researched and analyzed in a variety of ways. Research has shown that African American and Hispanic students tend to perceive of themselves as being unfairly treated and able to achieve less, as well as suspended at a disproportionately higher rate than Caucasian or Asian American students (Christle, et al, 2004; Lundy, 2003, Ogbu, 2004).

Ogbu and Fordham (1986) have written extensively about the role of race in the academic achievement of minority students. According to Ogbu and Fordham, one major reason for poor academic achievement among minorities is “that they experience inordinate ambivalence and affective dissonance in regard to academic effort and

success” (Ogbu & Fordham, 1986, p.177), i.e. historically they have not been recognized as academically capable and in turn this view has cast doubt on their own perceptions of their abilities and what it meant to be academically successful.

Diamond and Huguley (2014) further explored this topic as it applied to integrated school settings and found that prior educational experiences had a larger impact on student academic success when compared to race and further, academic orientation. Ainsworth-Darnell and Downey (1998) had similar findings; they found certain groups of African-American students were well characterized by Ogbu’s theory, but that these students were often marginalized and more likely to drop out of high school. These students were not reflective of all African-American students. This is not to say that the oppositional culture theory is any less valuable of a tool when studying minority academic achievement, only that there are potentially other more valuable bases for comparison.

Using data obtained from the National Educational Longitudinal Study 1988 (NELS: 88,⁵) Lundy (2003) investigated the impact that race, gender, and oppositional culture theory have on achievement and students social emotional development. Lundy (2003) found Asian-Americans scored highest on standardized tests followed by whites, Hispanics, and African-Americans, respectively. Grade point averages (GPA) also followed the same hierarchy as the standardized test scores. In regards to race and ethnic differences in attitudes and behaviors, the findings are consistent with oppositional culture theory; that is, when a group has a positive attitude about academics they are

⁵ The NELS is a longitudinal study designed basically to track the progress of students as they transition through preK-12 education to ultimately the work force.

more likely to be successful. Overall the study provided support for resistance theory as well; African-American and Hispanic students are more resistant to school than white and Asian-American students, as well as reported lower academic achievement. In regard to gender and racial and ethnic patterns, differences in academic achievement tended to mirror the pattern of effects predicted by the oppositional culture theory, which suggests that certain attitudes and behaviors are inappropriate for minorities because those attitudes and behaviors are reflective of white Americans. Girls rated their academic behaviors and attitudes higher than the boys and their achievement mirrored this rating (Lundy, 2003). Lundy (2003) also looked at comparisons between genders among the different races. He found consistent patterns across races when comparing the variables in the study; differences between genders were the same size as the racial differences, and boys were more resistant to school than girls across races.

Research has also been conducted to analyze other cultural issues such as suspension rates and how they affect the culture of the school, particularly the impact of school administration and students' race and gender on suspension rates. Christle et al. (2004) conducted a study to determine what school level variables are correlated with student suspension. The study focused on a group of 161 middle schools in Kentucky, but only schools that had been grades six through eight for the two years prior to the study. Middle schools were chosen because of their disproportionately higher suspension rates compared to the rest of the state.

Christle et al. (2004) found board violations (e.g. defiance); low socioeconomic status, law violations, retention rate, and dropout rate were all positively correlated with the suspension rate. Schools with these five variables report higher numbers of

suspensions. Gender and age were not significant related to suspension. Christle et al. (2004) also found attendance rate, academic achievement, and the percent of white students in the school were statistically significantly correlated with lower rates of suspension. Further, dropout rate, board violations, percent of students from low socioeconomic backgrounds, and amount of spending per student were statistically significantly higher in those schools with high suspension rates. This comprehensive study also found: (a) administrators at schools with high suspension rates had less experience than their counterparts, (b) administrators in schools with high suspension rates had a desire to reduce the suspensions at their schools, their counterparts did not, (c) all of the administrators at the schools with high suspension rates reported poor family involvement, and (d) administrators at high suspension rate schools expressed a need for more resources.

In summary, the research literature suggest that school culture impacts both student behavior and on the achievement and academic success of schools. The researcher intends to further this base of knowledge with a study of how specific aspects of culture, specifically in regards to settings characterized by gender separation, impact student achievement.

Achievement. Rodriguez (2007) conducted a case study to determine the perceptions of students, parents, and teachers relative to how a culture of success impacts them and the school. The two schools used in this study were urban high schools participating in a multi-high school study examining the relationship among school culture, structure and student achievement. Prior to the implementation of this study, the schools were suffering from poor attendance, low graduation/passing rates, and violence.

One school was structured to resemble thematic small learning communities (SLC); the other school was modeled as a small school aiming for educational excellence.

Rodriguez (2007) found that personalized relationships were the top priority to many underprivileged students and also critical to their success. When students feel as though there is someone in the school that they can count on or turn to, they are better able to focus on academics and remain connected to the school. Just as failure can be created by an environment, a positive environment can promote success among students. In doing so, schools must actively commit to making an effort to improve the culture of a school positively. Research has also been conducted to study culture and its relation to academic achievement in disadvantaged areas. Trends in research show that a positive school culture and positive attitudes about the school and its expectations leads to schools with higher academic achievement (Gaziel, 1997; Pritchard, Morrow, & Marshall, 2005).

Gaziel (1997) investigated the role of culture relative to effectiveness in schools with disadvantaged students. The sample included twenty different schools from developing towns in Israel; five were classified as being effective secondary (ES) and five average secondary schools (AS), five religious (ERS), and five non-religious (ARS) schools. The schools were reported by superintendents in their respective areas as effective or average based on student achievement. The schools culture was defined by student participation in school activities, academic achievement, and general orderliness. Gaziel found a statistical significant difference between ERS and ARS, as well as ES and AS; specifically, 44% of the variance of school effectiveness was explained by school culture. Academic emphasis, continuous school improvement, and a focus on teamwork,

orderliness, and adaptation to customer's demands made up 44% of the variance. These findings further support research that school culture impacts student success.

Other researchers have also investigated the relationship between academic and behavioral factors and school culture. The researchers found additional supporting evidence linking positive school culture and increased academic achievement. (e.g., Lynch, Lerner, & Leventhal, 2013; Shann, 1999; van der Westhuizen, Mosoge, Swanepoel & Coetsee, 2005). Shann (1999) completed a quantitative study to determine the relationship between school culture, academic achievement, and pro-social and antisocial behaviors. Specifically, the study explored students' perception of teacher caring, cooperation among students, and teacher perception of the amount of pro-social versus antisocial behaviors and the implications for achievement. The results of this study showed that these aspects of culture significantly impact achievement positively and the frequency of pro-social behaviors increases versus antisocial behaviors.

The link between academics, behavior, and school culture has been established by many researchers; however, the impact of academic expectations should not be ignored. Using differentiation-polarization theory, Van Houtte (2006) conducted a quantitative study to determine if the school culture and faculty of a vocational/technical school are less academically oriented than schools and faculty in general education setting. The differentiation-polarization theory posits that when students follow a prescribed "track" of studies (e.g. vocational, technical) it results in the development of pro-school and anti-school cultures (Van Houtte, 2006). A statistically significant relationship between school type and study involvement rates was found. The concept of study involvement was defined by student responses to a questionnaire investigating the value students place on

studying, its importance, and how important school is in general. General education schools were noted as having higher study involvement rates than the vocational/technical schools, thus verifying the projection made by the differentiation-polarization theory. The SES (determined by the prestige of the parent's occupation) context of the school was also found to have a direct impact on student achievement regardless of students' sex, ability, or SES background. Further, teacher's belief in their student's ability was significantly higher in general educational schools compared to vocational/technical schools. While there is much research on tracking and academic routing, this study contributes to the understanding of the comparison of general education schools directly with vocational/technical schools and it helps to further the discussion and understanding of the impact of culture on academics.

The effect/impact of behavior, academics, and surrounding community on school culture has been extensively researched. Further, the direction of influence has also been explored. For example, positive culture tends to lead to positive results in pro-social behavior and increased academic achievement (Gaziel, 1997; Rodriguez, 2007; Shann, 1999). These studies as well as others provide a base of information contributing to the push for culture based reform in schools. However, additional research needs to be done using different methodologies to further understand the complex relationship between school culture and academic achievement. SS schooling promotes a different type of school culture as well compared to traditional CE settings. Many SS schools are developed with a gender relational framework in mind. The schools/settings are developed with respect to instructional strategies and cultural aspects that are considered reflective of the intended population.

Parent involvement. There has been a considerable amount of research investigating the impact of different types of parental involvement in their student's education and its impact on academic achievement. Parental involvement has long been idealized as a method to increase student achievement. Parental involvement can take place in many different ways ranging from talking about school at home to volunteering in their child's school. Researchers have found mixed results (primarily positive) when investigating the impact of parent involvement on academic achievement, and the studies have examined all different ages, demographics, and economic status among other variables, as they relate to parent involvement (DePlanty, Coulter-Kern, & Duchane, 2007; Fan & Chen, 2001; Hayes, 2001; Hill, Castellino, Lansford, Nowlin, Dodge, & Bates, et al, 2004; Lee & Bowen, 2006; Lee, Kushner, & Cho, 2007).

Hill et al. (2004) conducted a study looking at several of the aforementioned variables. They found that when educated parents were academically involved in their students schooling, it resulted in fewer behavioral problems and in turn higher academic achievement. However, the results varied when they compared students and parents from different socioeconomic and educational backgrounds. Generally they found positive results, and specifically they found positive results when looking at African American families and the impact of parental involvement on academic achievement.

Lee et al. (2007) investigated the effect of parental involvement in single parent households on academic achievement, and how that relationship was affected by gender. This is an important frame of reference to consider as the number of single parent households continues to rise (Lee, et al., 2007). Almost 1 in 3 African American children live in a single parent home (www.census.gov) as of 2010. They found a difference in the

effect of parental involvement on academic achievement when comparing across genders. The only area where there was a significant impact on student achievement was on daughters living in a single father household when the father was highly involved.

Research has also been conducted investigating additional factors. Lee and Bowen (2006) investigate the impact of race/ethnicity and SES in addition to the impact of parental involvement. As hypothesized by the researchers, race/ethnicity and SES played significant roles in academic achievement. Parent involvement also had an effect that varied across levels of parent involvement, SES, and race. Students of lower SES reported lower parent involvement both at home and at school. However, families with lower SES where parent involvement was reported at a significant level, a positive correlation with academic achievement existed. This correlation is important to consider as it serves as evidence that parent involvement can be linked to student achievement regardless of the circumstances.

Participation in extracurricular activity. Student participation in extracurricular activity has also been linked to increased student achievement. Clark (1995) conducted a study investigating risk factors, protective factors, and gender differences related to academic achievement and resiliency. Clark found that participation in and the availability of extracurricular activities served as a protective factor and was connected to less risky behavior engaged in by youth.

Many other researchers have conducted studies investigating the impact that the level of participation and participation in general in extracurricular activities has on student achievement and behavior (e.g., Shulruf, 2010; Simoncini & Caltabiono, 2012; Sohn, 2008). The results have primarily shown a positive impact on student achievement

when students participate in extracurricular activities. Extracurricular activities can be any number of activities, including but not limited to, student government, athletics, theatre and clubs. As with any study investigating factors related to student achievement it is difficult to pinpoint a single event or method related to student achievement due to the number of different things that are linked to student achievement (e.g., SES, access to resources, parent educational attainment, etc.)

Shulruf (2010) conducted a meta-analysis of existing literature related to student involvement in extracurricular activity and its impact on educational achievement. He found that many of the studies showed a positive association between participation in extracurricular activities and student achievement. Although this association existed, no causal effect was found. Many of the studies used secondary data as it is difficult to obtain randomized trial research for a variety of reasons, mostly ethical. Nonetheless, 29 studies fit the search criteria for the study and most showed positive associations.

Student participation in extracurricular activity has been linked to higher levels of engagement, greater academic achievement, and a better overall school experience (Camp, 1990; Clark, 1995; Shulruf, 2010; Thomson, 2005). Participation has been linked to the development of leadership skills, an extended opportunity to practice skills learned in the classroom outside of the classroom, and the development of pro-social skills like cooperation and teamwork (Thomson, 2005). In addition to leading students away from risky behavior, it also creates a connection to school thus avoiding a detachment that could lead to dropping out. Extracurricular activity participation is one of many factors related to student achievement.

Up to this point, this review of literature has focused on activity outside of the classroom and its impact on student achievement. The next section of the review will explore a factor related to student achievement that occurs within the confines of the classroom and is primarily initiated by students.

Exposure to rigorous academic coursework. Student exposure to higher-level coursework, or multiple years of rigorous academic courses has been associated with higher levels of academic achievement (Clark, Scafidi, & Swinton, 2012; Mayer, 2008). Researchers have found that when students take higher-level courses such as Calculus or Physics, or when students have taken multiple years of an area of core academics, i.e. Math or Science, they perform better on standardized tests (e.g., ACT and SAT) (Chenoweth, 1996; DiMaria, 2004) and in high school in general as well as college.

Brody and Benbow (1990) conducted a study investigating multiple controlled settings to determine whether short intensive focused instruction, specific to content on a SAT test as opposed to rigorous educational exposure over time, would produce higher achievement scores on the SAT. They found short intense instruction did not produce significant gains on scores; however, when students were exposed to rigorous coursework/instruction over a period of five years, they showed significant gains. This does not discount the value of intensive focused instruction. Contrastingly, the findings provide support for exposure to higher-level coursework for all students.

Researchers have found exposure to rigorous coursework is beneficial for students of all ethnicities, backgrounds, intelligence levels, and SES levels (Campbell, 2010; Long, Conger, & Iatarola, 2012). Researcher have also explored demographic and aptitude variables together and individually. For example, Callahan, Wilkinson & Muller

(2010) examined the impact of higher-level coursework on students who were placed in English as a second language courses (ESL). They found students placed in ESL courses are statistically less likely to enroll in higher-level courses and, subsequently, do not enroll in college preparatory coursework nor post-secondary education. They also found language minority students enrolled in ESL course are 49% less likely to be exposed to higher-level coursework (college preparatory) than their non-ESL language minority peers. Such enrollment patterns have been attributed to scheduling conflicts, teacher expectations, as well as other conflicting issues (Callahan et al., 2010). Further, a culture of low expectations is created and students are never position to have access to upper level courses.

Minority Male High School Experience

The minority high school experience has been extensively researched and a large component of that research investigates the male experience, finding their academic performance to be disproportionally lower when compared to males of other ethnicities, primarily when compared to white students (Gordon, Iwamoto, Ward, Potts & Boyd, 2009; Roderick, 2003; Toldson, 2008). There are several recurring themes within the research providing further insight into the conversation around minority male achievement and relevant contributing factors. The expectations placed on minority males in school by teachers, administrators, and other school staff plays a significant role as to the direction of student achievement. The cultural norms that come along with being a minority male also have a strong relationship to academic achievement, i.e. what does it mean to be a minority male and how does this relate to school? A third recurring theme with a significant impact on academic achievement is the environment that minority

males grow up in. This is in reference to the physical environment (home, community, & school), socio economic conditions of their home/neighborhood, and the physical location of the environment (e.g. urban, suburban, and rural). These are not the only factors but their recurring presence in the research indicates a viable link to academic achievement.

Expectations. Research on the schooling experiences of minority males have found them to be living up or down to expectations others hold for them. Many students are impacted substantially by their environment and the expectations placed upon them; this theme is common across ethnicities, races, SES groups, and localities. African American and Latino students in particular have a greater challenge in that academic achievement is more commonly associated with a departure from their cultural expectations (Irving & Hudley, 2008; Noguera, 2008; Roach, 2006; Tatum, 2004). In environments where minority students have found success, themes of resilience, determination, and high expectations have been present (Tatum, 2004; Wasonga & Christman, 2003). This experience is not true for all students but several researchers have found this to be the case when researching the minority male high school experience.

Cultural norms. Pollard (1993) conducted a study investigating the relationship between gender, achievement, and African American and white female students' perception of their high school experience. Pollard argues that much of the comparative research failed to take into account group differences that exist between African American students, girls/women and white males when reporting these former groups have failed to achieve the same as white males. White male achievement continues to serve as the norm, therefore limiting the generalizability and implementation of the

strategies recommended as a result of study findings. Irving & Hudley (2008) identified “a positive relationship between cultural mistrust and oppositional cultural attitudes and an inverse relationship with outcome expectations, outcome value, and academic achievement” (Irving & Hudley, 2008, p.677). As students experience higher levels of cultural mistrust increases, the expectations they have for the benefits of the academic system decreases leading to lower levels of engagement and ultimately lower levels of academic success. Irving & Hudley posit that schools must be intentional with a focus on assisting African American students to develop a positive cultural identity associated with education. This can be done through mentoring programs, cultural appreciation events, and many other programmatic features aimed at reducing this risk factor of poor academic achievement.

The importance of cultural norms is not limited to African American students; several researchers have found similar results in the Latino community and more specifically among males within the Latino community (Roach, 2006). Gomez, Munte & Sorde (2014) conducted a study using minority male community members increase engagement in schools in an effort to reduce male cultural stereotyping and reducing violence in the school. In the study, two schools had males and females of traditionally underrepresented minorities were recruited from the community to participate in school activities and serve as mentors to the students. The results showed a greater tolerance to different cultures and less stereotyping as well as a reduction in violence within the schools (Gomez et al. 2014). Cultural norms help to shape how students perceive school and academics in general. Different cultures have different expectations and among

minorities, frequently the norm for masculinity is not associated with academic achievement but rather the opposite (Matthews, 2014; Roach, 2006).

Environment. There is a vast body of research that exists depicting the academic experience of the minority boy. In addition to the factors stated above, the environment where students live and attend school has frequently been found to be related to academic achievement, i.e. student in poorer city neighborhoods who attend schools in urban city neighborhoods are sometimes found to perform poorer academically than their counterparts at wealthier suburban schools (Johnson, 2014). Toldson (2008) identified several key supporters and barriers to African American male academic achievement commonly found in relevant literature. Family background, self-concept, teacher expectations, and value orientation are all factors linked to academic achievement. These factors have an impact on academic achievement depending on the direction of their involvement (Roderick, 2003). A family background of academic success, highly involved parents, and a supportive community is more likely connected to student achievement as opposed to the lack of their presence. Self-concept plays a large role in academic success as young minority males seem to experience a violation of a cultural norm if they strive for academic success (James, 2010; Matthews, 2014; Noguera, 2008; Roach, 2006). School climate plays a role in many of these factors as well. The school climate impacts self-concept, teacher expectations, and value orientation. A positive school climate leads to better self-concept, higher teacher expectations and strong value orientations (Osher & Fleischman, 2005).

Conceptual Framework

Our understanding of the value of SS is limited. One contributing factor is that much of the research has been conducted in private school settings (U.S. DOE, 2005). This is not an obvious concern because the philosophical foundation for SS schools developed in the private arena. Title IX of the Educational Amendments Act of 1972 prohibits exclusion or discrimination based on sex, thus making it difficult for public SS schools or classrooms to exist without violating this Act. Religious and private institutions are not held to the same legal requirements as a public school so they are able to implement SS arenas without as much trouble. Our understanding of the SS context is largely informed by research on SS schools and classroom offered in private school settings.

An understanding of SS schools and classrooms is also complicated by a selection effect, which is evident in private school setting. Many private schools are elite white institutions that maintain a homogeneous student population (namely, white and middle-upper class) due to the cost of attendance, tradition and reputation, entrance requirements, and location. Private schools also have the option of being discretionary with who they grant admittance to the school. The results of studies completed at such institutions must be considered with reservations, as they represent a very narrow and selective group of students. Schools who are able only admit students with high prior academic achievement, high socioeconomic and social status, and who have a family lineage of attendance; makes research results less generalizable because of the lack of diversity in the student body. To get an accurate picture of the perceived benefits or limitations of SS education, a diverse group of students from all backgrounds and ability levels must be

considered (U.S. Department of Education, 2008). Currently, the basis of research limits the discovered value of SS education to private/elite institutions as well as some charter schools who also have the ability to select their student body.

There are several other factors to be considered when examining the impact of SS settings on student achievement and student's personal development as well. These factors include the efficacy of SS settings (efficacy defined as when students achieve high academically), the effect on psycho-social development, gender learning differences, and the legal implications. When examining overall efficacy, most researchers have found mixed results with minimal benefit. However, there have been generally more null or positive results than results that found a negative impact (Clark, 2004; Gibb, Ferguson, & Horwood, 2008; Marsh, 1989). The minimal occurrence of a negative impact, or one that favors CE settings, maintains an argument for further research.

In addition to efficacy, the psycho-social implications should also be examined. The base of literature that does exist on this topic is not extensive and has found mixed results as well. Some researchers have hypothesized and found that SS settings can reinforce sex stereotypes (Carlile, 2009; Younger & Warrington, 2006). Research has also found SS settings can improve self-concept for both sexes in subjects not traditionally considered masculine or feminine for the opposite sex (Kessels & Hanover, 2008; Spielhofer, Benton, & Schagen, 2004).

In addition to efficacy and psycho-social implications, gender learning differences should also be considered. King and Gurian, (2006) found that sex specific teaching strategies significantly increased achievement in the respective sexes when implemented in SS settings. Other researchers such as Hartnell-Young, (2009) and Bravo, Gilbert, &

Kearney (2003) have found similar results. In addition to the considerations previously mentioned, the legal implications of SS settings must be considered as a primary component of SS implementation. Title IX initially made it nearly impossible to implement SS settings in public education for fear of exclusion and/or segregation. Recently, the initial passage of NCLB, (2001) has opened the door to SS settings. Implemented properly and with the appropriate options in place, SS settings are once again a part of the public education landscape. This was not a potential venue for school reform prior to the passage of NCLB.

Literature Review Summary

The research that exists about school culture, SS schooling and its impact on student achievement, self-esteem, and policy is primarily made up of research studies that have been conducted in a reactive manner. The studies are predominantly studies of schools that had problems, either behavioral or academic and thus implemented some version of a reform model or adopted a policy in an attempt to achieve their desired results. Future research should consider schools that have a history of being successful and look at what aspects of culture are focused on and how that impacts success.

It is also important to study culture, reform, and SS settings from a variety of demographic perspectives. Many studies investigating school reform take place in urban areas with high crime, low socio-economic status, and poor school achievement. Conversely, many studies examining SS and its impact on academic achievement take place in private school settings in minimally diverse settings. To gain a comprehensive view, aspects of school culture and school academic success must be viewed from a perspective that includes multiple demographics.

CHAPTER 3: Methods

Overview

The model analyzed in this study was developed as a result of the researcher's interest in school reform; throughout the development of the literature review gaps were noted in the literature when researching SS school reform. These gaps being the lack of studies conducted in racially diverse settings and the lack of stringent statistical analyses. A comprehensive report was issued by the DOE in 2005⁶ reviewing all relevant research on SS schools. One of the findings from the report was the lack of quantitative studies and the lack of sophistication in the quantitative studies included in their report. The combination of these factors led to the further research and subsequent development of the current structural model to be tested. The data was analyzed using structural equation modeling (SEM) to determine the relationship between SS schooling and academic achievement. "SEM is not viewed as a mere statistical technique but rather as an analytical process involving model conceptualization, parameter identification and estimation, data-model fit assessment, and potential model respecification" (Hancock & Mueller, 2010, p. 371). It is intended that through the use of these methods, a better understanding will develop regarding the impact of SS education on students and their academic achievement. The purpose of this study is to consider the impact of the locally exogenous factors, extra-curricular activities, level of parent involvement, and exposure to higher-level coursework in SS settings on the endogenous emergent factor Academic Achievement and further, conduct a between group comparison of racial groups to determine their impact on the hypothesized relationship. The groups for comparison were

⁶ <http://www2.ed.gov/rschstat/eval/other/single-sex/single-sex.pdf>

white males and minority males. The minority male group consisted of all males who were not identified as white. As discussed in the previous chapter, significant research exists to support the similarities between minority races educational experiences. Extra-curricular activities, level of parent involvement, and exposure to higher-level coursework are considered emergent factors because changes in the measured variables that make up these emergent factors would cause variation in the emergent factors and not vice-versa. What is novel about this investigation is the use of SS in a latent model to investigate the structural relationship and that the expected relationships in the model will change based on this variable.

A substantial portion of the research that currently exists on SS education and its efficacy has been conducted using qualitative methodologies. One reason for this is because it is difficult to conduct a quantitative study on SS education using random assignment to a group. Random assignment is difficult to obtain because it would mean that the subjects in the study would basically be part of an experiment, and participation in an experiment means that there are no guaranteed outcomes. All want to be assured that time in school is spent efficiently and being randomly assigned to a group doesn't guarantee that the group one is assigned to will lead to adequate educational achievement. This constitutes a demand for effective research conducted with appropriate sampling in an attempt to discount external factors that could contribute to success or failure in a SS setting. The goal of the study is to analyze a sample obtained from the randomly sampled Education Longitudinal Study of 2002 (ELS 2002). The subjects in the dataset were not randomly assigned to their groups but were randomly sampled from populations that met the study's criteria for inclusion. The internal validity of the study is accounted for in that

the exogenous variables are controlled for thus limiting the possibility that the relationship comparison between groups and the effect of SS settings is not portrayed accurately.

Research Questions

The goal of this research is to determine the relationship between parent- and student-level factors, SS education and academic achievement. The following research questions are addressed quantitatively:

- To what extent is the academic achievement of males explained by their participation in extra-curricular activities?
- To what extent is the academic achievement of males explained by the level of parental involvement?
- To what extent is the academic achievement of males explained by their exposure to higher-level coursework?
- To what extent does a between group difference exist between male students' academic achievement dependent on race when controlling for participation in extra-curricular activities, parent involvement, and exposure to higher-level coursework respectively and academic achievement?

Research Hypotheses

Research hypotheses are based on others existing research, and are as follows:

H_(1A): There is a positive relationship between level of participation in extra-curricular activities and greater academic achievement among male students.

H_(1B): There is a positive causal relationship between level of parent involvement and greater academic achievement among male students.

$H_{(1C)}$: There is a positive causal relationship between level of exposure to higher-level coursework and greater academic achievement among male students.

$H_{(2A)}$: There is a between group difference between male student achievement when comparing by race and controlling for participation in extra-curricular activities, level of parent involvement, and exposure to higher-level coursework.

The research hypotheses were tested using a national dataset (ELS: 2002) and structural equation modeling (SEM). The use of a national level dataset reduces the possible impact of the selection effect thus increasing the generalizability of the study. The sampling methods used in the ELS: 2002 were designed to assure comparable representation of subgroups and both private and public schools (further described in the following Population section). Further, SEM was used to investigate academic achievement in a SS environment for males in general, and minority males relative to their white male peers. Specifically, a measurement model was created to test whether the model fits the data, and a structural model, based on the research questions, was created to test for group differences between parameter estimates. The measurement model tested the observed variables to determine loading values on the latent factors. The structural model tested the observed variables loading on the latent factors as well as the latent factors impact on academic achievement and tested for between group differences. Model fit indices were assessed and the structural model was re-specified as appropriate and is described in the data analysis section below.

Population

The population of this study was taken from the population of respondents to the ELS 2002 study.⁷ ELS: 2002 was conducted in the spring of 2002 and was designed as a two-stage sample process; first schools were selected then students. Of the 1,268 schools samples, 1,221 were eligible and 752 responded (68% weighted participation rate). Non-public schools were sampled at a higher rate to ensure that the sample was large enough to compare with public schools. The students were randomly selected from the participating high schools 10th grade class rosters with different rates of sampling for different populations to ensure accurate representation, specifically Asian students being sampled at a higher rate than White, Black and Hispanic students to ensure valid sizes for comparison (NCES, 2007). In total, 19,218 students were sampled, of which 17,591 were eligible sophomores. The restricted used data file will be used (See Instrumentation below) and is comprised of a sample of 16,197 students who were enrolled in any of 752 high schools (public, Department of Education, charter, and private) in the 50 United States and the District of Columbia that had a 10th grade at the time of the first sample, who participated in the ELS: 2002 and the subsequent follow ups. The actual statistical formula for school and student sampling can be found on the NCES website in Appendix J of the file “ELS: 2002 Base Year Data File User’s Manual.”⁸ The sample was approximately 50% male and 50% female. The racial make-up of the participants was 1% American Indian, 10% Asian, 13% Black, 7% Hispanic, 8% Hispanic with race specified, 5% multiracial, and 56% white. Further, the ELS:2002 study used logical imputation to

⁷ http://nces.ed.gov/pubs2004/2004405_4.pdf

⁸ http://nces.ed.gov/pubs2004/2004405_4.pdf

address missing data and used a weighted hot-deck procedure to complete the variables with missing data.⁹ Accordingly, the ELS: 2002 data file was selected for its large size, representative sample, and represents a more recent dataset than most other publicly available datasets.

Measures

The researcher used 12 observed variables to define four latent factors in this study (see Table 12; Appendix A). The four latent factors as described in Chapter Two were Higher-Level Coursework, Extra-Curricular Activity, Parent Involvement, and Academic Achievement. The variables that made up the factors were chosen based on existing research on items related to academic achievement. The research used to select these variables was not reflective of gender or racial implications related to these items; rather, it was part of a larger discussion on academic achievement in general. The latent factor Academic Achievement was the only factor set to scale by the researcher as described below (See Instrumentation, under Design). The three other latent factors were not set to scale because their respective loading variables were on the same scale. The variables are described as follows:

Higher-Level Coursework. Higher-Level Coursework is defined by three observed variables: (a) years of biology coursework, (b) years of chemistry coursework, and (c) years of Calculus coursework. Each question was responded to in one of four ways using the following scale: (a) none or less than ½ year, (b) ½ year, (c) 1 year, or (d) more than 1 year. Missing data for the constructs that make up this variable ranged from .2% to 4.6%.

⁹ <http://nces.ed.gov/pubs2004/2004405.pdf>

Extra-Curricular Activity. Extra-Curricular Activity was defined by four observed variables: (a) participated in interscholastic sports, (b) participated in school band or chorus, (c) participated in school play or musical, and (d) participated in student government. Each question was responded to in one of three ways: (a) did not participate, (b) participated, or (c) participated as officer/leader/captain. Missing data for the constructs that make up this variable ranged from .2% to 4.6%.

Parent Involvement. Parent involvement was defined by three observed variables: (a) how often discussed things studied in class with parents, (b) how often discussed school activities with parents, and (c) how often discussed school courses with parents. Each question was responded to in one of three ways: (a) never, (b) sometimes, or (c) often. Missing data for the constructs that make up this variable ranged from .7% to 4.6%.

Academic Achievement. Academic achievement was defined by two observed variables: (a) total Carnegie units earned, and (b) GPA for all courses taken in the 9th – 12th grades – categorical. The first variable, Carnegie units earned was responded to categorically in one of 29 ways. The scale started with (a) less than 7 total credits earned, and increased each categorical response by 1.0 up to the final category of 34 or more. Approximately 92% of the responses fell into these categories; the other 8% were non respondent. The second variable, GPA was categorically responded to in one of 6 ways. The first scale started with (a) 0.00 – 1.00, the second scale ranged from (b) 1.01 – 1.50, the third and subsequent scales increased by .50 per response to a max of 3.51 to 4.00. Missing data for the constructs that make up this variable remained constant at 1.1%.

Single Sex. Single sex was determined by administrator's responses to whether or not the school was co-educational. Participants responded with (a) yes, (b), no, all-female school, (c) no, all-male school. Missing data was .43% for this variable.

Race. Race was determined by responses identifying oneself as (a) White, non-Hispanic, (b) American Indian or Alaska Native, (c) Black or African American, non-Hispanic, (d) Multiracial, non-Hispanic, (e) Asian, non-Hispanic, (f) Hispanic or Latino. Minority status will be constructed by collapsing categories b-f into one. Missing data for this variable was 4.1%.

Gender. The gender variable is defined by response to the question "What is your sex?" Missing data for this variable was 4.1%.

Study Sample

A sample size analysis was conducted using an A-priori sample size calculator for Structural Equation Models (Soper, 2014). The analysis was conducted with an anticipated effect size of .1, a desired statistical power level of .8, 4 latent factors, 12 observed variables, and a probability level of .05. The results indicated the recommended minimum sample size to detect effect to be 387 and the minimum sample size for model structure to be 200. The measured variable, school is coeducational (BYA11) has an *n* of 437 (2.7% of the entire dataset). Of these 437, 18 were missing the variable leaving a final *n* of 419 respondents who responded yes, all-male school thus indicating the sample size for the study to meet the minimum criteria. In total, 14,964 people responded yes (school is coeducational), 376 responded no, all-female school, and 69 responses were missing. The sample used for this study will compare white male students who have attended SS schools with minority male students who have attended SS schools in an

effort to determine if when equal levels of the indicators of academic achievement are present, race has an impact on academic achievement.

Preliminary descriptive statistics for the study sample are reported in Tables 1 and 2 below. Assumptions of normality are also considered. The data is considered univariately normal as the skew is below 3, it ranges from -2.065 to 3.163 with a standard error ranging from .117 to .121 and the kurtosis is below 8, it ranges from -1.193 to 9.627 with a standard error ranging from .234 to .242.

Table 1.

Descriptive Statistics for Student and Parent Level Engagement Variables Male

Study Variables	N	Mean (SD)	Minimum	Maximum
Participated in interscholastic sports	412	1.72(.787)	1	3
Participated in school band or chorus	410	1.17(.457)	1	3
Participated in school play or musical	408	1.14(.416)	1	3
Participated in student government	407	1.17 (.486)	1	3
How often discussed school courses with parents	407	2.10(.662)	1	3
How often discussed school activities with parents	408	2.22(.700)	1	3
How often discussed things studied in class with parents	408	2.12(.675)	1	3
Years of Biology coursework	413	2.98(.497)	1	4
Years of Chemistry coursework	413	2.84(.712)	1	4
Years of Calculus coursework	404	1.47(.909)	1	4
GPA for all academic courses	432	2.7424(.63383)	1	6
Total Carnegie units – categorized	432	25.89(4.159)	6	34

Table 2.
Correlations for Student and Parent Level Engagement Variables – Male

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Sports	-											
Band or chorus	-.03	-										
Play or musical	-.02	.45**	-									
Student govt	.15**	-.05	.03	-								
Discussed courses	.11*	.04	-.01	.03	-							
Discussed activities	.28**	.03	.05	.12*	.53**	-						
Discuss things studied	.06	-.02	-.05	.03	.39**	.45**	-					
Biology	.03	.07	-.04	.06	.03	-.06	.06	-				
Chemistry	.07	.01	.06	.08	.15**	.09	-.01	.09	-			
Calculus	.09	.07	.05	.12*	.11*	.10*	.01	.19**	.24**	-		
GPA for academic courses	.10*	.08	.07	.22**	.15**	.21**	.05	.13*	.36**	.36**	-	
Carnegie units	-.03	.16**	.07	-.04	.10*	.06	.06	.11*	.08	.12*	.21**	-

*p<.05. **p<.01.

Missing Data

When using a large data set, it is not uncommon to find that variables have missing observations (Kline, 2005). Missing data must be accounted for in any statistical analysis. The ELS dataset contains differing percentages of missing data dependent on which variable is being examined. Missing data is considered to be missing completely at random (MCAR), missing at random (MAR), or missing not at random (MNAR). Data that is MCAR would not be associated with any other variable, which is rare to find. MAR is data that are missing related to other variables but have no bearing on the value of the measured variable. MNAR data are not able to be ignored and no matter what imputation or deletion method is used, the results will be biased (Hancock & Mueller, 2010; Kline, 2005; Schumacker & Lomax, 2010). Personal communication with the Project Officer for ELS 2002 data was reported to be MAR (E. Christopher, Ph.D., Statistician, Project Officer for ELS:2002 and HSLs:09 personal communication, August 25, 2014).

There are several statistical methods to address missing data. For example, Hancock and Mueller (2010) suggest using techniques such as listwise or pairwise deletion, which is only appropriate if the amount of missing data are considered trivial. The percent of missing data for the variables used in this study ranges from less than 1% to almost 17% justifying the use of a more stringent technique. Of the 437 individual cases selected for use, 47 have at least one variable missing, three cases are missing two variables, six cases are missing three variables, one case is missing four variables, two cases are missing seven variables, and 23 cases have 10 or more missing variables. Hancock and Mueller (2010) also suggest that multiple imputation (MI) or full-

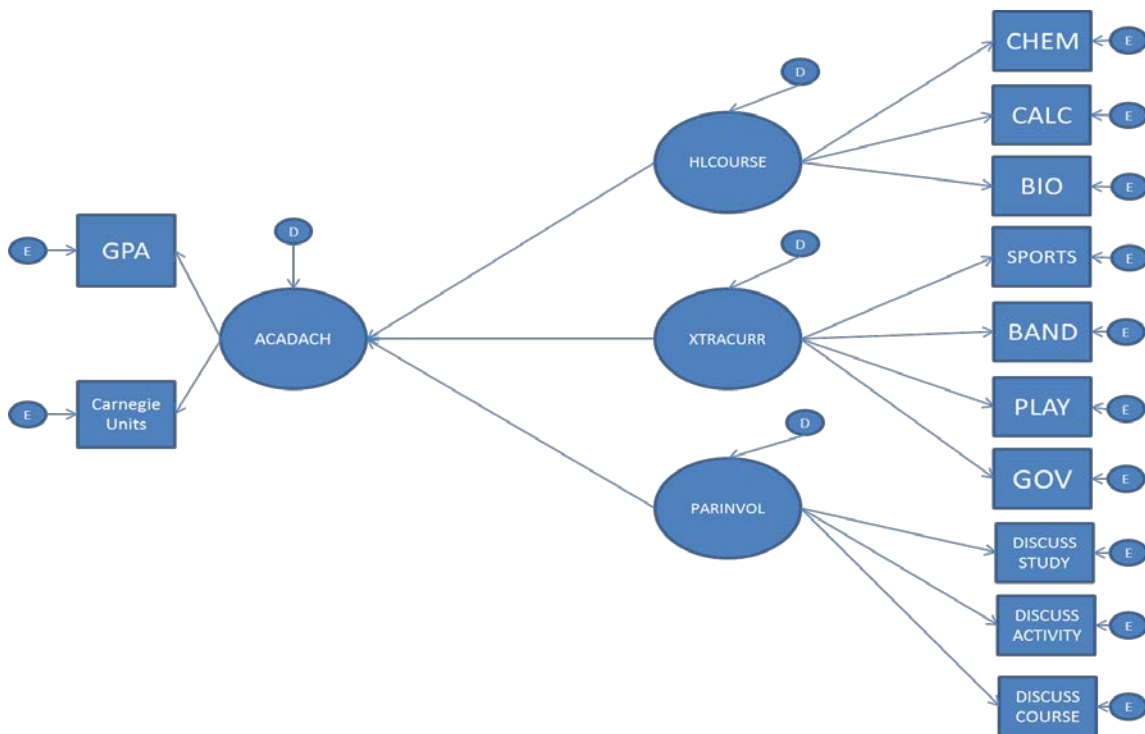
information-maximum-likelihood (FIML), both of which assume data to be MAR, be used for datasets with a larger percentage of missing data. Enders and Bandalos (2001) researched several methods for the treatment of missing data in SEMs. Their comparison of listwise deletion, pairwise deletion, ML, and FIML found FIML to be superior in nearly all trials. FIML had consistently lower rates of non-convergence and bias compared to the other methods studied. Although other factors may have had an impact on these rates, e.g. sample size or the type of missing data (MAR v. MCAR), FIML was found to be the most accurate method for treating the missing data. Accordingly, FIML will be used for treatment of missing data in this dataset. FIML is not without its limitations, e.g. there are not sufficient research studies on the effects of non-normal data and its impact on FIML estimates to have a true understanding (Enders & Bandalos, 2001). This lack of research does not preclude it from being the most appropriate method to use in this study and therefore is used.

Design

Confirmatory factor analysis was the design strategy used to investigate the impact of SS environments on male academic achievement when factors related to high academic achievement are present, further group differences are examined based on race. The independent or predictor factors are (a) higher-level coursework -- students years of exposure to calculus, chemistry, and biology (b) parent involvement -- whether or not and to what extent a student discusses school courses, school activities, and things studied with a parent, and (c) participation – student involvement in extracurricular activities consisting of interscholastic sports, school play, government, and school band (See Figure 1). The dependent or criterion variable is student achievement. Student

achievement is made up of student grade point average (GPA), and total Carnegie units earned. It is not uncommon to use multivariate analysis of variance (MANOVA) to conduct group comparisons. SEM is considered an alternative to MANOVA. As this study is designed as a latent variable system, MANOVA is likely to present misleading data whereas SEM is more likely to produce accurate data reflective of between group differences (Cole, Maxwell, Arvey, & Salas, 1993).

Figure 1: Full Structural Model



Structural Equation Modeling

Structural Equation Modeling (SEM) is a method of statistical analysis used to test a researcher’s hypothesis about a perceived relationship between variables both observed and latent (Russell, Kahn, Spoth, & Altmaier, 1998). SEM allows researchers to develop theoretical models with more variables than would traditionally be analyzed by

less sophisticated forms of quantitative analysis because the factors are treated as the unit of investigation (Schumacker & Lomax, 2010). SEM is theory based and allows the researcher to assess the fit of the theory against empirical data; it allows the researcher to determine relations among latent variables made up of observed measures (Hancock & Mueller, 2010; Lei & Wu, 2007). The use of SEM allows this researcher to compare a latent path model investigating the impact of the latent factors on academic achievement with a similar model that includes the between group differences based on race.

In order for any data analysis to produce results that are valid and generalizable, measurement error needs to be minimized to the greatest extent possible. SEM is a method of statistical analysis that accounts for measurement error when analyzing data (Kahn et al., 1998). SEM's ability to account for and provide the aforementioned qualities makes it the most appropriate and effective method of analysis to apply to the model and research questions being addressed in the research study. SEM also allows for the modification of the researchers model after the initial data analysis has been conducted. This can be done in a number of ways including but not limited to linking covariances, modifying loadings, and/or constraining variances to be non-negative. The modifications that are made are based on recommendations provided in the LISREL output. This modification is based on theory and allows for the researcher to find the most appropriate model and constraint level to represent accurate data and solid theoretical analysis (Hancock & Mueller, 2010).

Instrumentation

The restricted version of the data was used in order to conduct a transcript analysis to accurately measure academic achievement. The ELS dataset includes the

variable F1RAGP, which is a composite of all academic subjects (math, social studies, fine arts, and non-English) and is used in the calculation of the latent variable academic achievement. The transcript analysis allows the researcher to remove additional factors which may artificially inflate students GPA by taking multiple low level classes or in the case of students with English as a second language (ESL), additional ESL classes which may not reflect increasingly rigorous coursework. The purpose of this study is to determine the difference in academic achievement between two groups of male students so the GPA should be reflective of an academic setting.

The data from ELS was disaggregated using a variety of measures in an effort to obtain a dataset that could be used to accurately investigate the research questions designed. The entire dataset consisted of over 16000 subjects, for the purposes of this study only 437 (final count of 419 after modification for missing information) of them were of interest as that reflected the number of male students who attended a SS school. Each variable used in the study was modified using SPSS to reflect the actual terms used in the study instead of numerical calculations leading to an easier interpretation of the results. Three separate datasets were created to represent (a) all the male students who attended a SS school (b) all the minority male students who attended a SS school, and (c) all the white male students who attended a SS school. SPSS was used to obtain correlation matrices and standard deviations later used in the measurement and structural analyses conducted using LISREL.

Data Analysis

The unit of analysis for this study is measures of individual student academic achievement. The statistical analysis program LISREL 9.20 Student Edition (Joreskog &

Sprbom, 2013) was used to analyze the different models created to test the hypothesis via a 3 factor confirmatory factor analysis. Descriptive and inferential statistics were used to investigate the research questions. SPSS version 22 was used to determine means and standard deviations and a covariance matrix using the observed variables. SEM was used to determine the between group differences on academic achievement between white and minority students educated in SS environments when other factors commonly associated with academic achievement were present.

Model fit indices were applied to the models to determine appropriate fit and modifications were made to the models accordingly (Hu & Bentler, 1998). Data model fit was analyzed using absolute, parsimonious, and incremental fit indices. The absolute matrices compare observed and model-implied covariance matrices, parsimonious includes the complexity of the model, and incremental indices compare reproduced and null covariance matrices. Chi-square (χ^2) and standardized root mean squared residual (SRMR) were used to determine absolute fit with cutoffs of .05 and less than or equal to .08 respectively (Sivo, Fan, Witta, & Willse, 2006). The χ^2 test is reported in this analysis but not relied upon solely as it has been viewed as overly strict given that it detects the smallest of deviations from the proposed model (Hancock & Mueller, 2010). The root mean squared error of approximation (RMSEA) is reported with a cutoff level of less than or equal to .06 to determine parsimonious fit (Chen, Curran, Bollen, Kirby, & Paxton, 2008). The Akaike Information Criterion (AIC) will also be used to compare models looking for the lowest value to determine which model has the best fit. The comparative fit index was used to determine incremental fit with values closest to .95 showing the best model fit. Validity and Reliability of the factors were measured and

reported. Validity was measured using variance extracted with .50 as the cutoff for the measure of validity. Reliability was determined and reported using reliability of the construct and coefficient H. Typically in social science research, values for these coefficients around .70 to .80 are considered valuable, however individual study differences can impact what is considered acceptable (Hancock & Mueller, 2010). The reliability construct was found to be .66 and the coefficient H was .64. The loadings from the All Male structural model were used to calculate the reliability of the construct and the coefficient H.

Data Screening. In order for the data to be appropriately screened several assumptions had to be met. The assumption for missing data was met as all variables had missing data percentages less than 5. The control variable BYA11 (school is coeducational) has an *n* of 437, of these cases 23 cases have 10 or more missing variables and were removed from the dataset. Upon further investigation, it was discovered that the removed cases were not available for the follow ups. Hancock and Mueller (2010) suggest full-information-maximum-likelihood (FIML), be used for datasets with missing data. FIML was used for treatment of missing data in the remaining variables via LISREL.

The data was analyzed to determine if the assumption for multicollinearity was met. In order to test this, tolerance was assessed by utilizing the formula $1 - R^2$ looking for values under .10 (Kline, 2010). The assumption was met based on this test as all results were greater than .10.

Normal distribution is another assumption that must be met when using SEM. The data is considered univariately normal as the skew ranges from -2.065 to 3.163 and the

kurtosis ranges from -1.193 to 9.627. Although some of the variables were slightly over generally agreed upon thresholds of 3 for skew and 8 for kurtosis, the averages remained below those thresholds.

Several different models were tested in an effort to fully investigate the hypothesis. The first model will take into account all of the observed variables and investigate the pathways and relationships between them and academic achievement. The modification cutoff indices noted previously were used to determine model specification or misspecification and model re-specification adjustments will be made accordingly in an effort to find good model fit. Once model fit has been established, the impact on the previously established relationships was assessed and further between group comparisons will be analyzed.

Treatment of the data collected. All data collected and analyzed in this study was treated with the utmost confidentiality and in accordance to guidelines established by the institutional review board of The George Washington University (GWU). No names, locations, or any other identifying characteristics were used that could potentially identify any of the subjects. An application was submitted to the GWU Office of Human Research (OHR) and it was determined that this study does not meet the criteria to be human subjects research. The study was deemed exempt and no further review by the GWU Institutional Review Board (IRB) was required. All research was conducted on a secure computer in a secure location on the GWU campus in accordance with regulations promulgated by the Institute for Education Sciences to whom the restricted data belongs. When data is not being analyzed it will be kept under lock and key in a secure location.

Summary

In summary, the researcher used SEM in an attempt to determine the differences between groups of white and minority male student's academic achievement when controlling for family and school level indicators of increased academic achievement and educated in a SS environment. Data from a publically available data set was analyzed using a SEM approach in an effort to analyze the possible relationship all the while accounting for measurement error. The researcher will also construct a team of professionals and scholars to help guide the process and analyze the information. Expert methodologists and experts in the field of the SS education was utilized to help guide the research in an effort to make the research conducted able to be generalized and valuable.

Chapter 4: Results

Introduction

This study was designed to investigate the between group differences in academic achievement between white and minority males who attended school in an all-male setting. Subjects were selected from the Education Longitudinal Study (ELS) of 2002 and subsequent follow ups. A structural equation model was designed to investigate these differences. Latent factors were created to reflect observed variables reflective of parent involvement in their student's education, student involvement in extracurricular activities, and student exposure to higher-level coursework. These factors were research based, and selected because of their causal relationship with increased academic achievement when they are present either alone or in conjunction with other factors. Accordingly, the latent factors were analyzed together representing the full model as opposed to analyzing each factor separately. To this end, descriptive and inferential statistics are presented, respectively, followed by the model analysis results that include the statistical findings associated with each research question.

Descriptive Statistics. Descriptive statistics were obtained for the entire set of males who attended SS schools (Tables 1 and 2; in Chapter 3), as well as separately for the white males (Tables 3 and 4) and the minority males (Tables 5 and 6). A correlation matrix was developed for use in the SEM analysis for each group.

Inferential Statistics. Model fit indices were applied to the models based on the recommendations provided by LISREL after initial analysis. These recommendations included allowing the errors of PLAY and BAND to covary in the measurement model, adding the path from SPORTS to the latent factor PARENT for the all-male structural

model, allowing the errors of PLAY and BAND to covary in the all-white structural model and allowing the errors of PLAY and BAND to covary, adding the path from SPORTS to the latent factor PARENT, and allowing the errors of THINGS STUDIED and DISCUSS COURSES to covary in the minority male structural model. The recommended modification indices for the minority male model were implemented for all models for comparison as those recommendations retained the most factors and variables.

Absolute, parsimonious, and incremental fit indices are discussed further to determine model fit (Table 7). The absolute fit indices assess for differences between covariance matrices (observed and implied), whereas the parsimonious indices account for the differences between matrices as well as take into account the complexity of the model and the incremental indices compare the fit relative to the measurement model (Hancock & Mueller, 2007). If the model is determined to meet the fit indices the model can be analyzed as initially conceptualized, otherwise modifications to the models must be made. Chi-square (χ^2) and standardized root mean squared residual (SRMR) were used to determine absolute fit with cutoffs of .05 and less than or equal to .08 respectively. The root mean squared error of approximation (RMSEA) is reported with a cutoff level of less than or equal to .06 to determine parsimonious fit. The Akaike Information Criterion (AIC) is used to compare models in analyzing for best fit. The comparative fit index (CFI) is used to determine incremental fit with values closest to .95 showing the best model fit (Hu & Bentler, 1999).

Model Analysis Results

Measurement Model. The first analysis was conducted using LISREL to test the measurement model and to determine what if any impact the observed variables had on

academic achievement. Initially the measurement model did not fit the data; the RMSEA was high at .0809 and the CFI was considered poor at .774. The modification indices (MI) provided by LISREL suggested allowing the errors of PLAY and BAND to covary resulting in much better model fit as shown in Table 9. The new fit indices fell within recommendations with an SRMR of .0460, χ^2 of 89.662, an AIC of 1259.29, the RMSEA dropping to .0458 and the CFI increasing to .929 (Figure 2).

All Male Structural Model. The next model analysis was with all of the male students in the dataset remaining after the initial data disaggregation and screening. This model fit the data relatively well with the exception of the CFI being low at .915. The suggested MI that had a significant impact on the χ^2 and was theoretically sound was to add the path v1 (sports) to the latent factor PARENT. This resulted in increased data model fit with all indices except for CFI falling within the recommended thresholds, the CFI increased to .962, the χ^2 was 70.778, SRMR at .0443, RMSEA at .0331, and an AIC of 1238.412 (Figure 3).

All White Structural Model. The next structural analysis conducted consisted of only the white male subjects involved in the study. The model data fit was not strong for this section of the study. The SRMR was below the recommended cutoff points but the CFI was low at .795 and the RMSEA was high at .730, thus indicating poor model fit. The MI's for this analysis strongest and most theoretically sound recommendation was to allow the errors of PLAY and BAND to covary. The resulting fit indices were closer to recommended thresholds with the CFI increasing to .926 and the RMSEA dropping to .0452, the χ^2 was 74.794, SRMR at .0533, and an AIC of 588.408 (Figure 4) still indicating poor model fit.

Minority Male Structural Model. The final structural model that was analyzed prior to the groups being analyzed simultaneously was the model consisting of the minority males. This model also did not show a strong fit with the data. The initial model fit indices were all beyond the recommended thresholds, the RMSEA and SRMR were .700 and .0852 respectively, and the CFI was low at .859. The following MI were added one at a time selected based on the size of the impact and theoretical soundness, allowed errors of PLAY and BAND to covary, path from SPORTS to PARENT, and allow errors of COURSES and STUDY to covary. The resulting fit indices were closer to the recommended thresholds as RMSEA, SRMR and CFI were reported at .0552, .0790, and .917 respectively, the χ^2 was 68.590 and the AIC was 586.229 (Figure 5).

Model Comparison

The next steps taken in the analysis were running the groups simultaneously, followed by running the groups with constraints on the path loadings to compare parameters, concluding with the releasing of constraints individually to determine which model fits the data most accurately. The first simultaneous iteration (analysis without constraints) of the groups found the RMSEA to be above the cutoff at .0806 and the CFI was below the cutoff at .704 indicating poor model fit. The next iteration was the simultaneous group comparison with parameters constrained across all groups. This resulted in fit indices with a slightly higher RMSEA of .939 and a lower CFI of .668 still indicating poor model fit. The next and final step was to begin releasing constraints individually based on the MI and theoretical soundness. The first suggested MI that was used was to estimate the parameter between CALC and COURSE. This resulted in slightly better model fit but still as not adequate, the new RMSEA had dropped to .880

and the CFI had risen to .711. The resulting MI's were not theoretically sound or involved error covariances across groups so no additional MI's were added.

The resulting models were compared to investigate for the best fit (Tables 10 & 11). When comparing the three models, the Multi-Group with no constraints was selected, as the $\Delta\chi^2$ was significant and the ΔCFI was $\geq .01$. Therefore, the model estimating more parameters and thus less parsimonious was chosen.

When comparing the all-white group and the minority group models, differences were noted along nearly every path. The loading values of the latent factors PARTICIPATION, PARENT, and COURSE on the latent factor ACADACHIEVE were larger in the white group. Respectively the white groups' loading values compared to the minority groups' loading values were .73 to .03, .22 to .20, and .82 to .78. Interestingly the observed variables that make up the ACADACHIEVE factor show the reverse trend with GPA loading (significantly on all) at .44 for white and .75 for minority, and Carnegie Units loading at .96 for whites and 1.12 for minority.

Research Question 1. The first research question in this study was: To what extent is the academic achievement of males explained by their participation in extra-curricular activities? The analysis of the structural model of the all-male dataset showed a small positive correlation between participation in extracurricular activities at .01, the minority dataset was .03. Individually the observed variables reflected varying levels of impact on the latent factor PARTICIPATION. The results were sports, band/chorus, play/musical, and government had respective loading values of -1.3, 1.0, .05, and 8.45 for the all-male dataset and -.09, .46, .05, and -.04 for the minority dataset. Participation in student government had the greatest correlation with overall participation in school

activities with a standard error of 2.997 and a p-value of .005 indicating statistical significance within the all-male dataset, the same was not true for the minority group as the strongest correlation was participation in band/chorus (.46) although it was not significant. Although the loading of SPORTS on PARTICIPATION was negative in direction in the all-male dataset, the p-value was .061 indicating it was not a statistically significant relationship. None of the loading values on PARTICIPATION were significant in the minority male group.

Research Question 2. The second research question in this study was: To what extent is the academic achievement of males explained by the level of parental involvement? The second latent factor had a greater loading on academic achievement at .222 with a standard error of .025 and a p-value of .000 indicating the relationship was statistically significant for all males, the findings for the individual models were respectively .220, .025 and .000 for white males and .195, .036 and .000 for minority males. Individually the measured variables that make up the PARENT latent factor, discuss courses with parents, discuss school activities with parents, discuss things studied with parents, had respective loading values of .33, .73, and .30 for all males, .32, .75, and .30 for white males, and .31, .85, and .24 for minority males. Within the all-male group, only the variable DISCUSS ACTIVITIES was insignificant, the other measured variables were found to have p-values of .000; this indicates that DISCUSS STUDIED and DISCUSS COURSE have some positive, statistically significant correlation with parental involvement. The statistically significant loading value of the latent factor PARENT on ACADACHIEVE was slightly larger when compared to PARTICIPATION with a value of .222. Only one of the individual measured variable loadings were found to have

statistically significant positive relationships with the latent factor. The variable v6 (how often discussed activities in school with parents) had the largest loading at .729 with a standard error of .458 but was insignificant with a p-value of .112. The variable with the lowest loading was v7 (how often discussed coursework with parents) with a value of .296 and a standard error of .097, the variable v5 (discuss courses with parents) had a loading value of .33. Further analysis of the different models indicates that none of the measured variables were significant predictors of minority parent involvement. Conversely, only one of the loadings for the measured variables onto the latent factor was significant for the white group.

Research Question 3. The third research question in this study was: To what extent is the academic achievement of males explained by their exposure to higher-level coursework? The third latent factor, COURSE, turned out to have the largest loading on ACADACHIEVE with a value of .784, standard error of .025 and a p-value of .000 thus indicating statistical significance. Individually, Biology, Chemistry, and Calculus had respective loadings on the COURSE factor of .11, .35, and .47. These relationships were not significant in that they had p-values greater than 0.05. Analysis of the individual group models shows a significant loading (p-values of less than .05) onto the latent factor ACADACHIEVE of .817 for the white group and .780 for the minority group. The observed variables had respective loadings of .089, .254, and .545 for the white group (none significant) and .128, .463, and .395 for the minority group (none significant). The latent factor COURSE had a loading value onto ACADACHIEVE of .82 for the white group and .78 for the minority group, congruent with the results of the all-male model as

it was the largest predictor of academic success and was statistically significant for both groups (p-values of .000 for the white and .000 for the minority model).

Research Question 4. The fourth research question in this study was: To what extent does a between group difference exist between male students' academic achievement dependent on race when controlling for participation in extra-curricular activities, parent involvement, and exposure to higher-level coursework respectively and academic achievement? The loading of CARNEGIE onto ACADACHIEVE was -.154 for the minority students and 2.263 for the white students. This was a non-significant statistic as the p values were .117 and .923 respectively. The loading between the latent factors remained the same between groups at -.05, .10, and .258 for PARTICIPATION, PARENT, and COURSE respectively, p-values indicated statistical significance for COURSE with a value of .000. PARTICIPATION and PARENT were not found to be significant as their p-values were .264 and .608 respectively. This result shows that there is a between group difference on academic achievement between races in SS settings when other indicators of academic achievement are present. The only difference of statistical significance was for the latent variable COURSE.

Analysis of the observed variables indicated some difference between groups. The loading values of sports, band, play, government on the latent factor PARTICIPATION for the white group were 1.00, -.185, .168, and -2.938 with p-values over .05 indicating no significance except for government with a p-value of .000. The minority group values were 1.00, -.451, -.343, and -1.422 respectfully also insignificant with p-values over .05 except for government with a p-value of .002. For the latent factor PARENT, the observed variables discuss things studied, discuss activities, and discuss coursework for

the white group had values of 1.00, .424 and .812 respectively (all significant) and the minority group had values of 1.00, .382, and .890 respectively (all significant). The loading values of the observed variables chemistry, calculus, and biology onto the latent factor COURSE were 1.00, 2.974, and 6.571 respectively for the white group (all significant) and 1.00, 6.588, and 4.848 respectively for the minority group (all significant).

Table 3

Descriptive Statistics for Student and Parent Level Engagement Variables - All White

Study Variables	N	Mean (SD)	Minimum	Maximum
Participated in interscholastic sports	263	1.71(.772)	1	3
Participated in school band or chorus	261	1.15(.449)	1	3
Participated in school play or musical	261	1.13(.419)	1	3
Participated in student government	261	1.16(.453)	1	3
How often discussed school courses with parents	262	2.10(.645)	1	3
How often discussed school activities with parents	262	2.22(.692)	1	3
How often discussed things studied in class with parents	262	2.11(.660)	1	3
Years of Biology coursework	263	3.00(.441)	1	4
Years of Chemistry coursework	263	2.92(.631)	1	4
Years of Calculus coursework	259	1.53(.941)	1	4
Total Carnegie units-categorized	273	25.88(3.903)	6	34
GPA for all academic courses	273	2.8020(.60538)	1	6

Table 4

Correlations for Student and Parent Level Engagement Variables - White

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Sports	-											
Band or chorus	.02	-										
Play or musical	.00	.37**	-									
Student govt	.21**	-.06	.05	-								
Discussed courses	.10	.04	.01	.07	-							
Discussed activities	.28**	.02	.13*	.15*	.53**	-						
Discuss things studied	.06	.01	.05	.04	.40**	.48**	-					
Biology	-.02	.08	-.11	.17**	.04	-.09	.06	-				
Chemistry	.10	-.02	.01	.07	.17**	.13*	.09	.07	-			
Calculus	.12	.02	.04	.18**	.12	.10	.01	.16**	.22**	-		
GPA for all academic courses	.21**	.10	.09	.25**	.15*	.18**	.07	.09	.26**	.32**	-	
Carnegie Units –	-.05	.14*	.11	-.05	.08	-.01	.05	.14*	.16**	.15*	.19**	-

*p<.05. **p<.01.

Table 5

Descriptive Statistics for Student and Parent Level Engagement Variables - Minority

Study Variables	<i>N</i>	Mean (SD)	Minimum	Maximum
Participated in interscholastic sports	131	1.76(.812)	1	3
Participated in school band or chorus	131	1.22(.485)	1	3
Participated in school play or musical	129	1.16(.423)	1	3
Participated in student government	129	1.21(.570)	1	3
How often discussed school courses with parents	127	2.07(.704)	1	3
How often discussed school activities with parents	128	2.20(.722)	1	3
How often discussed things studied in class with parents	128	2.13(.721)	1	3
Years of Biology coursework	132	2.94(.549)	1	4
Years of Chemistry coursework	132	2.64(.830)	1	4
Years of Calculus coursework	128	1.34(.818)	1	4
GPA for all academic courses	141	2.6040(.65124)	6	34
Total Carnegie units – categorized	141	25.86(4.541)	1	6

Table 6
Correlations for Student and Parent Level Engagement Variables - Minority

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Sports	-											
Band or chorus	-.10	-										
Play or musical	-.05	.55**	-									
Student government	.04	-.06	.00	-								
Discussed courses	.16	.05	-.06	-.02	-							
Discussed activities	.30**	.03	-.13	.09	.54**	-						
Discuss things studied	.08	-.08	-.22*	.02	.39**	.40**	-					
Biology	.10	.07	.07	-.07	-.03	-.06	.04	-				
Chemistry	.03	.10	.16	.12	.10	.05	-.12	.09	-			
Calculus	-.01	.21*	.11	-.01	.06	.07	.02	.26**	.24**	-		
GPA for all academic courses	-.05	.09	.05	.22*	.16	.26**	.03	.20*	.50**	.43**	-	
Carnegie units –	.02	.14	-.06	-.02	.22*	.24**	.11	.11	.03	.16	.29**	-

*p<.05. **p<.01.

Table 7
Absolute, Parsimonious, and Incremental Fit Indices

	Absolute			Parsimonious			Incremental		
	df	P	X ²	SRMR	RMSEA	LB	UB	AIC	CFI
Recommended			NS	≤.08	≤.06				.95+
Measurement Model	48		183.714(.0000)	.0673	.0809			1351.347(est) 1263.633(sat)	.774
Measurement Model w MI	47		89.662(.0002)	.0460	.0458			1259.295(est) 1263.633(sat)	.929
All Male	50		100.709(.0000)	.0511	.0485			1264.343(est) 1263.633(sat)	.915
All Male w MI	48		70.778(.0179)	.0443	.0331			1238.412(est) 1263.633(sat)	.962
White Males	51		125.293(.0000)	.0684	.0730			611.701(est) 588.408(sat)	.795
White Males w MI	48		74.794(.0079)	.0533	.0452			567.203(est) 588.408(sat)	.926
Minority Males	51		86.189(.0015)	.0852	.0700			597.828(est) 613.639(sat)	.859
Minority Males (v3v2cov)	50		79.806(.0047)	.0861	.0650			593.444(est) 613.939(sat)	.880
Minority Males (v3v2cov/v1 to Parent)	49		74.801(.0102)	.0780	.0611			509.439(est) 613.639(sat)	.896
Minority Males w MI(prev + v7v5cov)	48		68.590(.0271)	.0790	.0552			586.229(est) 613.639(sat)	.917
Group Comparison Constrained Global	115		296.106(.000)	.0857/ .128	.0806			1240.621(est) 1201.515(sat)	.774
Group Test b/w Parameters	124		349.954(.000)	.101/.157	.0939			1303.469(est) 1201.515(sat)	.668
Group Test v9 released	123		319.654(.000)	.0929/.146	.0880			1275.168(est) 1201.515(sat)	.711

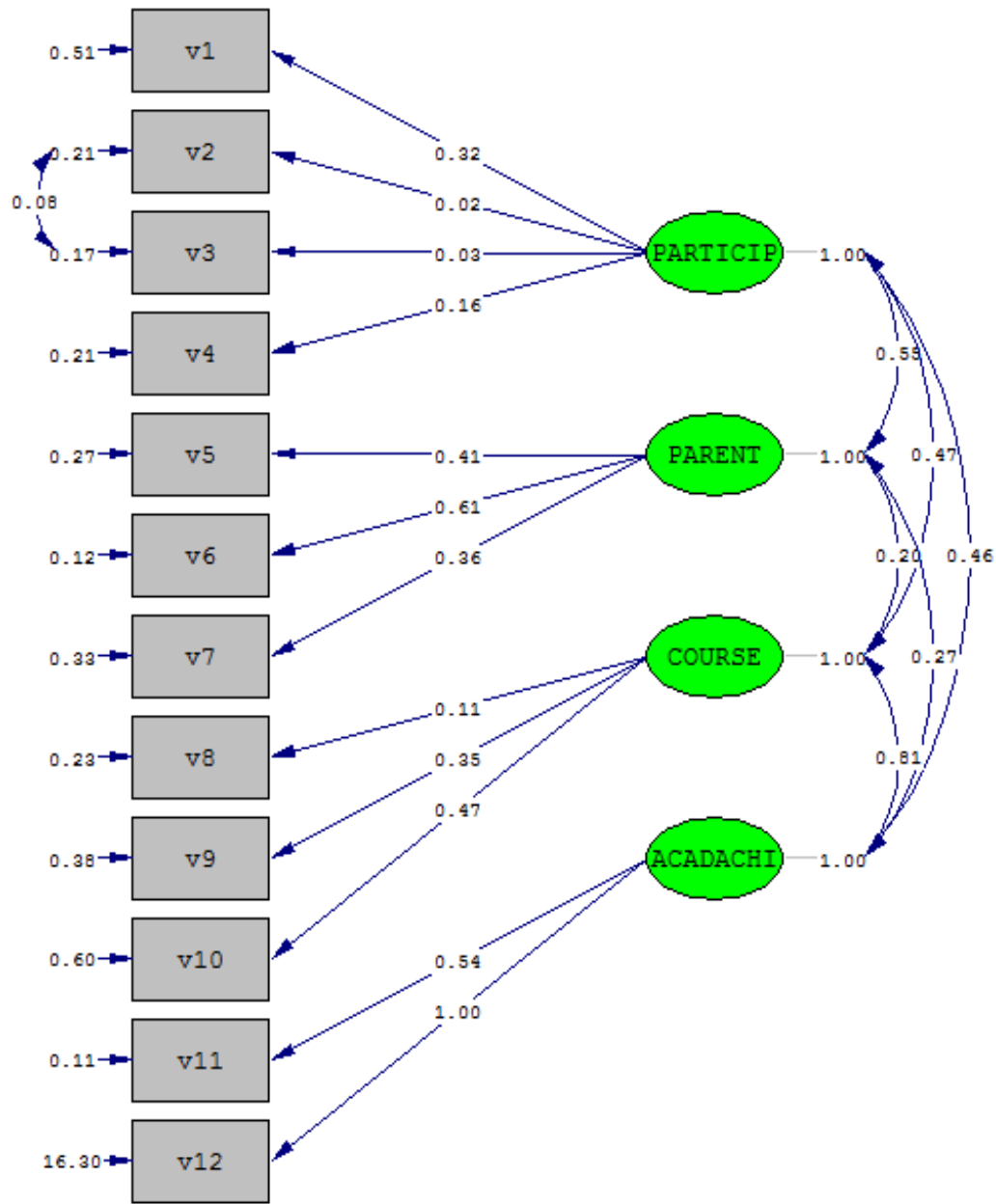
Table 8
Model Comparisons

Model	Fit			
	X^2	Df	p	CFI
Multi-Group No Constraints (Step 2)	296.106	115	.000	.774
Multi-Group Loading Constraints (Step 3)	349.954	124	.000	.668
Multi-group Constraints 1 release (Step 3b)	319.654	123	.000	.711

Table 9
Model Selection

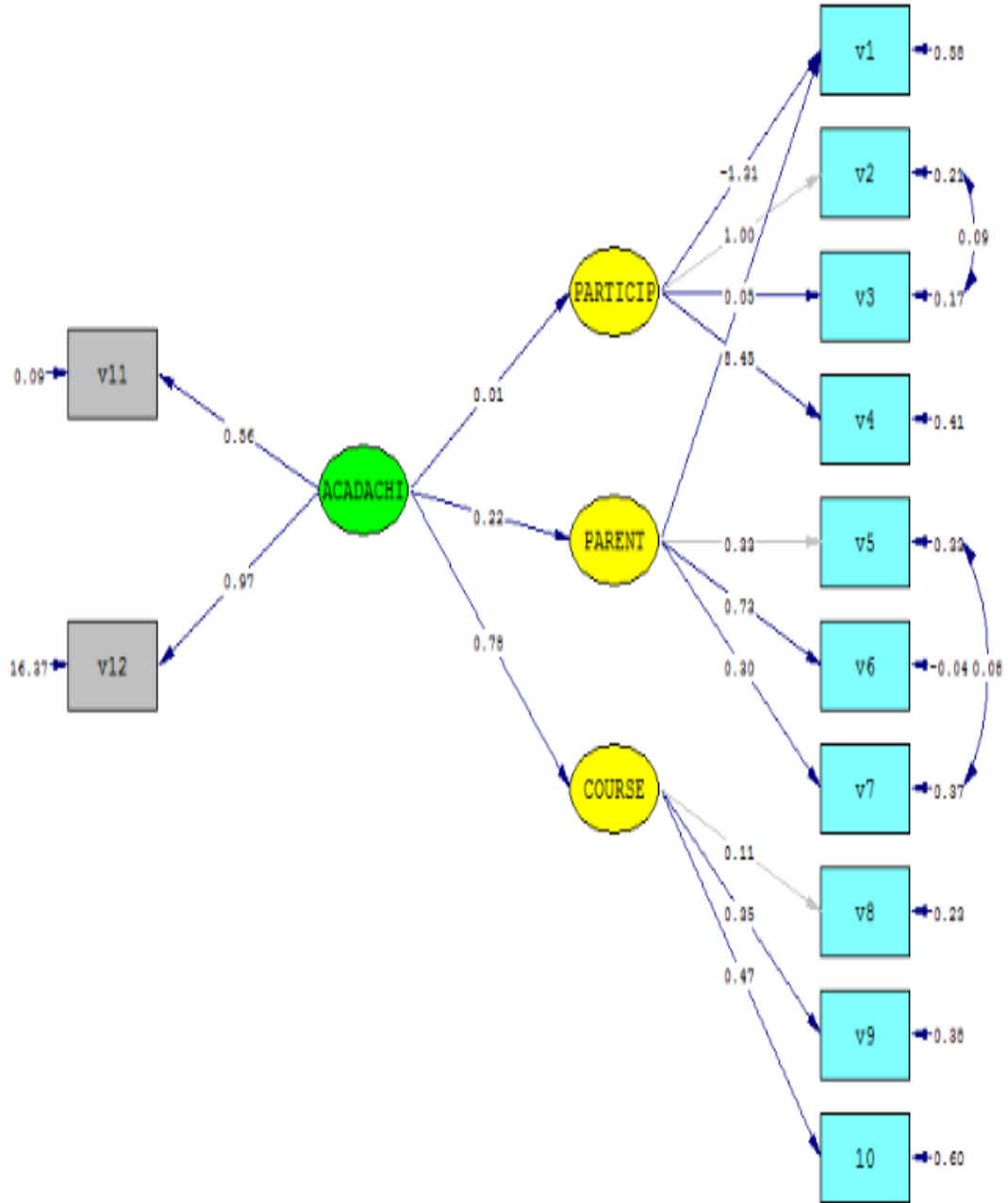
Model	Fit				Decision
	ΔX^2	Δdf	P	ΔCFI	Model Chose
Step2 v Step3	53.848	9	$\leq .05$.106	Step 2
Step2 v Step3b	23.548	1	$\leq .05$.063	Step 2

Figure 2
Measurement Model



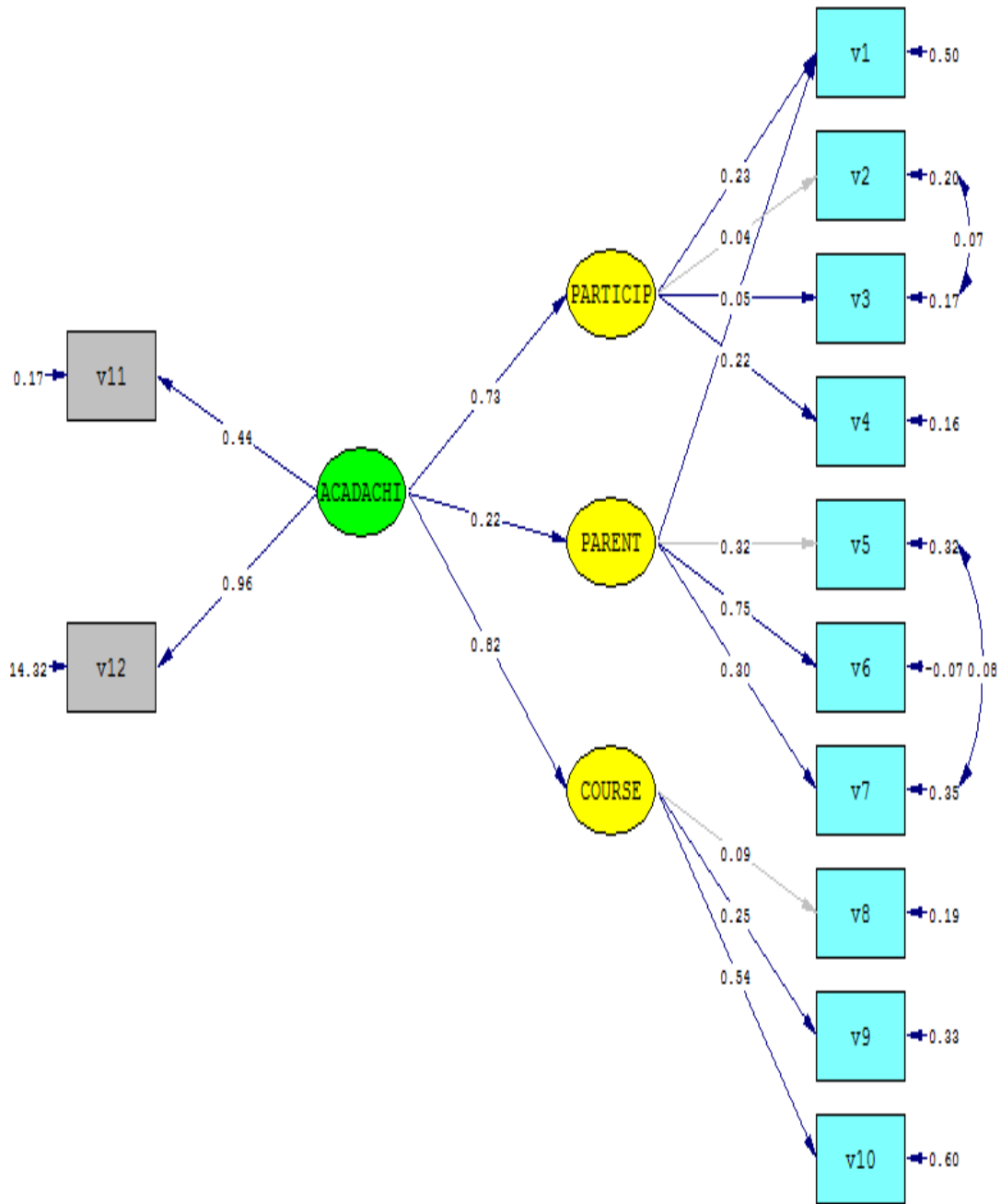
Chi-Square=89.66, df=47, P-value=0.00018, RMSEA=0.046

Figure 3
All Male Structural Model



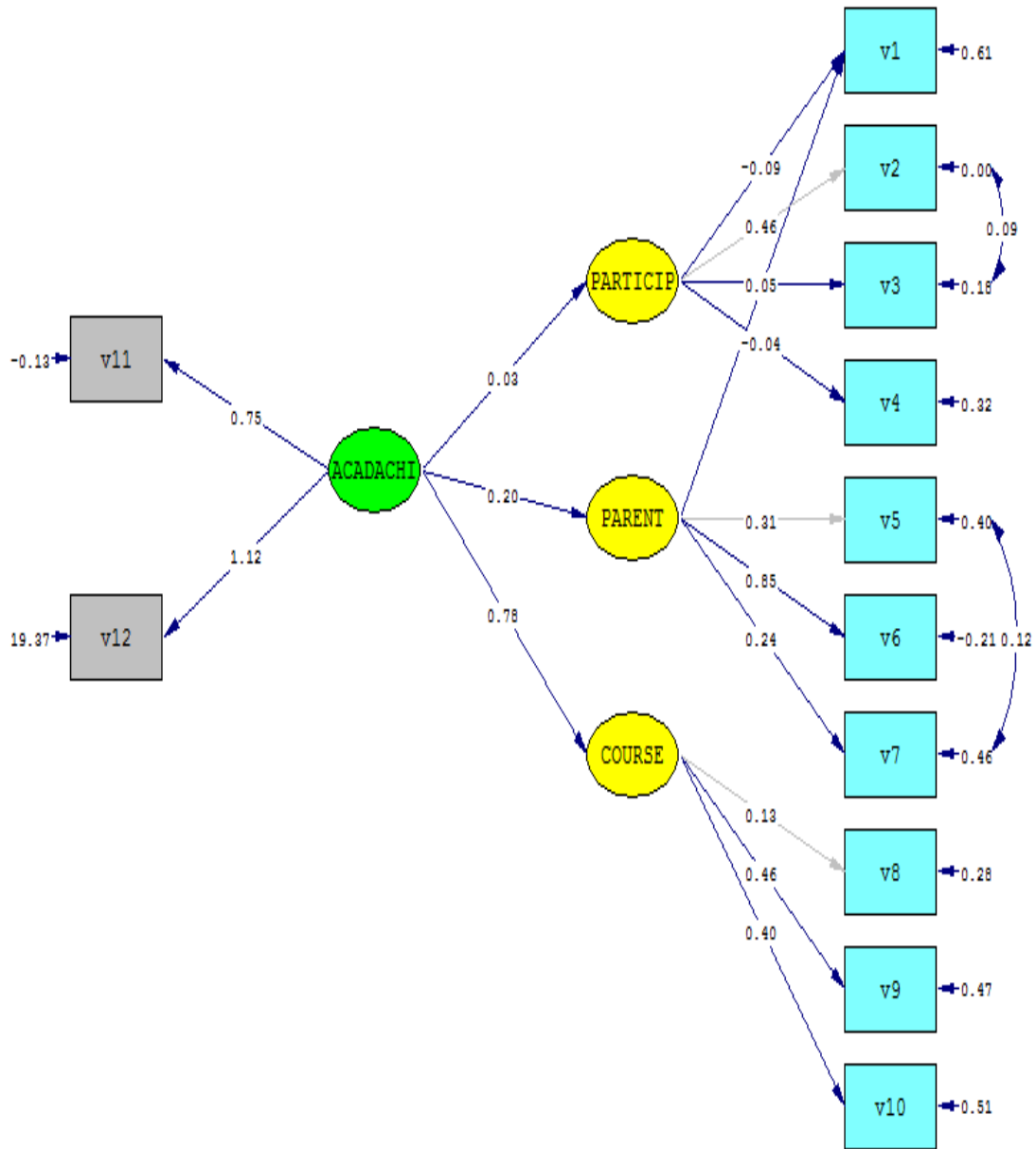
Chi-Square=70.78, df=48, P-value=0.01787, RMSEA=0.033

Figure 4
All White Structural Model



Chi-Square=74.79, df=48, P-value=0.00794, RMSEA=0.045

Figure 5
All Minority Structural Model



Chi-Square=68.59, df=48, P-value=0.02710, RMSEA=0.055

Chapter 5

The purpose of this study was to investigate the impact the latent factors have on academic achievement and further to investigate the group differences on academic achievement when comparing by race. Data from the Education Longitudinal Study of 2002 (ELS) and its subsequent follow up iterations were used for the analysis. A structural model was created reflective of theory and research based indicators of academic achievement to test the model. The analysis was conducted in line with four research questions designed to investigate the relationships, impact, and difference among the observed variables, latent factors, and academic achievement. This chapter will explore the limitations of the study, findings from the analysis, implications for practice and policy, and future research.

Limitations

The primary limitation in this study was the time frame in which the data was collected. It was not until 2006 that operating a SS school became a widely used viable option. The initial collection of data in 2002 limited the number of possible SS settings to be sampled. Had the first iteration of the study been conducted in 2006 or later (post-NCLB), the sample of students attending SS settings may have been larger thus leading to greater generalizability of the results and robust findings. For the purposes of this study and the methodology involved, however, the sample was still large enough to conduct the analysis and provide appropriate results although it was not large enough to provide good model fit.

The use of a secondary dataset was another limitation of the study. The researcher was limited in the design of the latent factors in that they were designed based on

measured observations selected by the previous researchers' dataset. There are many ways in which the latent factors could have been constructed to reflect similar intentions yet possibly have produced different results.

This study used a composite variable to include all subjects who were non-white into one subgroup, minority. All races within the study carry with them slightly different relationships with the observed variables and academic achievement. It was necessary to group all the subgroups into one in order to obtain a sample size large enough to be analyzed and contrasted with the white subjects. Future research could build upon this research by looking at subgroups individually in the comparison to further investigate the relationships between the observed variables and latent factors as well as the relationship between the latent factors and academic achievement.

The initial measurement model and subsequent structural models resulted in poor model fit. The fact that the model fit was poor for all models indicates that all results must be interpreted with caution. The theory did not match the data and thus the results should not be generalized within the larger discourse. The changes made to the structural models as suggested in the modification indices provided by LISREL were guided primarily by empirical evidence and did not reflect an appropriate guiding theoretical model. Future studies would produce results with broader generalizability by placing a stronger emphasis on the theory guiding the design of the models. Future research would benefit from conducting an exploratory factor analysis prior to conducting a confirmatory factor analysis thereby providing models that are more likely to fit the corresponding measurement and structural models. The exploratory factor analysis would inform the

researcher of potential data model fit issues prior to running the full structural models and modifications could be made accordingly.

Findings

The first three research questions were answered using the data from the structural model using the dataset consisting of all males with the recommended modification indices allowing the errors of PLAY and BAND to covary, the errors of DISCUSS COURSES and DISCUSS THINGS STUDIED to covary, and the path from v1 (participation in sports) to PARENT included. The fourth research question investigating the between group differences uses the group comparison model with no constraints. The model using all male data fit the data reasonably well after adding in modification indices. The resulting model had a CFI of .962, SRMR of .0443, RMSEA of .0331, and an AIC of 1238.412 indicating acceptable fit. The group comparison model used for analysis did not fit the data as well and several fit indices fell under recommended levels to be discussed in detail along with the discussion of the fourth research question.

The first research question in this study was: To what extent is the academic achievement of males explained by their participation in extra-curricular activities? Albeit small, participation in extracurricular activities is positively related to academic achievement for males enrolled in single-sex schools. Further, particular forms of extra-curricular activities differentially impacted the latent factor participation. Participation in sports is negatively correlated with the latent factor, whereas participation in band/chorus, play/musicals and student government are positively correlated to the latent factor. Participation in student government, however, is the only form of extra-curricular activity statistically significantly related to the latent factor participation. Interestingly,

the participation in sports is negatively correlated with the latent factor, although the relationship is not statistically significant. This finding does not coincide with much of the existing research on participation in extra-curricular activities. Researchers have found participation in extra-curricular activity to be positively correlated with academic achievement. Researchers such as DeMeulenaere (2010) and Trudeau & Shephard (2008) found a positive correlation with participation in sports with academic achievement. Research supporting the negative correlation exists but it is much less common. Kim (2014) found mixed results when analyzing the ELS data for a correlation between sports and academic achievement, dependent on the sport selected. For the purposes of this research study, the type of sport was not disaggregated. Selection of specific sports reflective of academic achievement may have yielded different results and future research would benefit from this additional analysis.

When examining the minority-only group, none of the observed variables had any significant correlation with the latent factor PARTICIPATION. The correlations of all forms of extra-curricular activities were very close to zero, and non-significant. These findings suggest that the observed variables chosen to represent the latent factor PARTICIPATION were poor predictors of the possible relationship of participation in extra-curricular activities for minority males attending single-sex schools. When comparing between groups, researchers such as Shulruf (2010) found that a relationship existed between extra-curricular participation and academic achievement, but no causal effect existed. Others such as Simoncini & Caltabiono (2012) and Sohn (2008) have found that a causal relationship did exist; further, Demeulenaere (2010) found a positive correlation between sports and academic achievement for urban youth. Considering

findings such as theirs, in order to interpret the findings from the current study, one must be reflective of the variables selected to make up the latent factors and whether or not they were appropriate for both groups of students.

The second research question in this study was: To what extent is the academic achievement of males explained by the level of parental involvement? Parent involvement was found to positively affect the achievement of males enrolled in single-sex schools. Further, when compared to student participation in extra-curricular activities, it has a greater influence on academic achievement. An examination of the various ways in which parents can be involved suggest that students discussing school activities with their parents contributed more to the latent factor parent involvement than how often they discussed their coursework with their parents. This is not surprising as the measured variable (participation in sports) is also statistically significantly correlated with the latent factor (PARENT) as sports are loosely referred to activities. This finding is consistent with other research; for example, Addi-Racah & Arviv Elyashiv (2006) and Hayes (2011) who found that a higher level of parent involvement is reflected in increased student achievement. A similar pattern was found when analyzing the minority model and the white model in that these variables were again insignificant measures of minority student's level of parent involvement. Overall, parent involvement had a greater impact on academic achievement for white males than minority males attending single-sex schools. This is an important finding in that research has traditionally found that parent involvement in school has been positive correlated to academic achievement. This finding could be due to the measured variables chosen to represent the latent factor PARENT did not represent minority students conception of parent involvement.

The third research question in this study was: To what extent is the academic achievement of males explained by their exposure to higher-level coursework? Student's exposure to higher-level coursework had the greatest impact on the latent factor ACADACHIEVE when compared to all the latent factors. This finding is not surprising given that students who are exposed to academic subjects considered challenging for multiple academic years are traditionally the students who are academically motivated and high performing (Clarke, Scafidi, & Swinton, 2012; Mayer, 2008; Parke & Keener, 2011). As expected based on the analysis of the first two research questions, the loading values of the measured variables was insignificant in the minority male group indicating they are poor predictors of minority males exposure to higher level coursework. The values between the groups were not very different and all went in the same direction. The loading value of the latent factor COURSE onto ACADACHIEVE was however significant for when comparing the minority and the white model indicating that exposure to higher level coursework is a significant predictor of academic achievement for all students in this study.

The final research question in this study was: To what extent does a between group difference exist between male students' academic achievement dependent on race when controlling for participation in extra-curricular activities, parent involvement, and exposure to higher-level coursework respectively and academic achievement? Analysis of this model shows that there is a difference between the groups academic achievement. This difference should be interpreted with caution for any future research as the results were insignificant. These results confirm the hypothesis that a between group difference exists between minority and white students who attend SS settings and controlling for

participation in extra-curricular activities, level of parent involvement, and exposure to higher-level coursework however only significant for parent involvement and higher-level coursework.

One interesting component of this data is that the loading values of the observed variables on their respective latent factor differed between groups indicating that a difference exists between variables between races. The difference in loading indicates that GPA and Carnegie Units are better measures of academic achievement for White males, as the minority male's correlation was negative. The low and statistically insignificant value of PARTICIPATION loading onto ACADACHIEVE indicates that the latent factor for participation is not a good predictor of academic achievement for minority males. The finding that participation in extra-curricular activity is a poor predictor of academic achievement for minority males is supported in earlier literature (Salomone, 2006; Smyth, 2010) referencing the selection effect inherent in SS research as many of the white SS schools are private elite institutions with robust extra-curricular programs.

The difference in loading between races could prove problematic in analyzing the between group differences but there is research that would support the differences between the loadings. The loading of the observed variable Biology on the latent factor COURSE was higher for the minority group although both statistically significant. Biology is a science on which the instruction is vocabulary intensive when compared to the other sciences. Biology is a subject is traditionally underrepresented by minorities (Mead, Clarke, Forcino, & Graves, 2015; Sakai & Lane, 1996). Thus, if a minority student is exposed to multiple years of Biology; it is likely they are taking multiple high

level courses which helps to explain why the observed variables that make up the latent factor COURSE are good representations of minority students in the group comparison model. Conversely the loading of calculus onto COURSE was smaller for minorities compared to the white group and they were both significant. The loadings of the observed variables on the latent factor PARTICIPATION were also different although not as large of a difference as the loadings onto COURSE. The loading difference of students' participation in band and theatre were relatively small but still significant between groups. All were statistically significant with the exception of participation in theatre for the minority group. The observed variable for student participation in government had a larger loading value for white students. The larger loading value would indicate that participation in student government is a stronger predictor of overall involvement in extracurricular activities for white students compared to minorities. Thomson found that the culture of a school is a large predictor of student participation in extra-curricular activities. School culture as a predictor of student achievement, when viewed through the context of other researcher's findings (Irving & Hudley, 2008; Noguera, 2008) about minority student development and the desire to identify with cultural norms and be viewed as "non-white" could help to explain why it is a greater predictor for white students in regards to student participation. The differences between groups for the observed variables loading onto the latent factor PARENT were small indicating minimal difference between the groups.

Implications

The data and subsequent analyses provide support for the argument that more research needs to be conducted in this area in order to find appropriate and generalizable

results. The data was supportive of all the hypotheses. This study provides a basis for support for involvement in extracurricular activities, high levels of parent involvement, and students taking higher-level courses. These were not unexpected findings as the measured variables that made up the latent factors were selected based on prior research indicating they were predictors of increased academic achievement. This study also provided additional support for SS educational settings as all subjects were educated in SS settings.

For the practitioner. The findings from this study were not unexpected so the implications for the practitioner are limited in terms of novelty. Practitioners should continue to encourage students to attempt higher levels of coursework as they progress through school. Students' exposure to higher-level coursework had positive correlations with academic achievement regardless of whether students were white or minority. The same holds true when interpreting the findings for the other two latent factors (participation in extracurricular activities and level of parent involvement) in that they had positive correlations with academic achievement regardless of race.

For policy. Policies are already in place allowing for SS education to take place. This research shows that effective education and academic achievement can take place in SS settings. Methodological limitations prevent this study from being used as a complete representation of SS settings and would not be useful in court when trying to speak to the defensibility of SS settings. However, in parts, the study could be used to defend the lack of a negative impact of SS settings as well as the value of individual student and parent level variables and their usefulness as predictors of academic achievement when used in a SS setting. This research adds to the research currently in place and should be taken into

consideration when reauthorization is taking place or when policy that would impact SS settings is being considered. These policies should remain in place and continue to be reevaluated as planned. This research study is not reflective of policy currently in place as it was conducted prior to the current policies in place concerning the implementation and sustaining of SS environments. This research study should still be considered important when considering future policy. Although it does not show a particularly strong level of support for SS environments, it also does not show a negative impact of the SS environment. This is congruous with similar findings; particularly the U.S. DOE report (2005), which referenced the lack of empirical studies finding anything other than small if any positive impact or a null effect.

Future Research

This study provides a foundation for future researchers interested in SS environments as well as parent and student level indicators of increased academic achievement. A study similar in design with a different dataset would be valuable in that the first collection of data from this dataset was conducted prior to the authorization of No Child Left Behind, and the relaxed regulations in regards to SS schools. The number of SS schools increased after NCLB and thus the availability of SS schools to draw from when creating the dataset would be larger and more reflective of that community.

Additional studies could broaden the conversation by constructing latent factors out of different observed variables, this would further the discussion as to the impact that the SS settings has on the students' academic achievement when other factors reflective of academic achievement are present. Many of the chosen variables were not strong predictors of minority participation in extra-curricular activities, parent involvement, or

higher-level coursework, and thus the latent factors were not a good representation of minority students with the exception of ACADACHIEVE as those values were significant for minority males. Future research should account for differences between the different minority groups as this may lead to better observed variable selection in turn leading to better latent factor construction. This research study did not disaggregate by minority and as a result the minority latent factors were poorly constructed.

Additional predictor variables such as socio economic status (SES) could further define the population and possibly support better model fit as well. In addition to conducting research when choosing variables specific to minority males, an exploratory factor analysis prior to a confirmatory factor analysis would allow the research to fix identification issues before running the full structural models. An exploratory factor analysis was not conducted in this study and in turn, many of the relationships were found to be insignificant and many of the models did not fit the data. This presents a large problem in that the findings are for the most part not generalizable to a larger discussion on SS schools.

Future researchers would benefit from assessing the latent constructs individually prior to or instead of assessing them as part of the entire model. Problems with invariance could be identified and addressed before the full measurement model is constructed thus leading to model construction that fits the data and the resulting analysis would be applicable to the larger discourse. Further, additional insight might have supported the treatment of individual variables as individual constructs and to create a path analysis.

The use of a dataset with a larger proportion of students from SS settings would make other types of statistical analysis possible. In addition to other types of statistical

analysis, a larger dataset would allow SS settings to be compared to coeducational settings as well. Initially this research study was designed to study the impact of SS settings on African American males using SS as a moderator to compare with coeducational settings. Once the data was screened and the target population was analyzed, it was discovered that it was much too small to run an analysis with any significance and hence the method and target population were modified to reflect an appropriate study.

Summary and Conclusion

This research was conducted in an attempt to determine what if any impact the latent factors (participation in extra-curricular activity, parent involvement, and exposure to higher-level coursework) had on male academic achievement. In addition, between group differences were measured to compare white and minority males. It was discovered that the latent factors did have a positive impact on academic achievement for both groups. Although at times the impact was different dependent on the group, in general the direction and approximate impact were close to each other regardless of the group. This study supported the researcher's hypotheses. Further studies would need to be completed with additional controls, a larger sample, and different latent factors in order to further understand the impact of the SS environment and its correlation to a student's racial status.

This research study added to the research discussed in the literature review section of this dissertation, specifically the literature supporting the connection of the parent level and student level variables and their impact on student achievement. Differences existed between groups when analyzing specific measured variables and their contribution to the

latent factors. The reasons for these differences could be further investigated in future research. If these differences could be accounted for in future research, latent variables could be constructed using measured variables that were more aligned with respect to their impact relative to race.

This research contributes to the discussion on SS education and its effectiveness as it adds to the base of research showing that SS environments can be conducive to academic achievement. This research study does not give a definitive answer as to the value or lack thereof for SS environments but it does add to the larger discussion. This research would have to be conducted many more times, modified, and account for other factors in order to provide any substantial contribution to the discussion, it is however a start.

This research study lacks generalizability as a complete study due to significant methodological limitations. Predictive relationships were discovered between individual observed variables and latent factors; however, the structural model, in its entirety, is not a valuable addition to the discourse on the value or lack thereof of SS settings. Individual components of the study support the defensibility of SS settings as they are continually analyzed and scrutinized. Any negative impact of SS settings was negligible at best further supporting the use of SS settings when the situation is appropriate.

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Appendix A

Table 10
Descriptive Statistics for Student and Parent Level Engagement Variables

Study Variables	N	Mean (SD)	Minimum	Maximum
Participated in interscholastic sports	14054	1.56(.757)	1	3
Participated in school band or chorus	14038	1.26(.548)	1	3
Participated in school play or musical	14022	1.17(.442)	1	3
Participated in student government	13973	1.119(.512)	1	3
How often discussed school courses with parents	13461	2.06(.674)	1	3
How often discussed school activities with parents	13453	2.12(.717)	1	3
How often discussed things studied in class with parents	13440	2.09(.662)	1	3
Years of Biology coursework	14708	2.84(.762)	1	4
Years of Chemistry coursework	14652	2.35(.988)	1	4
Years of Calculus coursework	14529	1.31(.734)	1	4
GPA for all Academic courses	14784	2.57(.835)	0	6
Total Carnegie units-categorized	14808	24.05(5.537)	6	34

Table 11
Correlations for Student and Parent Level Engagement Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
Sports	-											
Band or chorus	.027**	-										
Play or musical	.031**	.333**	-									
Student government	.165**	.082**	.111**	-								
Discussed school courses	.095**	.062**	.050**	.088**	-							
Discussed school activities	.278**	.131**	.122**	.150**	.516**	-						
Discuss things studied	.066**	.057**	.044**	.097**	.444**	.468**	-					
Biology	.083**	.029**	.041**	.053**	.068**	.066**	.041**	-				
Chemistry	.152**	.065**	.069**	.117**	.108**	.150**	.066**	.304**	-			
Calculus	.137**	.071**	.049**	.124**	.050**	.100**	.047**	.163**	.285**	-		
GPA for all Academic courses	.187**	.154**	.118**	.208**	.149**	.214**	.132**	.146**	.425**	.372**	-	
Total Carnegie Units –	.128**	.111**	.061**	.080**	.089**	.118**	.059**	.041**	.218**	.122**	.476**	-

* p<.05. ** p<.01.

Table 12

Variables

BYA11 – School is coeducational

BYSEX – Sex Composite

BYRACE – Student’s race/ethnicity composite

Latent Factor Participation in extra-curricular activity

F1S26B – Participated in interscholastic sports

F1S26C – Participated in school band or chorus

F1S26D – Participated in school play or musical

F1S26E – Participated in student government

Latent Factor Parent Involvement

F1S64A – How often discussed school courses with parents

F1S64B – How often discussed school activities with parents

F1S64C – How often discussed things studied in class with parents

Latent Factor Higher-Level Coursework

F1S17H – Years of Calculus

F1S16F – Years of Chemistry

F1S16C – Years of Biology

Latent Factor Academic Achievement

F1RAGP – GPA for all academic courses

F1RHTUNP – Total Carnegie units – categorized

The Education Longitudinal Study of 2002 and its follow ups were the data set used to investigate the model developed for this research study.