Predicting success: Academic potential and talent development factors among Black and White students

Valija Cynthia Rose
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PREDICTING SUCCESS: ACADEMIC POTENTIAL AND TALENT DEVELOPMENT FACTORS AMONG BLACK AND WHITE STUDENTS

A Dissertation
Presented to
The Faculty of the School of Education
The College of William and Mary in Virginia

In Partial Fulfillment
Of the Requirements for the Degree
Doctor of Philosophy

by
Valija Cynthia Rose

May 2009
PREDICTING SUCCESS: ACADEMIC POTENTIAL AND TALENT DEVELOPMENT FACTORS AMONG BLACK AND WHITE STUDENTS

by

Valija Cynthia Rose

Approved May 2009

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DEDICATION

To my parents, Dr. La Francis Rodgers-Rose and Dr. Vattel T. Rose,
for unconditional love and unwavering support

To my grandmother, Beulah Polly Smith Rodgers (1908-1980),
for wisdom and strength untold

To the waymakers, known and unknown, seen and unseen,
I stand tall on your shoulders
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ABSTRACT

A broadened conception of giftedness has impacted the language and nature of the field of gifted education, making talent development its central metaphor. Despite the emergence of the talent development paradigm, relatively little talent development research exists among racially and socioeconomically diverse learners. The purpose of this study was to expand upon talent development research and to examine how well academic potential predicts success.

This study employed secondary data analysis of the National Education Longitudinal Study of 1988 (NELS:88). Françoys Gagné’s Differentiated Model of Giftedness and Talent served as the theoretical and conceptual framework. The analytic sample included 1,916 Black and White eighth grade students who scored in the top decile within their racial group on any one of four base-year achievement tests. Descriptive statistics and regression analyses were used to examine educational degree attainment and occupational prestige.

Findings revealed that socioeconomic indicators were the most influential predictors of success for both Black and White students. Additional common predictors of success included attending a private school, grades being important, and participation in gifted programs for Black students and Advanced Placement programs for White students. Additional findings demonstrated comparable educational degree attainment and occupational prestige across race and levels of academic potential.
Several interrelated implications for policy, practice, and research emerged from this study. Most notably, policy implications include establishing identification policies that err on the side of inclusion, and a shift in focus from early indicators of the achievement gap to an emphasis on long-term educational and life outcomes.

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DEVELOPMENT FACTORS AMONG BLACK AND WHITE STUDENTS
CHAPTER ONE: THE INTRODUCTION

Introduction


In an increasingly global economy that relies heavily on higher order thinking and problem solving skills, American students have consistently performed poorly on standardized measures in comparison to their international counterparts (see National Commission on Excellence in Education, 1983; U.S. Department of Education, 2000). This reality has caused tremendous concern among American business and political leaders who question the nation’s ability to maintain its competitive edge and to continue to be a leader in innovation throughout the world. Within the field of gifted education, and possibly in American society more largely, many people look to the nation’s top students to make significant contributions in the proliferation of innovative ideas and products (Subotnik & Arnold, 1994; U.S. Department of Education, 1993). These
contributions in turn enhance America's ability to remain competitive. But is this expectation of significant contributions from the nation's top students a reasonable one?

For more than 80 years, researchers within the field of gifted education have been trying to determine the predictive validity of intelligence (Subotnik & Arnold, 1994). This quest for predictive validity manifests itself in questions such as: To what extent does intelligence predict achievement? Are gifted children more likely to become extraordinary adults, eminent in fields such as science, mathematics, and the arts? Assuming that intelligence does in fact predict achievement, and that gifted children are more likely to become eminent in their chosen field, possibly a more important question is by what process does this occur?

The developmental process that "focuses on the optimal... development of each student" (VanTassel-Baska, 1998, p. 760) is referred to within the field of gifted education as talent development. Talent development is not only central to the ideals of gifted education; talent development is an ideal that should apply to education more generally (VanTassel-Baska). This sentiment of talent development for all was expressed in *A Nation at Risk* in declaring, "All, regardless of race or class or economic status, are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost" (National Commission on Excellence in Education, 1983, p. 1). This assertion maintains that everyone deserves the opportunity to develop to their fullest potential, intellectually and otherwise.

The purpose of the research topic under study in this analysis was two-fold. One was to examine how well academic potential predicts success, and the other was to examine how factors impact the talent development process. This area of inquiry holds
great promise in making a contribution to the field of gifted education and to education more broadly by connecting theory, research, and practice. The results of this study provide guidance to policymakers and administrators in crafting policies and programs that nurture and support the development of talent among an increasingly diverse student population.

This introductory chapter outlines the topic of research, beginning with a statement of the problem. Next, the chapter describes the theoretical and conceptual framework through which the problem was investigated. Then the chapter reviews the purpose of the study and the method of inquiry. After presenting the research questions and definition of terms, the chapter concludes with the significance of the study and the limitations of the study.

Statement of the Problem

The field of gifted education has experienced a paradigm shift (Kuhn, 1996; Olszewski-Kubilius, 2009). From a relatively narrow conception of giftedness that focused almost exclusively on general intellectual ability, to a broader conception that recognizes outstanding abilities in a wide variety of areas, the field of gifted education has begun to embrace giftedness in all of its complexity and multidimensionality (Moon & Dixon, 2006; VanTassel-Baska, 1998). Early research within the field of gifted education viewed giftedness as a relatively stable, dichotomous construct, evidenced by high scores on mental measures such as an IQ test (Borland, 2005). Currently, giftedness is largely considered a malleable construct that manifests itself in a wide variety of areas, and requires systematic development (Gallagher, 2003; VanTassel-Baska, 2005).
This broadened conception of giftedness has impacted many aspects of the field of gifted education, including the identification of students and the provision of services (Feldhusen, 1998; Treffinger, 1998; VanTassel-Baska, 1998). Notably, this broadened conception of giftedness has also impacted the language of the field. Students who have been recognized as having outstanding abilities have been referred to as gifted, talented, high-ability, high-achieving, and high potential, among other things. Little consensus exists within the field of gifted education on the proper terminology to use when “labeling” this group of students. Where consensus does seem to exist is in the recognition that outstanding potential, whatever it is called, must be nurtured and developed (Feldhusen, 1998, 2001; Treffinger, VanTassel-Baska), and that the process through which outstanding potential is developed, the talent development process, is a complex one that is impacted by a number of factors, both internal and external to the learner (Gagné, 2009; Piirto, 2004; Tannenbaum, 2003).

Despite broader conceptions of giftedness and the emergence of the talent development paradigm within the field of gifted education, relatively little empirical research exists on the talent development process. Early, yet seminal studies focusing on the talent development process (e.g., Bloom, 1985; Csikszentmihalyi, Rathunde, & Whalen, 1993) made significant contributions to the field’s understanding of the factors that impact talent development. However, the more recent of these two studies is now 15 years old. Not only are the Bloom study and the Csikszentmihalyi et al. study now dated, but both studies relied on sampling techniques that did not yield a racially/ethnically diverse group of participants. While both studies explicitly discussed gender, neither made significant references to race.
As the field of gifted education fully embraces the broader concept of talent development and recognizes that indeed, "Outstanding talents are present in children and youth from all cultural groups, across all economic strata" (U.S. Department of Education, 1993, p. 26), it is imperative that the field possesses a broader understanding of the talent development process. In addition to the need for a broader understanding of the talent development process, a deeper understanding of that process is also needed. Following the publication of *Frames of Mind* (Gardner, 1983) several theories of talent development emerged within the field of gifted education (e.g., Gagné, 1985, 1995, 2003, 2008, 2009; Piirto, 2004; Tannenbaum, 2003). Some of these theories incorporated the idea of ability within a specific area or domain, which develops over time, and is impacted by personality characteristics, environmental factors, and chance.

Although talent development theories have emerged within the field of gifted education, some researchers maintain that few theories actually guide the field’s research efforts (Coleman, 2006a; Robinson, 2006). To this end, Coleman has asserted, “Our field is largely atheoretical and theory-laden. The research in our field is not theory driven, but rather is theory associated” (p. 348). Coleman’s observation clearly identifies the need for theory-driven research within the field of gifted education. However, more than just conducting theory-driven research for the sake of research, research must inform practice. The field of gifted education, similar to education more largely, lacks coherence in translating research to practice (VanTassel-Baska, 2006). Consequently, studies are needed that make contributions on all three fronts of theory, research, and practice.

As talent development has come to represent the primary paradigm within which giftedness is viewed in the field of gifted education, a closer examination of talent
development theories is required. For example, among the various talent development
theories, are some more successful than others in describing the process that nurtures and
develops outstanding potential? A Nation at Risk (National Commission on Excellence in
Education, 1983) clearly outlined the need for everyone to be given the opportunity to
develop to their fullest potential, but is talent development the same for everyone? Are
particular factors more or less important in talent development among various
populations? The answers to questions such as these are critical in establishing policies
and practices that promote excellence in education and support the optimal development
of all learners.

Theoretical and Conceptual Framework

The theoretical and conceptual framework for this study was the Differentiated
theory, the DMGT is said to have laid the foundation for a focus on talents within the
field of gifted education (Feldhusen, 2001) and captures many of the elements
Csikszentmihalyi et al. (1993) found to be instrumental in the talent development process
(Moon, 2006). The DMGT was originally published in 1985 and has evolved
considerably over the past 25 years (Gagné, 2009). The version of the model that served
as the theoretical and conceptual framework for this analysis was the one presented in
Building Gifts Into Talents: Detailed Overview of the DMGT 2.0 (Gagné, 2009). The
DMGT 2.0 incorporates numerous changes introduced to the model since Gagné’s
retirement (Gagné, 2009).

The DMGT is an interactive talent development model. Central to the model is
the distinction between giftedness and talent. This distinction is critical given ambiguity
within the field of gifted education relative to these two terms (Gagné, 1985, 1995, 2003, 2009; Moon & Dixon, 2006; Robinson, 2006). In the DMGT, "Giftedness designates the possession and use of outstanding natural abilities, called aptitudes, in at least one ability domain to a degree that places an individual at least among the top 10% of age peers" (Gagné, 2009, p. 63, in original). There are six ability domains identified in the DMGT, four belonging to the mental subcomponent and two belonging to the physical subcomponent. The four mental ability domains are: intellectual, creative, social, and perceptual. The depiction of the DMGT provided in Figure 1 illustrates the subcategories of each ability domain. Intellectual giftedness encompasses general intelligence, frequently denoted g, as well as domain-specific abilities. In addition to recognizing intellectual domains of ability, the model recognizes ability in areas as diverse as motor control and leadership.

In contrast to the definition of giftedness, "Talent designates the outstanding mastery of systematically developed abilities, called competencies (knowledge and skills), in at least one field of human activity to a degree that places an individual at least among the top 10% of age peers who are or have been active in that field." (Gagné, 2009, p. 63, in original). The model outlines a diversity of fields in which talent can be displayed, including academics, work-related fields, games, and sports and athletics. New to the DMGT 2.0, ACT's World-of-Work taxonomy (ACT, 2008 as cited in Gagné, 2009) is utilized as a means to classify work-related talent fields.
Figure 1. Gagné’s Differentiated Model of Giftedness and Talent (DMGT 2.0).

"Talent development corresponds to the progressive transformation of gifts into talents" (Gagné, 2009, p. 63). The talent development process captures the systematic pursuit of specific excellence goals, over time, through structured programs and activities, and is undergirded by the concepts of maturation, learning, and practice (Gagné, 2009). Whether the learning and practice are formal or informal, whether they occur within an institution or outside of an institution, they play an important role in the development of talent. The DMGT 2.0 highlights significant revisions to the developmental process component of the model. This expanded component includes learning activities, the investment of time and money, and stages of development characterized as progress. The developmental process along with giftedness and talent combine to form the DMGT's basic trio of components.

The remaining components of the DMGT are intrapersonal catalysts and environmental catalysts. Similar to other components of the DMGT, the intrapersonal and environmental catalysts have been revised in this current version of the model. Although both of these catalysts directly impact and interact with the developmental process, the environmental catalysts now pass through the sieve of the intrapersonal catalysts. Previously, depictions of the model showed intrapersonal and environmental catalysts equally impacting the talent development process. Because of the new placement of intrapersonal catalysts in the DMGT, this component will be explored first.

The intrapersonal catalysts encompass physical and mental traits, as well as goal management. The physical and mental traits/characteristics include appearance, health, temperament, personality, and resilience, all of which are under the partial influence of genetic endowment (Gagné, 2003, 2008, 2009). Previously, Gagné (2003) has recognized
numerous psychological factors associated with talent development. In fact, he suggested that they were too numerous to name. Under the current iteration of the DMGT, many of these psychological factors are captured under the goal management component of intrapersonal catalysts.

Goal management consists of three subcomponents, awareness, motivation, and volition. Self-awareness influences self-concept and self-esteem (Gagné, 2004), and plays an important role in planning developmental activities (Gagné, 2009). Within the DMGT, motivation and volition are distinguished from one another as goal-identification activities versus goal-attainment activities. "The term motivation is reserved for goal-setting processes (e.g., identifying and selecting interests, needs, motives, passions, values), whereas the term volition covers all goal-attainment activities (e.g., resource and time allocation, delay of gratification, effort, perseverance, self-regulation)" (Gagné, 2004, p. 127, in original).

The environmental catalysts of the DMGT include milieu, individuals, and provisions. Previous versions of the environmental catalysts also included events. This subcomponent has now been renamed turning points, and has been placed under the progress subcomponent of the development process. The milieu consists of geographic, demographic, and familial surroundings, and can greatly impact the availability, affordability, and quality of programs and activities. Individuals, namely parents, family, teachers, peers, and mentors, can positively or negatively impact the talent development process. Specific provisions outlined in the DMGT include enrichment, curriculum pacing, grouping, and acceleration, although provisions cover "all forms of talent development services and programs" (Gagné, 2009, p. 70). Overlap exists between the
provisions subcomponent of environmental catalysts and the activities subcomponent of the developmental process. The distinction between the two may lie in the systematic, deliberate pursuit towards a specific goal within the developmental process.

The Differentiated Model of Giftedness and Talent was influenced by Tannenbaum’s (1983) work on the role of chance in the talent development process (Gagné, 2003, 2009). Frequently citing John William Atkinson’s (1978) “rolls of the dice,” Gagné has stated that chance impacts genetic endowment and the family circumstances into which a child is born. This assertion is of great import, given the impact that socioeconomic status, parental support, and other indicators of social capital have on academic achievement.

When examining earlier versions of the DMGT (Gagné, 1985, 1995, 2008) in comparison to the version on which this analysis relies (Gagné, 2009), one can clearly see that Gagné’s thinking about chance in the talent development process has evolved. Gagné (2003, 2004, 2008) has previously maintained that chance is the most important component of the DMGT. Although the current depiction of the model places chance behind gifts, environmental catalysts, intrapersonal catalysts, and the development process, the components it influences, Gagné maintains that chance in fact serves as a “_qualifier of any causal influence” (Gagné, 2009, p. 70, in original), and should no longer be included in the model.

An advantage of the DMGT is its comprehensiveness (Moon, 2006). Previous research has examined various components of the model, but has failed to look at the model comprehensively. This study made an attempt to examine the Differentiated Model of Giftedness and Talent holistically. The field of gifted education needs empirical
evidence that sheds light on talent development in general, as well as specific models of
talent development, such as the DMGT.

Purpose of the Study

The purpose of this study was two-fold. First, this study examined the age-old
question within the field of gifted education as to the predictive validity of aptitude or
potential. How well does academic potential predict future success? Next, this study has
expanded upon previous research that has examined the talent development process
among gifted learners to include a more diverse group of students, across racial groups
and domains of academic potential. Additionally, this study utilized the Differentiated
framework in analyzing the talent development process. Hopefully, the results of this
study contribute to an improved understanding of talent development among a wider
range of learners with academic potential.

Specifically, using a large, longitudinal, nationally representative probability
sample of youth, this study explored the role of demographic characteristics, levels of
academic potential, intrapersonal catalysts, and environmental catalysts in transforming
gifts into talents. Although talent development has been the predominant lens through
which the field of gifted education has been viewed over the last two decades, many
questions remain about the talent development process. Some of those questions are:
How well does a broadened conception of giftedness predict talent? What factors are
most important in predicting talent outcomes? How does the talent development process
differ among Black and White learners who exhibit academic potential? Do various
components of the DMGT impact Black and White learners who exhibit academic potential differentially? This study sought to answer these questions.

Method of Inquiry

Longitudinal research designs are most appropriate in examining the predictive validity of academic potential (Subotnik & Arnold, 2000). These designs collect information about the same individuals over time, which allows for changes within individuals to be examined. Several longitudinal studies have been conducted within the field of gifted education over the past 80 years, with various strengths, weaknesses, and methods of inquiry (Arnold & Subotnik, 1994; Subotnik & Arnold, 2000). A specific recommendation made to improve upon some of the weaknesses inherent in longitudinal research in general, and in longitudinal research within the field of gifted education in particular, is to recognize the value of secondary data analysis (Subotnik & Arnold). This type of analysis includes a large sample and facilitates answering questions about gifted populations and subgroups.

Consistent with Subotnik and Arnold’s (2000) recommendations, this study utilized secondary data analysis of a large-scale nationally representative longitudinal study. A variety of multivariate techniques were employed to address several research questions. Specifically, this study used data from the National Education Longitudinal Study of 1988 (NELS:88/2000). The NELS:88/2000 was funded by the U.S. Department of Education, National Center for Education Statistics (NCES) in an effort to provide trend data about the transitions from middle school to high school to postsecondary institutions and the work force. In the spring of 1988, a nationally representative sample of 24,599 eighth graders completed questionnaires on a range of topics including school,
work, home experiences, the role of parents and peers, neighborhood characteristics, educational and occupational aspirations, and other student perceptions (Curtin, Ingels, Wu, & Heuer, 2002). In addition to questionnaires, students completed achievement tests in four areas: reading comprehension, mathematics, science, and social studies. Many of the students who participated in the initial data collection wave were resurveyed in 1990, 1992, 1994, and 2000. A total of 12,144 students completed the fifth and final data collection wave (Curtin et al.). In addition to data collected from students, the multilevel NELS:88/2000 contains extensive survey information from parents, teachers, and school administrators.

Since talent development is a process that occurs over time, the NELS:88/2000 dataset, which contains a total of 12 years of data, was determined to be most appropriate for the research questions asked. These data provided information about participants eight years post high school graduation, which allowed enough time for the completion of advanced degrees and participation in a variety of occupations. The basic unit of analysis in this study was students who participated in all five data collection waves of the NELS:88/2000. Because this study used a nationally representative probability sample, the group of students who participated in all five data collection waves in fact represents a much larger group of students nationally.

Research Questions

Using descriptive statistics and multivariate analyses, this study addressed the following research questions:

1. How do the top 10% of Black students and the top 10% of White students compare on key variables relevant to talent development?
2. How do educational degree attainment and occupational prestige differ among Black and White students who exhibit varying levels of academic potential?

3. What talent development factors are most influential in predicting educational degree attainment among Black and White students who exhibit varying levels of academic potential?

4. What talent development factors are most influential in predicting occupational prestige among Black and White students who exhibit varying levels of academic potential?

Definition of Terms

1. Academic potential: Increasingly, the term potential is being used within the field of gifted education to capture the concept of aptitude for outstanding future performance. The DMGT defines giftedness as “the possession and use of outstanding natural abilities, called aptitudes, in at least one ability domain to a degree that places an individual at least among the top 10% of age peers” (Gagné, 2009, p. 63, in original). Earlier, yet recent presentations of the DMGT used the term potential as a descriptor for aptitude (e.g., Gagné, 2003, 2004). In alignment with the DMGT, academic potential in this study refers to individuals who scored in the top 10% within their racial group on any one of four achievement tests administered as part of the base-year NELS:88/2000. Although achievement is not a perfect correlate for aptitude, Lohman (2006) has indicated that achievement and aptitude tests measure the same underlying construct and demonstrate substantial overlap.

2. Educational degree attainment: Information on educational attainment in the U.S. has been collected in every decennial census since 1940. Educational attainment is an
indicator of success, with higher educational attainments associated with higher earnings (Crissey, 2009). In this study, educational attainment was derived from two NELS:88/2000 questions: F4HSDIPL determined the respondent’s high school diploma, GED, or certificate of completion status as of 2000; and F4HHDG determined the highest postsecondary degree earned.

3. **Levels of academic potential:** This term recognizes that students who exhibit academic potential may do so at varying levels or degrees. Gagné (2003, 2004, 2009) has discussed this issue as one of “the prevalence estimate” and has proposed a metric-based system of levels within the gifted/talented population. The first level, labeled mildly gifted, corresponds to the top 10%. The second level is labeled moderately gifted and corresponds to the top 1%. The levels become progressively more selective, with the fifth and final level labeled extremely or profoundly gifted. This level corresponds to the top 1:100,000. Using Gagné’s prevalence estimate as a guide, along with the frequently selected top 5% as an additional indicator of prevalence, levels of academic potential in this study refers to the top 1%, top 5% and top 10% or the 90th to 94th, the 95th to 98th, and the 99th percentile groups.

4. **Occupational prestige:** Occupational prestige scores are among the “most durable and widely used measures in the sociologist’s arsenal” (Nakao & Treas, 1994, p. 1). They represent the “social standing” or prestige of occupational titles and are used as one element in the calculation of socioeconomic index. The occupational prestige scores utilized in this study were derived from a nationally representative 1989 survey of more than 1,100 respondents. Each respondent was asked to rate 110 occupational titles on a scale from 1 to 9. The survey design allowed for the rating of 740
occupations (Nakao & Treas). According to the Nakao and Treas study, physicians hold the highest occupational prestige, with a score of 86.05.

5. **Talent development:** This term refers to what has become the “central metaphor for gifted education” (VanTassel-Baska, 1998, p. 760). Talent development focuses on the optimal development of each student. It is the dynamic, developmental process that transforms gifts into talents (Gagné, 2009). This process consists of activities, investment, and progress, and is impacted by giftedness, intrapersonal catalysts, and environmental catalysts. Within the context of this study, talent development is the process through which academic potential transforms and manifests itself into the completion of at least a bachelor’s degree and participation in a prestigious occupation.

**Significance of the Study**

As the field of gifted education has moved towards a talent development paradigm, more information is needed about the talent development process. Talent development research in the field of gifted education has largely been limited to retrospective case studies of eminent individuals (Bloom, 1985), prospective longitudinal studies of a relatively small number of individuals with similar demographic characteristics (Csikszentmihalyi et al., 1993), or longitudinal studies of the most elite group of prodigious youth in one particular domain (e.g., Study of Mathematically Precocious Youth, Lubinski & Benbow, 1994). While earlier research has been instrumental in laying the foundation for what is known about talent development among gifted learners, more research is needed using longitudinal designs on a broader group of students.
Broadened conceptions of giftedness should be reflected in research efforts within the field of gifted education. Not only does the talent development process need to be examined in domains such as mathematics, it needs to be examined in other domains as well. In that the federal definition of giftedness acknowledges the existence of outstanding talents across all cultural groups and all economic strata (U.S. Department of Education, 1993), research should examine the talent development process among students of color. This study sought to expand and strengthen the body of research on the talent development process in the field of gifted education by examining a less elite and more demographically diverse group of individuals across a variety of domains.

Although the Differentiated Model of Giftedness and Talent (DMGT) has existed in various forms for nearly 25 years, few studies, if any, have comprehensively investigated the model empirically. The role of empirical research cannot be understated. Dubin (1978) expressed this quite clearly in stating, “Empirical analysis has meaning only by reference to a theory from which it is generated” (p. 17). In examining the DMGT empirically, this study has the potential to provide important feedback as to the accuracy of the model.

Lastly, this study is significant in that it directly responds to some of the issues outlined in a recent report card on the state of research in the field of gifted education (Coleman, 2006a; Robinson, 2006; VanTassel-Baska, 2006). Specifically, Coleman raised the need for a connection between theory and research; Robinson suggested the use of large datasets; and VanTassel-Baska described the need for more longitudinal studies that allow researchers to see talent development over time. This study simultaneously addresses each of these issues.
Limitations and Delimitations

Every study has limitations and delimitations (Locke, Spirduso, & Silverman, 2007). Limitations refer to factors beyond the researcher's control that may impact the internal validity of a study. These factors are extraneous variables that make it difficult to make inferences about an observed relationship (Gall, Gall, & Borg, 2007; Shadish, Cook, & Campbell, 2002). The delimitations of a study on the other hand refer to factors within the researcher's control that impact external validity. External validity indicates the extent to which inferences can be made from a sample to a larger population. This denotes the ability to make generalizations across individuals and environments (Bracht & Glass, 1968; Gall et al.; Shadish et al.).

Limitations

This study has several limitations. The NELS:88/2000 began when respondents were in the eighth grade and continued until the typical respondent was 26 years old. During this 12-year period of time, similar age respondents experienced the same societal conditions and national historic events, making history a limitation of this study (Shadish et al., 2002; Subotnik & Arnold, 1994). Fortunately, respondents were located in geographically diverse regions; therefore, they may have been impacted by these national historic events differentially.

Attrition is the most significant threat to internal validity in a longitudinal study (Gall et al., 2007; Shadish et al., 2002; Subotnik & Arnold, 1994). Although the NELS:88 began with nearly 24,600 respondents, slightly less than half completed the study. Unfortunately, attrition is not random (Gall et al.; Schneider, Carnoy, Kilpatrick, Schmidt, & Shavelson, 2007). Instead it is subject to selection bias, indicating that
participants who remain in a sample tend to have different characteristics from those who drop out. As a result, the NELS:88/2000 requires the use of weights to address the issues of attrition and nonresponse.

In addition to attrition, there is the issue of missing data. Over a 12-year period, NELS:88/2000 questionnaires asked respondents hundreds of questions on a range of topics. These respondents represented various groups, including students, parents, teachers, and school administrators. Although more than 12,000 students participated in the final data collection wave, many of them did not answer every question. In this analysis, missing data was imputed. This is a limitation of the study.

Utilizing secondary data analysis introduces another limitation of the study. The Differentiated Model of Giftedness and Talent (DMGT) provided the theoretical and conceptual framework for this study. However, the questionnaires used in this study were not designed with this conceptual framework in mind. Consequently, there is no perfect translation from the DMGT to the NELS:88/2000. It was necessary to select and utilize variables that best operationalized constructs presented in the model. At times, several variables were combined and used as proxies to capture the complex and abstract nature of the DMGT. The fullness of the model was lost in reducing these constructs to proxy variables. On the other hand, statistical power was gained.

Delimitations

A delimitation of this study is the examination of talent development in Black and White students exclusively. Although Hispanic and Native American students also have a history of underrepresentation in gifted programs (Donovan & Cross, 2002; Ford, 1998; Ford, Grantham, & Whiting, 2008b), historically, Black students have represented the
largest group of students of color in public elementary and secondary schools. It has only been within the last decade that Hispanic students have begun to outnumber Black students in public schools (KewalRamani, Gilberston, Fox, & Provasnik, 2007). Moreover, the underrepresentation of Black students in the field of gifted education has a long research history, dating back at least to Jenkins’s 1936 study.

There are additional delimitations of this study related to the operationalization of potential and measures of success. First, success in this study was predicted solely based on academic potential. While the DMGT acknowledges creative, social, perceptual, muscular, and motor control as non-intellectual domains of giftedness, these areas were not included in this study. In addition, this study identified academic potential as the top 10%, in alignment with the DMGT. Although this criterion represents a broadened conception of giftedness relative to traditional standards, it may be a narrow conception of giftedness by other standards. Selecting the top 10% as opposed to the top 15% or top 20% is a delimitation of the study.

Success can be measured in any number of ways in a variety of fields. Within the context of this study, success was measured using educational degree attainment and occupational prestige. Although the analytic sample for this study was selected based on their eighth grade achievement test performance, as adults they may have opted to participate in fields where educational degree attainment and occupational prestige fail to capture success. In fields such as the visual and performing arts, leisure, sports, and technology (Gagné, 2009), educational degree attainment and occupational prestige may not be the most appropriate measures of success.
CHAPTER TWO: REVIEW OF THE LITERATURE

The purpose of this study was two-fold. First, this study examined the age-old question within the field of gifted education as to the predictive validity of potential. How well does academic potential predict future success? Next, this study expands upon previous research that has examined the talent development process among gifted learners to include a diverse group of students, across racial groups and domains of academic potential. This study utilized the Differentiated Model of Giftedness and Talent (DMGT; Gagné, 2009) as a framework for analyzing the talent development process.

The theoretical and conceptual framework provides the organizational structure for this chapter. Beginning with an overview of the DMGT, this chapter then examines the literature relevant to talent development in five strands. The first strand examines how giftedness or academic potential has been identified within the field of gifted education. The next strand explores broad talent development studies. The next strand examines background characteristics such as race, gender, and socioeconomic status, particularly as they relate to talent development and educational outcomes. The last two strands explore two of the DMGT’s components: intrapersonal catalysts and environmental catalysts. The chapter concludes with a summary of the literature relevant to talent development.

The Differentiated Model of Giftedness and Talent (DMGT)

As a theory, the DMGT is said to have laid the foundation for a focus on talents within the field of gifted education (Feldhusen, 2001). This interactive, developmental model of talent development was originally published in 1985 and has evolved considerably over the past 25 years (Gagné, 2009). Central to the model is the distinction between giftedness and talent. This distinction is critical given ambiguity within the field
of gifted education relative to these two terms (Gagné, 1985, 1995, 2003, 2009; Moon & Dixon, 2006; Robinson, 2006). In the DMGT, "Giftedness designates the possession and use of outstanding natural abilities, called aptitudes, in at least one ability domain to a degree that places an individual at least among the top 10% of age peers" (Gagné, 2009, p. 63, in original). There are six ability domains identified in the DMGT, four belonging to the mental subcomponent and two belonging to the physical subcomponent. The mental ability domains are: intellectual, creative, social, and perceptual.

In contrast to the definition of giftedness, "Talent designates the outstanding mastery of systematically developed abilities, called competencies (knowledge and skills), in at least one field of human activity to a degree that places an individual at least among the top 10% of age peers who are or have been active in that field." (Gagné, 2009, p. 63, in original). The model outlines a diversity of fields in which talent can be displayed, including academics, work-related fields, games, and sports and athletics. New to the DMGT, ACT’s World-of-Work taxonomy (ACT, 2008 as cited in Gagné, 2009) is utilized as a means to classify work-related talent fields.

The talent development process captures the systematic pursuit of specific excellence goals, over time, through structured programs and activities (Gagné, 2009). This process "corresponds to the progressive transformation of gifts into talents" (Gagné, p. 63). This process is undergirded by the concepts of maturation, learning, and practice. Whether the learning and practice are formal or informal, whether they occur within an institution or outside of an institution, they play an important role in the development of talent. The newly revised developmental process component of the model includes learning activities, the investment of time and money, and stages of development.
characterized as progress. The developmental process along with giftedness and talent combine to form the DMGT's basic trio of components.

The remaining components of the DMGT are intrapersonal catalysts and environmental catalysts. Although both of these components directly impact and interact with the developmental process, the environmental catalysts now pass through the sieve of the intrapersonal catalysts (Gagné, 2009). The intrapersonal catalysts encompass physical and mental traits, as well as goal management. The physical and mental traits include appearance, health, temperament, personality, and resilience, all of which are under the partial influence of genetic endowment (Gagné, 2003, 2008, 2009). Goal management, as an overarching construct, governs the process of self-development, providing structure and efficiency. The three subcomponents of goal management are awareness of self and others, motivation, and volition. Motivation and volition are distinguished within the model as goal-identification activities versus goal-attainment activities.

The environmental catalysts of the DMGT include milieu, individuals, and provisions. The milieu consists of geographic, demographic, and familial surroundings, and can greatly impact the availability, affordability, and quality of programs and activities. Individuals, namely parents, family, teachers, peers, and mentors, can positively or negatively impact the talent development process. Specific provisions outlined in the DMGT include enrichment, curriculum pacing, grouping, and acceleration, although provisions cover "all forms of talent development services and programs" (Gagné, 2009, p. 70). Overlap exists between the provisions subcomponent of environmental catalysts and the activities subcomponent of the developmental process.
The distinction between the two may lie in the systematic, deliberate pursuit towards a specific goal within the developmental process.

**Broad Talent Development Studies**

The field of gifted education in particular, and education more generally, has long been preoccupied with the question of how talent develops and emerges. Although this question has been explored from different perspectives, using different lenses and language, the basic question endures. To that end, several empirical studies have attempted to answer that question. Because talent development is a process that occurs over time, most talent development studies have been longitudinal or have been conducted retrospectively. Some of these studies have been limited to specific domains of talent, such as the Study of Mathematically Precocious Youth (SMPY; Lubinski & Benbow, 1994); others have been broad-based, to include several different domains of talent. This section examines two broad talent development studies: *Developing Talent in Young People* (Bloom, 1985) and *Talented Teenagers: The Roots of Success & Failure* (Csikszentmihalyi et al., 1993).

*Developing Talent in Young People*

"The Development of Talent Research Project began with the speculation that there must be a very large pool of potential talent available in each society that can either be developed or neglected, depending in large measure on environmental conditions" (Bloom, 1985, p. 5). Talent was defined in this study as "an unusually high level of demonstrated ability, achievement, or skill in some special field of study or interest" (Bloom, p. 5). Because the study focused on demonstrated ability, achievement, or skill, a retrospective design was deemed most appropriate.
Interested in identifying talent development themes across fields of study, three broad areas of talent were selected for participation in the project. These areas were athletic or psychomotor fields; aesthetic, musical and artistic fields; and fields that emphasized cognitive or intellectual development. Swimmers, tennis players, concert pianists, sculptors, research mathematicians, and research neurologists were selected to represent the broader fields.

Criteria for participation in the study were developed in concert with experts, teachers, and scholars in the respective fields. The final sample included 120 participants who had reached world-class levels of accomplishment, including Olympic swimmers, top-ranked tennis players, international piano competition finalists, Guggenheim Fellowship winners, Sloan fellowship recipients, and National Institute of Health five-year research grant recipients. Each participant was under 40 years old. Face-to-face semi-structured interviews were conducted with each of the 120 participants. To provide a more holistic picture of the talent development process, additional interviews were conducted with parents and teachers.

Numerous talent development insights were gained from this study both within and across talent areas. The major finding that emerged across talent areas is that potential, no matter how outstanding, must be nurtured and developed. "No matter what the initial characteristics (or gifts) of the individuals, unless there is a long and intensive process of encouragement, nurturance, education, and training, the individuals will not attain extreme levels of capability in these particular fields" (Bloom, 1985, p. 3, in original).
Bloom (1985) found the nurturance and encouragement that occurred in the talent development process began in the home. Parents provided a child-oriented, structured home-life that valued hard work, doing one’s best, and productive use of time. Not only did parents value these traits in their children; they modeled them. Parents were active, engaged, loved learning, and possessed a strong work ethic. They devoted time and resources to encourage their child’s optimal development, making significant personal and family sacrifices along the way.

In addition to parents, Bloom (1985) found that teachers were instrumental in providing education, training, and support. While parents frequently shared an interest in their child’s talent area, they sought the expertise of progressively masterful teachers as their child’s talent developed. These teachers provided excellent teaching and in turn demanded many hours of practice and quality work. They also helped students develop their unique way of interpreting and expressing their talent.

Although the Bloom (1985) study focused on the environmental conditions under which talent develops, talented individuals play a role in their own talent development. Bloom found students were willing to work hard, persist, and devote time to practice. They were also eager and displayed an increasing commitment to their talent area. Interestingly, Bloom noted few participants in the study were so outstanding at a young age that they would have been identified as becoming eminent.

Although we cannot be certain of this, we believe that only a small percentage (10% or less) of these talented individuals had progressed far enough by age eleven or twelve for anyone to make confident predictions that these would be
among the top twenty-five in the talent field by the ages of twenty to thirty. (p. 533, in original)

This statement reaffirms talent development as a process, which occurs over time, and requires nurturance and support.

*Developing Talent in Young People* was a landmark talent development study within the field of gifted education, and remains highly referenced throughout the literature. Nearly 25 years old, many findings from this study continue to be supported in both the qualitative and quantitative empirical research base. Although women were well represented in this study in the aesthetic, musical, and artistic fields, as well as the athletic fields, there was only one research mathematician out of 20, and one research neurologist out of 20. Additionally, since race was never explicitly mentioned, one must assume that none of the participants were people of color. The changing demographics of the nation, as well as the need to maintain mathematics and science interests among girls and women dictate that talent development studies better reflect the nation’s demographics. Moreover, participation in this study required world-class status within a given field. While it is important to understand talent development among individuals who reach eminence, the sustainability of the nation requires developed talent among a larger portion of the population.

*Talented Teenagers: The Roots of Success and Failure*

This study was motivated by an interest in determining why it is that among equally gifted teens from similar environments, some cultivate their talent while others give up and never develop their abilities (Csikszentmihalyi et al., 1993). In an attempt to answer that question, Csikszentmihalyi and his colleagues conducted a five-year
longitudinal study of more than 200 talented teens from two nationally reputable suburban high schools. Talent areas included mathematics, science, music, athletics, and art. Students were identified for participation using multiple measures. These 9th and 10th grade students were in advanced or accelerated classes, and were nominated by teachers who recognized their potential for outstanding future performance.

This study employed a complex data collection strategy that involved multiple data sources and techniques. In addition to standard data collection techniques such as self-report questionnaires and interviews, students wore electronic pagers for seven consecutive days during the study. When students were beeped, they were to record their activities, level of engagement, and mood. In addition to these measures, PSAT scores and class rank percentiles were collected. Data were also collected during the study from parents and teachers.

This study reported major findings relative to parents, teachers, and talented teenagers. The primary finding was that motivation matters. The question of how motivation developed was a complex one. In the development of talent, parents were instrumental in establishing a safe, conducive home environment that simultaneously allowed a balance between structure and freedom, integration and differentiation. At times talented teens were the center of attention, at other times they were simply an integrated member of a well-organized, efficient home life. Families provided structure and rules, while offering time to explore interests and passions. Csikszentmihalyi and his colleagues (1993) reported, "A home environment in which one is secure enough to feel cheerful and energetic, and challenged enough to become more goal directed, increases teenagers' chances of progressively refining their talents" (p. 175).
Several important findings emerged from this study relative to teachers. Teachers most successful in facilitating talent development had the ability to recognize talent in their students, even when students did not recognize it in themselves. These teachers modeled an interest in and passion for the talent area. As teachers exhibited flow, they provided a safe haven for students to exhibit flow. The researchers insisted teachers must know how to spark the joy of learning, because “Students will learn only if they are motivated” (Csikszentmihalyi et al., 1993, p. 195).

In terms of talented teenagers’ role in their own talent development, Csikszentmihalyi and colleagues (1993) found that some personality traits were more conducive to cultivating talent than others. Talented teenagers were mindful of their time, spending more time alone or with family and studying more. Interestingly, talented teenagers watched more television when they had free time (p. 88); however, they spent less time with friends, and were more conservative in sex attitudes. In general, these students recognized the conflict between productive work and peer relations. Overall, the study found that talent development requires effort, energy, and enjoyment. These elements are important in creating flow, and thus providing optimal experiences. These experiences lie at the center of cultivating talent, as “Talent will be developed if it produces optimal experiences” (Csikszentmihalyi et al., p. 252).

The methodology employed in this study was truly innovative and provided a glance into the inner lives of talented teenagers that often goes unseen. This study has had a significant impact on the field of gifted education as a whole, and particularly relative to the field’s understanding of talent development in adolescence. As outstanding and innovative as this study was, there were still a number of shortcomings. First,
participation in the study was limited to those who were in accelerated or advanced classes and were nominated by a teacher. While this represents one appropriate method for locating talent, it overlooks the fact that many student populations are missing from these accelerated and advanced experiences. Moreover, this study occurred in two suburban high schools, with less than 15% of the participants being students of color. Parents of talented teens in the study had higher incomes, more education, and higher occupational levels than their census communities. Widening the pool of developed talent requires a greater understanding about talent development among diverse populations.

Identification of Giftedness and Academic Potential

“High potential in children means different things to different people. But no matter what definition we accept, identifying it has to be counted among our inexact sciences, partly because the methods and instruments available for that purpose are imprecise” (Tannenbaum, 1983, p. 342). Some 25 years later, high potential still means different things to different people; and the identification of high potential remains an inexact science. As such, identification continues to be a controversial issue in the field of gifted education, with implications for programs and services (Borland, 2008). More than just a matter of the quality or quantity of services, identification has significant implications for who receives services. “Identification is... a matter of locating children who possess high potential in comparison with other children with no guarantees that they will eventually excel by universal standards as adults, with proper nurturance” (Tannenbaum, p. 342).

Historically, giftedness was associated with general intelligence, g, and was viewed as a relatively stable, dichotomous construct (Borland, 2005). Either you were
gifted or you were not. As the field of gifted education has evolved to recognize that
giftedness (or potential) is a malleable construct that manifests itself in a wide variety of
areas (Gallagher, 2003; VanTassel-Baska, 2005), the identification of giftedness has also
evolved. Another factor that has impacted the identification of giftedness is the fact that
students of poverty and certain groups of students of color are woefully underrepresented
in gifted education programs (Donovan & Cross, 2002). This section examines the
underrepresentation of Black students in gifted education, and what has emerged as best
practices for identification.

Underrepresentation of Black Students

Although leaders in the field have grappled with the underrepresentation of
various student populations in gifted education for decades, disproportionality remains a
reality. As early as 1936, Jenkins found that Black students were not identified as gifted
de spite high intelligence test scores. More than 70 years later, similar research findings
prevail. In 1993, National Excellence: A Case for Developing America’s Talent declared
“Outstanding talents are present in children and youth from all cultural groups, across all
economic strata” (U.S. Department of Education, p. 26). Sixteen years later, the field of
gifted education is still struggling to consistently identify and serve talented students
across cultural groups and economic strata (Ford et al., 2008b; Richert, 2003).

In 1998, Ford examined the trends in representation of students of color in gifted
programs from 1978 to 1992. Using Office of Civil Rights (OCR) data, Ford documented
a large and consistent discrepancy between the overall demographics of the student
population and the demographics of gifted education programs. In her analysis, Ford
found Asian American students to be overrepresented in gifted programs, while African
American, American Indian, and Hispanic American students were underrepresented in such programs. For example, in 1982 Asian American students represented 2.6% of the student population and 4.7% of the gifted education population. Ford calculated this discrepancy to be a 45% overrepresentation of Asian American students in gifted education. In the same analysis, Ford reported the underrepresentation of African American, American Indian, and Hispanic American students to range from 40% to 57%. Although one might question whether the demographics of the general student population must be identical to the demographics of the gifted education population, it is difficult to dismiss the disproportionality in participation of African American, American Indian, and Hispanic American students in gifted programs, in comparison to other students.

In a similar analysis conducted 10 years later, Ford and her colleagues (2008b) published an analysis of recruitment and retention of diverse students in gifted education. The authors presented the demographics of student enrollment data in comparison to gifted education enrollment data. Although more than a decade had passed since Ford’s (1998) previous analysis, 2002 OCR data produced similar patterns of over- and underrepresentation emerged as did 1978 to 1992 OCR data. Although Ford and her colleagues did not present percentages of under- or overrepresentation in their more recent analysis, calculations would produce an underrepresentation of 23% each for American Indian and Alaskan Native students, 51% for Black students, and 42% for Hispanic American students. These data would also show an overrepresentation of 73% for Asian/Pacific Islander students and 22% for White students.

Also using OCR data, Donovan and Cross (2002) reported that less than 0.5% of all Black students were identified gifted in 1976. By 1998, that rate had increased to
slightly more than 3%. While this represents a more than 600% growth in participation in
gifted programs, Black students represent far more than 3% of the entire school
population. These results clearly indicate that Black students have been and continue to
be underrepresented in gifted education. Given the rapid and increasing diversity in U.S.
public schools (Snyder, Dillow, & Hoffman, 2008), as well as the need for the nation to
maintain international economic competitiveness (National Mathematics Advisory Panel,
2008), equitable identification in gifted education should be an imperative. In 2005,
minority students comprised nearly 43% of the public school population (Snyder et al.)
and are soon projected to become the majority in public schools. The failure to
adequately serve students of color with outstanding talents negatively impacts not only
the students and their families, but also the nation’s future.

**Best Practices in Identification**

By and large, good identification policies are good identification policies,
irrespective of the students being identified. However, there are specific considerations
for identifying underrepresented populations in gifted education. To illustrate this point,
consider the National Association for Gifted Children’s (1997) position paper on *Using
Tests to Identify Gifted Students*. This document emphasizes the point that instruments
utilized in the identification and screening for gifted services have limitations, including
the inability to perfectly predict intelligence or achievement. As such, the organization
recommends the use of multiple measures, gathered from multiple sources, in different
ways, and in different contexts. Although the organization’s position paper is not
specifically directed towards the identification of underrepresented students, the
recommendations parallel those specifically for underrepresented students.
Robinson, Shore, and Enersen (2007) and Borland (2008) provided an overview of the research on best practices in the identification of gifted students. In alignment with the National Association for Gifted Children’s position paper, best practices in the identification of gifted students outlined in Robinson et al. and Borland call for the use of multiple and alternative approaches to identification. Some of these approaches include: portfolio assessments; performance-based assessments; nonverbal ability or reasoning tests such as the Cognitive Abilities Tests (CogAT), the Naglieri Nonverbal Ability Test (NNAT), and the Raven’s Progressive Matrices; and teacher, student, and peer nominations. While each of these alternative approaches may be useful in identifying underrepresented gifted students, there are cautions for many of these approaches as well.

Naglieri and Ford (2003) supported the use of nonverbal ability tests such as the NNAT as a means to address the underrepresentation of gifted minority students. The authors contended that nonverbal measures can make gifted education services more accessible to students who have traditionally been underrepresented. Lohman (2005b) and Lohman and Lakin (2008) also supported the use of nonverbal measures in the screening and identification process, but underscored the need for these nonverbal measures to be utilized in the identification process in conjunction with more traditional measures. Specifically, Lohman asserted that some academically capable students of color perform more poorly on nonverbal measures than traditional measures. Moreover, Lohman questioned the wisdom in identifying students using nonverbal measures when in fact gifted services are provided to students in a verbal-laden context. This assertion demonstrates the need for multiple measures in the identification of gifted students.
VanTassel-Baska, Johnson, and Avery (2002) and VanTassel-Baska, Feng, and de Brux (2007) reported on the development of and findings from using performance tasks in the identification of students of color and students of poverty on a statewide basis in South Carolina. VanTassel-Baska, Feng, and de Brux concluded that performance-based tasks increased the representation of students of color and students of poverty in the gifted programs; however, students identified using these alternative measures did not perform as well on the state assessment. In addition, the authors acknowledged that the funds and resources required to incorporate performance-based tasks on a wide-scale may be prohibitive.

Several cautions have been made about the use of teacher referrals in the screening and identification of gifted students. Far too frequently teacher referrals have served as gatekeepers, precluding many underrepresented students from gaining access to gifted programs (Ford, 1998; Ford et al., 2008b). Teachers’ perceptions and understanding about giftedness can impact who is referred for gifted screening, as well as the attitude teachers hold towards these students. In a recent study, Neumeister, Adams, Pierce, Cassady, and Dixon (2007) found that teachers of identified gifted students of color and students of poverty were unaware of the manifestations of giftedness among these populations. Although these students had been identified using measures prescribed in the school district in which the teachers worked, many of these teachers held on to more traditional conceptions of giftedness and questioned whether some students identified gifted were actually gifted. The findings from this study indicate that teacher referrals should not serve as the entry point for student screening.
Lohman (2005a) has been one of the leading voices in the discussion about the use of valid and reliable aptitude measures for all students. He has maintained that students should be compared with other students who have had a similar opportunity to learn. This includes the use of local norms. According to Lohman, decisions about potential for academic excellence should be made by comparing “each student’s score only to the scores of other students who share similar learning opportunities or background characteristics. In other words, identification of aptitude should be made within such groups” (p. 349).

Background Characteristics

Quoting the psychologist John William Atkinson, Gagné has asserted that all human accomplishments can be attributed to “two crucial rolls of the dice over which no individual exerts any personal control. These are the accidents of birth and background. One roll of the dice determines an individual’s heredity; the other, his formative environment” (Atkinson, 1978, p. 221, as cited in Gagné, 2008). Although Gagné (personal communication, February, 26, 2009) maintains that background characteristics such as race and gender belong to the intrapersonal component of the DMGT, as “accidents of birth and background,” the race and gender dice can have lasting impacts on educational experiences and outcomes, including talent development.

This section explores how race, gender, and socioeconomic status impact and interact with talent development and measures of success. An adequate discussion of the role these factors play in educational experiences and outcomes require that they be placed into a larger historical context.
In its founding documents, the United States declared its dedication to ideals of universal freedom and equality. Today, after more than two centuries of struggle to realize these ideals, race, gender, and class inequality remain pervasive and deeply entrenched in American Society. (Glenn, 2004, p. 187)

Perhaps this deep entrenchment is more prevalent in education than in any other American institution.

*Race*

Many Black students experience differential educational outcomes, evident in what has become known as the achievement gap. The achievement gap means different things to different people, and there are many indicators of its occurrence. These indicators range from the experiences and outcomes for kindergarten students to differentials in labor force participation rates and wages among adults (Ferguson, 2007).

In the K-12 setting, manifestations of the achievement gap appear as differentials in National Assessment of Education Progress (NAEP) test scores, SAT scores, Advanced Placement (AP) participation and test scores, graduation rates, discipline infractions, course-taking patterns, participation in special education, and participation in gifted education (see KewalRamani et al., 2007 for a detailed presentation). Post-secondary manifestations of the achievement gap include differences in educational degree attainment, unemployment rates, and wages. In 2007 for example, approximately 36% of White 25- to 29-year-olds had attained a bachelor’s degree or higher in comparison to 20% of Black 25- to 29-year olds (Planty et al., 2008). The Black-White achievement gap is far encompassing and by some accounts represents a national failure to “live up to
most basic democratic ideals, including the provision of equal educational opportunity” (Books, 2007, p. 11).

Within the field of gifted education and the associated talent development literature, race has largely been discussed within the context of underrepresentation, identification, underachievement, and special programs. Although the issues of underrepresentation and identification have already been explored in this review of the literature, it is important to note the complexity and multidimensional impact of race on educational outcomes and talent development. Just as there is a near inseparability of race, class, and gender, there is a near inseparability of underrepresentation (Donovan & Cross, 2002; Ford, 1998; Ford et al., 2008b), identification (Borland, 2004; Lohman, 2005a; Naglieri & Ford, 2003; VanTassel-Baska et al., 2002), underachievement (Ford, 1996), and special programs (Hertzog, 2003; Lee, Olszewski-Kubilius, & Petemel, 2009; Tomlinson, Callahan, & Lelli, 1997) as it relates to Black students in gifted education. The common themes underlying these critical issues are those of structure, access, and support (Morris, 2002).

**Gender**

In terms of educational outcomes, historically women have attained less formal education than men. Since the 1980’s however, women have attained a higher level of education than men, but have remain underrepresented in certain fields, including mathematics and engineering (Planty et al., 2008). In 2005-2006, women earned nearly 60% of all bachelor’s and master’s degrees, but earned less than 30% of those degrees in computer information systems and engineering (Planty et al.). During that same year,
women earned 49% of all doctorates, although they tended to be in the social sciences and health professions.

This idea of the underrepresentation of women in the sciences is apparent in the Bloom (1985) study, where only one female research scientist and one female research neurologist participated in the study. In their longitudinal study of Westinghouse Science Talent Search winners, Subotnik and Steiner (1994) found women to be more likely to have left science and science-related fields. More recent studies have reported similar findings of scientific girls being more likely than their male counterparts to switch fields and to attain degrees outside of mathematics and the sciences (Feist, 2006; Webb, Lubinski, & Benbow, 2002).

Reis (1995) has maintained that societal, cultural, and personal barriers to female talent development interfere with the capacity to perform and achieve at optimal levels. These barriers include mixed messages from family, marriage, personal lives, and limited time to pursue talent areas. Noble, Subotnik, and Arnold’s (1999) New Model of Female Talent Development incorporated many of the conflicts and compromises Reis suggested females make in the development of their talent. Not only does the model acknowledge the personal motivation, resilience, and support women require in the development of talent, the model also acknowledges that developed talent in women may manifest itself in their personal lives as opposed to a public domain.

Socioeconomic Status

Poverty is a long recognized barrier to talent development that cuts across race, ethnicity, culture, gender, and language (Burney & Beilke, 2008). Not that poverty precludes the development of talent, but poverty certainly diminishes access,
opportunities, and other advantages money provides (Bloom, 1985). Poverty as a risk factor is associated with reduced educational outcomes, including lower rates of participation in advanced courses and programs, such as gifted programs. As is the case with students of color, students of low socioeconomic status are underrepresented in gifted programs, and at the highest level of achievement (Borland & Wright, 1994; Patton, Prillaman, & VanTassel-Baska, 1990; Wyner, Bridgeland, & Diiulio, 2008).

In addition to lower rates of participation in special programs and services, students of poverty score lower than their more economically advantaged counterparts on measures such as the NAEP tests, AP tests, and the SAT (Loveless, 2008; Rouse & Barrow, 2006; Wyner et al., 2008). Additionally, students of poverty are less likely to attain a bachelor’s degree and are less likely to attend the most selective colleges (Wyner et al.). Buchanan (2006), conducting a replication study using the NELS:88 dataset, found socioeconomic status to be the most important predictor of educational attainment, irrespective of race. Reporting similar findings using a different longitudinal dataset, Walpole (2003) concluded that socioeconomic status was an important predictor of graduate school attendance.

In terms of research more specifically related to talent development and gifted education, Bloom (1985) and his colleagues found in their study of world-class performers that the vast majority of participants came from families where the father had earned a college degree, with many fathers having earned an advanced degree. Many mothers were also college graduates. At the least, these world-class performers typically came from comfortable, white-collar and professional families. Similarly, the two
greatest former prodigies from the Study for Mathematically Precocious Youth (SMPY) had fathers who held advanced degrees in the sciences (Muratori et al., 2006).

Given the important role schools play in the development of talent among students of poverty, some suggest that greater emphasis should be placed on programming as opposed to identification (Coleman, 2006b; Coleman & Southern, 2006). Numerous program initiatives have been established to increase representation of students of poverty in gifted programs (e.g., Borland, Schnur, & Wright, 2000; Borland & Wright, 1994; VanTassel-Baska et al., 2002), and have been quite successful. Given the limiting and constricting condition of poverty, “Focusing on overcoming the limitations of poverty may be more productive in influencing the lives of individual students” (Burney & Beilke, 2008, p. 295).

Intrapersonal Catalysts

The intrapersonal catalysts in the DMGT (Gagné, 2009) can be divided into the physical/mental characteristics and goal-management factors. The physical factor includes elements such as height and slenderness, which are not critical in the examination of academic potential. However, the mental characteristics encompass temperament and personality, including self-concept and locus of control. On the other hand, goal-management, which includes an awareness of self and others, as well as motivation and volition, are very important in talent development, no matter what the domain. This section explores the literature on intrapersonal catalysts in talent development.
Mental Traits

Self-Concept

Self-concept has emerged as a complex, multifaceted construct which can be examined in general terms, or relative to academic, social, emotional, and physical dimensions (Pyryt, 2008). Despite early, mixed findings on how gifted students compare to their more typical peers on self-concept, more recent studies indicate that gifted students have a healthy self-concept, at least comparable to that of their average-ability peers (see Neihart, 1999; Pyryt, 2008 for an empirical literature review). Using data from the National Education Longitudinal Study of 1988 (NELS:88), Sayler and Brookshire (1993) reported that both accelerated and gifted eighth grade students possessed a higher general self-concept than a comparison group of “regular” eighth graders.

In their meta-analysis examining the link between giftedness and self-concept, Hoge and Renzulli (1993) found that gifted students generally had a high academic self-concept. Reis and Díaz (1999) found high-achieving, economically disadvantaged urban female students possessed a strong belief in self. Hébert (2000) reported a similar strong belief in self among intelligent, urban young men. McCoach and Siegle (2003a) reported that both gifted achievers and gifted underachievers possessed high academic self-perceptions, with these self-perceptions failing to distinguish one group from the other. This is in contrast to the relationship between academic self-perceptions and self-report grade point averages (GPA) among a heterogeneous population of high school students (McCoach & Siegle, 2001). In that study, the researchers determined self-perceptions to be the single most important factor in distinguishing students with high GPAs from those with low GPAs.
Locus of Control

Overall, research suggests that gifted students have a more internal locus of control than typical students. Sayler and Brookshire (1993) found using NELS:88 data that both accelerated and gifted eighth grade students had a higher locus of control than their typical peers. McLaughlin and Saccuzzo (1997) reported similar findings among more than 800 ethnically diverse fifth to seventh grade gifted and nongifted students.

Some studies suggest a positive relationship between self-concept, internal locus of control, and academic achievement. Along these lines, a number of studies have found an external locus of control to be associated with poor academic achievement. Moore (2006) examined the locus of control orientation among achieving gifted, underachieving gifted, and nongifted middle school students. She found achieving gifted students to be more internally oriented than either of the other groups of students.

Much of the research on Black students’ locus of control focuses on their more external orientation in comparison to their White peers. Coleman and colleagues (1966) found 12th grade Black students had a lower locus of control than their White counterparts. Among gifted students, Yong (1994) and McLaughlin and Saccuzzo (1997) reported that ethnically diverse gifted students had an internal locus of control.

Self-Management

Gagné’s (2009) current conception of self-management includes terms such as awareness, values, needs, effort, and perseverance. Previous depictions of the DMGT also included terms such as self-regulation and resource allocation. “Self management gives structure and efficiency to the talent development process” (Gagné, 2008, p. 225).
This section explores the role of self-management in the talent development process, namely through motivation and volition.

**Motivation**

Examining factors that supported or hindered the production of academic Olympians in three countries, Nokelainen, Tirri, Campbell, and Walberg (2007) found motivation to be a statistically significant distinguishing factor between the most and least successful Olympians. Similarly findings prevailed in studies using the School Attitude Assessment Survey-Revised (SAAS-R; McCoach & Siegle, 2003b), which reported motivation/self-regulation to be the strongest predictor of achievement (Baslanti & McCoach, 2006; McCoach & Siegle, 2003a).

Motivation is associated with academic achievement across racial groups and socioeconomic status. Gottfried, Gottfried, and Guerin (2006), in their nearly 25-year longitudinal study, have identified what they refer to as motivational giftedness. This term “applies to those individuals who are superior in their striving and determination pertaining to an endeavor” (p. 437). In their study, Gottfried et al. have found that those who possessed motivational giftedness outperformed their counterparts on achievement tests, teacher and parent ratings, grade point averages, and SAT scores.

While Gottfried and his colleagues (2006) have maintained that motivation should be a criterion for giftedness, Gagné & St Peré (2001) found that cognitive abilities were a much stronger predictor of academic achievement than intrinsic motivation, extrinsic motivation, or persistence among a group of 200 female high school students. Whatever the precise role of motivation in academic outcomes and talent development, there is little dispute that motivation can only help in the talent development process.
Volition

A substantial portion of the talent development literature examines the role talented youth play in their own development, specifically as it relates to how they spend their time and the extent to which they are willing to work hard. Bloom (1985) reported that talented youth were willing to work hard, persist, and devote numerous practice hours to their talent area. In discussing the phases of learning and talent development, Bloom noted an increased commitment to the talent area with each passing phase, evidenced by increased practice and preparation time.

Csikszentmihalyi and colleagues (1993) reported that talented teenagers were particularly careful about how they spent their time, spending more time alone, or with family, and less time socializing with peers. Talented teens spent more time on classwork, studied more, and frequently engaged in their passion area. More than simply engaging in their passion area, talented teenagers were committed to their passion area, exhibiting flow in that area.

Finnish and U.S. mathematics Olympians reported hard work and effort to be important factors in their talent development, although the researchers found effort attribution to be negatively associated with high school GPA (Nokelainen, Tirri, & Campbell, 2004). Examining long-term outcomes among adults who had been identified gifted as children and similarly matched ability adults who had not been identified gifted as children, Freeman (2006) found hard work to be a better predictor of adult success than the gifted label.
Environmental Catalysts

Although Gagné (2008) has maintained that environmental catalysts matter least in the talent development process, there is a substantial body of literature supporting the idea that environment matters, in significant ways. Referring to Bloom as a “dedicated environmentalist,” Gagné acknowledges the degree to which his placement of environment in the talent development differs from Bloom’s (1985) perspective. This section examines how environmental catalysts impact talent development. These catalysts will be reviewed in the order in which they appear in the DMGT: milieu, individuals, and provisions.

**Milieu**

The concept Gagné (2003, 2009) refers to as milieu, many educational researchers refer to as context. Within the DMGT, macroscopic and microscopic levels of the milieu are recognized as impacting talent development. This section examines the relevant research on milieu as it impacts talent development, both in and out of schools. Using a two-level focus, this section reviews macroscopic and microscopic school context factors, starting with those factors closest to home.

*Materials in the Home*

Early, frequent, and substantive exposure to educational materials in the home has been positively associated with school readiness, and ultimately, increased long-term academic outcomes (Brooks-Gunn & Markman, 2005; Ferguson, 2007; Hodgkinson, 2007). These educational materials in the home and corresponding activities include books in the home, being read and sung to, playing games, and doing puzzles. Unfortunately, children experience these opportunities differentially, with students of
color and students of poverty receiving fewer opportunities. Recognizing the physical and motivational advantages these home environments provide in the talent development process, Gottfried and his colleagues (2006) referred to them as “intellectually and culturally advantageous” (p. 443).

Although this type of exposure and experiences in the home are more likely to occur among better educated, financially-secure families, they are not limited to families of great means. Hrabowski, Maton, and Greif (1998) found that parents of academically successful African American males engaged their sons as youngsters in educational toys, accelerated workbooks, and cultural activities and events. Some of these parents were single, without a great deal of formal education, but they recognized the value and importance of education.

School Characteristics

Some 55 years after the landmark Brown v. Board decision declared that separate is inherently unequal, the nation continues to struggle with separate and unequal access, facilities, resources, and teacher quality in American schools (Chemerinsky, 2003; Kozol, 2005; Planty et al., 2008). Despite seemingly monumental gains and decades of struggle towards integration, an alarming trend of resegregation in American schools exists (Orfield & Lee, 2006). These trends are not without significant consequences for our students and our nation’s future. “We need to recognize that our acceptance of a dual education system will have consequences that may be no less destructive than those we have seen in the past century” (Kozol, p. 11).

Students of color and students of poverty are more likely to attend high-poverty, high-minority concentration schools that suffer from reduced facilities and opportunities
These schools offer fewer advanced courses, have lower overall academic achievement, and have less effective teachers. Specifically, these schools are less likely to offer gifted programs and Advanced Placement courses. Additionally, they employ fewer certified teachers, with less education, who are more likely to leave, resulting in increased teacher turnover. Students of color primarily experience these high-poverty, high-minority concentration schools in urban areas; however, students in rural areas experience schools facing similar challenges (Howley, Pendarvis, & Gholson, 2005).

Individuals

A wealth of research exists on the important role individuals play in talent development. People can positively or negatively impact talent development. This section specifically explores the role parents, teachers, and peers play in the talent development process.

Parents

Parents are children's first teachers. As such, they play a critical role in the development of their children. As first teachers, parents frequently are the first to recognize outstanding potential in their children (Albert, 1994; Bloom, 1985). This early recognition of potential opens the doorway for exposure and opportunities. In addition to identifying talent early and providing exposure, parents shape the talent development process through the opportunities they afford their children (Bloom, 1985; Hrabowski et al., 1998; Muratori et al., 2006). Some of these opportunities require a sacrifice of resources, but others simply involve taking advantage of free community resources and programs. For example, competitions and special programs for the gifted have the ability
to translate into direct educational benefits and talent development advantages, while participation in sports, music, and other activities benefit children in staying busy, balanced, and out of trouble.

In addition to the identification of talent and exposure to opportunities and experiences, parents play the very important, but somewhat intangible role of shaping the attitudes and dispositions their children possess. Some researchers would argue that providing these intangibles is the most important thing parents can do to facilitate the development of talent in their children (Csikszentmihalyi et al., 1993). Although researchers have used different terminology to describe the attitudes and dispositions parents pass on to their talented children, there is general agreement in the salience of this concept in the development of successful talent. It consistently emerges across decades, centuries, domains, and cultures (Bloom, 1985; Campbell & Vema, 2007; Chan, 2005; Goertzel, Goertzel, Goertzel, & Hansen, 2004; Nokelainen et al., 2004; Ochse, 1990; Piirto, 2004; Wu, 2005).

Whether through a love of learning, stimulating conversations, high expectations, hard work, a sense of responsibility, discipline, or general support, parents display these important attitudes and dispositions that impact their child’s talent development. Much of the discussion in Csikszentmihalyi et al. (1993) about the home life of talented teens revolved around these very concepts. Csikszentmihalyi and his colleagues found that the family life of successful talented teens included a delicate balance, and necessary tension between order and chaos, constraint and freedom, integration and differentiation. The researchers concluded that these competing forces contributed to the organization of psychic energy and the development of optimal talent.
It is important to note that the Csikszentmihalyi et al. (1993) study contained a relatively homogenous sample of primarily White, middle to upper-middle class, suburban teens. While these characteristics were typical of the family life of successful talented teens, they might manifest themselves differently across race and socioeconomic status. What researchers have found in examining the parental support provided in the homes of talented students of color and students of poverty is a general sense of high expectations, coupled with pride and support (Berry, 2008; Hrabowski et al., 1998; Huff, Houskamp, Watkins, Stanton, & Tavegia, 2005; Tomlinson et al., 1997; VanTassel-Baska, 1989). Possibly this is the form the necessary tension Csikszentmihalyi and his colleagues referenced takes on in culturally and socioeconomically diverse families. Although each of these studies utilized a qualitative methodology, which raises questions about generalizability, the results are consistent across samples, geographic locations, and a nearly 20-year time period.

**Teachers**

Like parents, teachers play an important and sustained role in the talent development process. Although the teacher who engages a talented student in his or her talent area changes at various point in the talent development process, teachers as a group are central to the successful development of talent. Like parents, teachers have the opportunity to identify talent in youth (Csikszentmihalyi et al., 1993; Ocshe, 1990; Piirto, 2004). Students spend a significant amount of time in school. The more likely teachers are able to identify talent in their students, the more likely students are able to have their academic needs met in schools. Students identified as talented are likely to participate in special classes, programs, and competitions, which represent a better match than the
traditional curriculum and are facilitative in talent development. Unfortunately, teachers systematically get mixed reviews in identifying talent (Neumeister et al., 2007). This is particularly true in identifying talent among students who do not fit the stereotypical prototype of talented youth.

A key role teachers play in talent development is in the attitudes and expectations they possess. Similar to the role of parents, talented students and eminent producers alike have reported the presence of a teacher who was encouraging, supportive, caring, had high expectations, a love of learning, intense passion in a particular interest area, and challenged their thinking. Not only did these teachers serve as role models for emulation (Ochse, 1990), they also provided a safe place for students to engage in their own interest area (Csikszentmihalyi et al., 1993; Ochse).

By many accounts, some teachers do not possess the facilitative attitudes and expectations that positively impact talent development. Bad teachers and bad school experiences seem to be a recurring theme among the eminent producers Goertzel et al. (2004), Ochse (1990), and Piirto (2004) studied. Goertzel et al. and Piirto are both replete with accounts of uninspiring teachers who failed to recognize talent, emphasized rote memorization, and were committed to a lockstep curriculum. Somehow these eminent producers developed despite their teachers and school experiences instead of because of them.

The concept of high expectations regularly emerges in the literature on the achievement and underachievement of high-ability students in general and high-ability students of color in particular (Berry, 2008; Csikszentmihalyi et al., 1993; Hrabowski et al., 1998; Reis & Díaz, 1999; Schultz, 2002; Tomlinson et al., 1997). One reason high
teacher expectations may be so important for students of color is because research consistently demonstrates differential teacher expectations based on race (Figlio, 2005; McKown & Weinstein, 2008; Tenenbaum & Ruck, 2007). While it is probably an overstatement to say that high teacher expectations alone make the difference between achievement and underachievement among these students, it is not an overstatement to say that high teacher expectations facilitate talent development. Few students have the benefit of teachers with facilitative attitudes and expectations every year of their schooling; however, it appears that finding a few of those teachers along the way can have a lasting impact on talent development.

Peers

“It is not only what we do that determines the pattern of our lives, but also whom we choose to associate with” (Csikszentmihalyi et al., 1993, p. 89). This profound statement summarizes the literature on the impact of peers on academic achievement and outcomes. These findings appear to hold across race, socioeconomic status, and levels of academic potential, as evidenced by the consistency of results in both general education and gifted education research.

Numerous studies have cited the positive or negative association of peers as being important in achievement and talent development alike. Using the NELS dataset, Stewart (2007) found that positive peer association was amid the strongest predictors of grade point average among African American high school students. Also using NELS:88, Sokatch (2006) reported that friends’ aspirations to attend college were the greatest predictor of 4-year college enrollment among low-income, urban, minority students. Analyzing 1998 NAEP data on reading, Johnson (2000) reported a strong peer effect,
independent of race, ethnicity, gender, and income. While Johnson found this peer effect to be strong for fourth graders, the effect diminished among eighth graders.

Within the gifted education research, much of the literature on underachievement, particularly as it relates to Black and urban students, points back to an association with negative peers. In terms of the literature on "acting White," negative peer pressure and a negative peer group appear to be a constant (Ford, 1993; Ford, Grantham, & Whiting, 2008a; Hébert, 2001). This is in stark contrast to the research on achieving students of color, students of poverty, and urban students who cite an association with positive peers, who hold similar educational values (Reis & Díaz, 1999; Hébert, 2000).

The double-sided coin of peer relationships supports Horvat and Lewis's (2003) assertion that the "burden of acting white" is really about negative peer groups.

Characterizing the black peer group as a homogeneous collective that is opposed to academic excellence has led researchers to underexamine the heterogeneity of the black peer group and the differential effects and influences that friends and peers exert on the academic striving of black students. (Horvat & Lewis, 2003, p. 275)

The differential effects and influences peers can have on academic outcomes are significant across racial, ethnic, gender, and socioeconomic background characteristics. Indeed, the educational and social values peers hold seem to be incredibly important markers of success, particularly among the most vulnerable student populations.

**Provisions**

The provisions component of the environmental catalysts in the DMGT recognizes the role programs, activities, and services play in talent development. Whether
through summer programs, school-based gifted programs, talent search programs, or enriched or accelerated classes, provisions can make a substantive difference in terms of appropriately-matched experiences and maintaining high levels of engagement. This section specifically examines the literature relative to the impact of special programs on talent development, including gifted programs, participation in Advanced Placement coursework, and participation in extracurricular activities.

An increasing percentage of college students are enrolled in remedial courses (National Center on Education and the Economy, 2007). Participation in these courses place students at greater risk for not attaining a bachelor’s degree. On the other hand, students who participate in a rigorous secondary school curriculum are more likely to complete college (Adelman, 2006). Analyzing data from the High School & Beyond (HS&B) Class of 1982 and the National Education Longitudinal Study (NELS:88/2000) Class of 1992, Adelman reported that 82% of the Class of 1992 who reached calculus as their highest level of mathematics earned a bachelor’s degree, in comparison to only 7% of students who reached Algebra I as their highest level of mathematics.

*Advanced Placement*

As one of many indicators of a rigorous high school curriculum, participation in Advanced Placement (AP) courses may also be associated with higher rates of college completion. There are inconsistent findings however, relative to the advantages participation in AP courses offers students. Colleges and universities increasingly use AP participation and examination grades in admission decisions (Geiser & Santelices, 2004; Klopfenstein & Thomas, 2009). Studies have found students who scored a 3 or better on AP examinations were more likely to perform well in comparable college courses (Geiser
Santelices; Hargrove, Godin, & Dodd, 2008), and typically displayed strong measures of early indicators of college success (i.e., GPA). Yet, it is still unclear whether participation alone in AP increases the likelihood of bachelor’s degree attainment after controlling for other variables (Geiser & Santelices; Klopfenstein & Thomas).

Advanced Placement has been presented as a viable and appropriate option for high-ability learners within the talent development literature in gifted education (Bleske-Rechek, Lubinski, & Benbow, 2004; Hertberg-Davis, Callahan, & Kyburg, 2006; VanTassel-Baska, 2001). Students have reported enjoyment in participating in AP courses because of the challenge and the opportunity to be with intellectual peers (Bleske-Rechek et al.; Hertberg-Davis et al.). Analyzing data from the first and second talent search cohorts of the Study of Mathematically Precocious Youth (SMPY), “At age 33, 70% of individuals who had taken one or more AP courses or exams during high school had obtained an advanced degree (master’s or beyond), compared with 43% of those who had not taken an AP course or exam” (Bleske-Rechek et al., in original). It is important to note the relative homogeneity in this sample, representing the most prodigious mathematical talent in the early to mid-1970s.

Special Programs

Participation in appropriately-matched special programs and services for high-ability learners has consistently been shown to positively impact talent development. Students have reported participation in talent search programs, competitions, and science fairs as being instrumental in their development (Muratori et al., 2006), including better preparation for college (Henfield, Moore, & Wood, 2008; Hertzog, 2003). Students report higher levels of engagement in these programs, suggesting a better match for high-ability
learners. Specific benefits of participating in gifted programs cited by students include academic rigor, better quality teachers, equally skilled peers, and overall better preparation for the future (Henfield et al.; Reis & Díaz, 1999).

Clasen (2006) reported in a 13-year follow-up study of a pre-college program that students more engaged in the program had a higher rate of college attendance and completion. Matthews and McBee (2007) conducted an underachievement study among 440 summer residential program participants. The researchers found students' previous school performance had little predictive value on students' academic performance and behavior in the summer program. These findings suggest that underachievement is malleable and context-specific. Better matched programs may be important both in minimizing the occurrence of underachievement, and cultivating and developing talent.

Extracurricular Activities

Participation in extracurricular activities demonstrates a level of student engagement and is associated with positive student outcomes. Major talent development studies found students to be engaged in extracurricular activities (Bloom, 1985; Csikszentmihalyi, 1993); although Csikszentmihalyi and his colleagues stressed the importance of time management in balancing extracurricular activities with productive work.

Olszewski-Kubilius and Lee (2004) found gifted students enrolled in a summer gifted program participated in a variety of extracurricular activities, both in-school and outside-of school. Students engaged in activities ranging from sports to working with computers. Overall, sports were the most frequent extracurricular activity, although students also engaged in music, academic clubs, and community service activities such as
volunteering. Bucknavage and Worrell (2005) cited results similar to Olszewski-Kubilius and Lee, with sports the most frequent extracurricular activity. These findings defy stereotypes of gifted students’ nonparticipation in sports. Other studies focusing on the experiences of high-achieving gifted learners have regularly reported extracurricular activity participation (Hébert, 2000).

Beyond a general level of engagement, participation in extracurricular activities has been shown to have a positive impact on academic outcomes. Using NELS:88/92 data and fixed-effects regression analysis, Lipscomb (2007) investigated the extent to which participation in extracurricular activities constitutes human capital investment. He found engagement in extracurricular activities had a substantive and statistically significant impact on mathematics achievement scores. Moreover, participation in extracurricular activities was associated with a 5% increase in bachelor’s degree attainment expectations.

Summary of the Literature

This chapter presented a review of the literature relevant to talent development. As the theoretical and conceptual framework for the study, the Differentiated Model of Giftedness and Talent (DMGT; Gagné, 2009) provided the organizational structure for the chapter. Following an overview of the DMGT, this chapter examined five literature strands: broad talent development studies; how giftedness and academic potential has been identified; background characteristics; intrapersonal catalysts; and environmental catalysts. Table 1 presents a summary of the research findings by literature strand.
### Table 1

**Summary of Research Findings by Literature Strand**

<table>
<thead>
<tr>
<th>Strand</th>
<th>Source</th>
<th>Summary</th>
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<tbody>
<tr>
<td>Identification of Giftedness and Academic Potential</td>
<td>Borland, 2008; Tannenbaum, 1983</td>
<td>High potential has different meanings to different people. Its identification is an inexact science and remains a controversial issue.</td>
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<td></td>
<td>Gallagher, 2003; VanTassel-Baska, 2005</td>
<td>Increasingly, potential is viewed as a malleable construct that manifests itself in a wide variety of areas.</td>
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<td></td>
<td>Donovan &amp; Cross, 2002; Ford, 1998; Ford et al., 2008b; U.S. Department of Education, 1993</td>
<td>Despite the assertion that outstanding talents are present in children and youth across all cultural groups and economic strata, Black students historically have been and continue to be underrepresented in gifted programs.</td>
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<td></td>
<td>Borland, 2008; National Association for Gifted Children, 1997; Robinson et al., 2007</td>
<td>Best practices in identification call for the use of multiple and alternative approaches and measures, including: portfolio assessments; performance-based assessments; nonverbal ability or reasoning tests; and teacher, student, or peer nominations.</td>
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<td></td>
<td>Lohman, 2005b; Lohman &amp; Lakin, 2008; Naglieri &amp; Ford, 2003; Neumeister et al., 2007; VanTassel-Baska et al., 2007</td>
<td>Alternative measures have been successful in identifying underrepresented groups, although researchers have cautioned against their inappropriate use.</td>
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<td></td>
<td>Lohman, 2005a</td>
<td>Valid and reliable aptitude measures should be used for all students. Decisions about potential should be made by comparing students' scores to those with similar opportunities to learn or background characteristics.</td>
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Table 1 (continued)

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<th>Summary</th>
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<tr>
<td>Background Characteristics</td>
<td>Books, 2007; Glenn, 2004</td>
<td>Race, gender, and class inequality remain pervasive and deeply entrenched in American society. The achievement gap represents a failure to achieve equal educational opportunity.</td>
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<td></td>
<td>Ferguson, 2007; KewalRamani et al., 2007; Planty et al., 2008</td>
<td>The Black-White achievement gap manifests as differentials in NAEP, SAT, and AP test scores; graduation rates; course-taking patterns; participation in special and gifted education; educational degree attainment; and unemployment rates.</td>
</tr>
<tr>
<td></td>
<td>Morris, 2002</td>
<td>Structure, access, and support underlie many of the issues facing Black students in gifted education, including identification and underrepresentation.</td>
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<td></td>
<td>Bloom, 1985; Planty et al., 2008; Subotnik &amp; Steiner, 1994; Webb et al., 2002</td>
<td>While women attain a higher level of education than men, they are underrepresented in mathematics and the sciences, and tend to leave those fields even after displaying early talent.</td>
</tr>
<tr>
<td></td>
<td>Noble et al., 1999; Reis, 1995</td>
<td>There are societal, cultural, and personal barriers to female talent development. Female-developed talent may manifest itself in personal lives as opposed to a public domain.</td>
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<tr>
<td></td>
<td>Borland &amp; Wright, 1994; Patton et al., 1990</td>
<td>Students of poverty are underrepresented in gifted programs.</td>
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<td></td>
<td>Bloom, 1985; Buchanan, 2006; Walpole, 2003; Wyner et al., 2008</td>
<td>Poverty diminishes both educational access and outcomes, including test scores, educational degree attainment, and selectivity of college.</td>
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Table 1 (continued)

Summary of Research Findings by Literature Strand

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<th>Strand</th>
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<tr>
<td>Intrapersonal</td>
<td>Hoge &amp; Renzulli, 1993; Sayler &amp; Brookshire, 1993</td>
<td>Gifted students tend to have both a higher general self-concept and a higher academic self-concept than typical students.</td>
</tr>
<tr>
<td>Catalysts</td>
<td>Hébert, 2000; McCoach &amp; Siegle, 2001, 2003a; Reis &amp; Díaz, 1999</td>
<td>There appears to be a positive relationship between self-concept and achievement, irrespective of race and urbanicity.</td>
</tr>
<tr>
<td></td>
<td>McLaughlin &amp; Saccuzzo, 1997; Moore, 2006; Sayler &amp; Brookshire, 1993</td>
<td>Gifted students tend to have a more internal locus of control orientation than typical students, irrespective of race. An internal locus of control is positively associated with achievement.</td>
</tr>
<tr>
<td></td>
<td>Coleman et al., 1966</td>
<td>Black students have a lower (more external) locus of control than White students.</td>
</tr>
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<td></td>
<td>Baslanti &amp; McCoach, 2006; Gottfried et al., 2006; McCoach &amp; Siegle, 2003a; Nokelainen et al., 2007</td>
<td>Motivation is a distinguishing factor between achievement and underachievement, greater success and less success.</td>
</tr>
<tr>
<td></td>
<td>Bloom, 1985; Csikszentmihalyi et al., 1993</td>
<td>Talented youth work hard, persist, and devote time to their talent area. They are careful about how they spend their time, spending more time alone, with family, working on classwork, and studying.</td>
</tr>
<tr>
<td></td>
<td>Freeman, 2006</td>
<td>Hard work is a better predictor of adult success than the gifted label.</td>
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</tbody>
</table>
Table 1 (continued)

Summary of Research Findings by Literature Strand

<table>
<thead>
<tr>
<th>Strand</th>
<th>Source</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Catalysts</td>
<td>Brooks-Gunn &amp; Markman, 2005; Ferguson, 2007; Gottfried et al., 2006;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hodgkinson, 2007; Hrabowski et al., 1998</td>
<td>Educational materials in the home, such as books, games, and puzzles, have been positively associated with school readiness and academic outcomes. These home environments have been described as intellectually and culturally advantageous.</td>
</tr>
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<td></td>
<td>Chemerinsky, 2003; Kozol, 2005; Orfield &amp; Lee, 2006; Planty et al., 2008</td>
<td>Resegregation in American schools is on the rise. Separate and unequal access, facilities, resources, and teacher quality plague U.S. schools.</td>
</tr>
<tr>
<td></td>
<td>Planty et al., 2008</td>
<td>Students of poverty and students of color are more likely to attend high-poverty, high-minority concentration schools with reduced facilities and opportunities.</td>
</tr>
<tr>
<td></td>
<td>Albert, 1994; Berry, 2008; Bloom, 1985; Campbell &amp; Verna, 2007; Chan, 2005; Csiszentmihalyi et al., 1993; Hrabowski et al., 1998; Nokelainen et al., 2004; Tomlinson et al., 1997; VanTassel-Baska, 1989</td>
<td>Parents identify talent, and provide exposure and opportunities in talent development. They model a love of learning, hard work, and high expectations. They provide a balance between integration and differentiation, constraint and freedom.</td>
</tr>
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<td></td>
<td>Berry, 2008; Csiszentmihalyi et al., 1993; Ochse, 1990; Piirto, 2004; Reis &amp; Diaz, 1999; Tomlinson et al., 1997</td>
<td>Successful teachers in talent development are encouraging, supportive, model a love of learning, have high expectations, and display an intense passion in an interest area. They identify talent in their students.</td>
</tr>
</tbody>
</table>
### Table 1 (continued)

**Summary of Research Findings by Literature Strand**

<table>
<thead>
<tr>
<th>Strand</th>
<th>Source</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Catalysts (continued)</td>
<td>Figlio, 2005; McKown &amp; Weinstein, 2008; Tenenbaum &amp; Ruck, 2007</td>
<td>Some students of color experience differential (lower) teacher expectations based on race.</td>
</tr>
<tr>
<td></td>
<td>Hébert, 2000; Johnson, 2000; Reis &amp; Díaz, 1999; Sokatch, 2006; Stewart, 2007</td>
<td>Achieving students cite an association with positive peers. Positive peer association is a strong predictor of GPA and college enrollment among low-income, urban, and minority students.</td>
</tr>
<tr>
<td></td>
<td>Ford, 1993; Ford et al., 2008a; Hébert, 2001; Horvat &amp; Lewis, 2003; Reis &amp; Díaz, 1999</td>
<td>“Acting White” is associated with negative peer pressure.</td>
</tr>
<tr>
<td></td>
<td>Bleske-Rechek et al., 2004; Geiser &amp; Santelices, 2004; Hargrove et al., 2008; Hertberg-Davis et al., 2006; VanTassel-Baska, 2001</td>
<td>Advanced Placement (AP) is a viable option for gifted students. AP participation is positively associated with college success and educational degree attainment.</td>
</tr>
<tr>
<td></td>
<td>Clasen, 2006; Henfield et al., 2008; Hertzog, 2003; Muratori et al., 2006</td>
<td>Participation in appropriately matched programs and services for gifted learners positively impacts talent development. Students cite better quality teachers, equally skilled peers, and better preparation for college.</td>
</tr>
<tr>
<td></td>
<td>Bucknavage &amp; Worrell, 2005; Lipscomb, 2007; Olszewski-Kubilius &amp; Lee, 2004</td>
<td>Gifted students participate in a variety of extracurricular activities. These activities are associated with increased achievement scores and increased educational degree expectations.</td>
</tr>
</tbody>
</table>
CHAPTER THREE: METHODOLOGY

This chapter provides an overview of the research design and methodology employed in this study. The chapter begins with the purposes of the study and the research questions. Next, a brief description of the NELS:88/2000 dataset is provided, followed by a discussion of the sampling techniques and instrumentation utilized within the NELS:88/2000 dataset. Next, the chapter presents the variables used in this study, as well as a rationale of how the researcher operationalized the constructs outlined in the conceptual framework. Then the chapter examines the procedures utilized in the study and data management issues. The chapter then describes the statistical analyses that were used to address the research questions. Lastly, the chapter describes the ethical safeguards of this study.

The purposes of this study were to investigate how well academic potential predicts future success and how intrapersonal and environmental factors impact the talent development process. The Differentiated Model of Giftedness and Talent (DMGT; Gagné, 2009) provided the theoretical and conceptual framework through which the talent development process was viewed. This study expands upon existing talent development research among high-ability learners to include a diverse group of students, representing two racial groups and four domains of academic potential. A review of the current literature demonstrated the need to: 1) examine how well a broadened conception of giftedness predicts future indicators of talent; and 2) examine how intrapersonal and environmental factors simultaneously impact the talent development process. An improved understanding of talent development is needed for all learners, including racially diverse learners who exhibit academic potential.
Secondary data analysis of the National Education Longitudinal Study of 1988 (NELS:88) was employed in this study. Using descriptive statistics and multivariate analyses, this study addressed the following research questions:

1. How do the top 10% of Black students and the top 10% of White students compare on key variables relevant to talent development?

2. How do educational degree attainment and occupational prestige differ among Black and White students who exhibit varying levels of academic potential?

3. What talent development factors are most influential in predicting educational degree attainment among Black and White students who exhibit varying levels of academic potential?

4. What talent development factors are most influential in predicting occupational prestige among Black and White students who exhibit varying levels of academic potential?

Overview of the National Education Longitudinal Study of 1988

The National Center for Education Statistics (NCES), situated within the U.S. Department of Education’s Institute for Education Sciences, is the primary federal organization responsible for collecting, analyzing, reporting, and disseminating statistical data related to the condition of education in the U.S. and other countries (U.S. Department of Education, National Center for Education Statistics, 2005). One of the agency’s many program goals is to collect and analyze data from the Longitudinal Studies Program. This program was established “to provide ongoing, descriptive information about what is occurring at the various levels of education and the major
transition phases of students' lives” (U.S. Department of Education, National Center for Education Statistics, p. 117). Encompassing studies from early childhood to postsecondary levels, the National Education Longitudinal Studies Program facilitates the analysis of significant educational issues across the learning spectrum.

The National Education Longitudinal Study of 1988 (NELS:88) is the third in a series of four secondary longitudinal studies within NCES's National Education Longitudinal Studies Program. The other secondary studies within that program are: the National Longitudinal Study of the High School Class of 1972 (NLS-72); the High School and Beyond Longitudinal Study (HS&B), which began in 1980; and the Education Longitudinal Study of 2002 (ELS:2002). These longitudinal studies “provide not only measures of educational attainment, but also rich resources in exploring the reasons for and consequences of academic success and failure” (U.S. Department of Education, National Center for Education Statistics, 2005, p.134). In combination, the four secondary longitudinal studies represent the educational experiences of secondary students across the decades, from the 1970s to the 2000s.

Sample

Commencing with a base year study in the spring 1988 and continuing through four follow-up studies in 1990, 1992, 1994, and 2000, the National Education Longitudinal Study of 1988 (NELS:88/2000) provides trend data about the transitions of eighth grade students from middle school to high school to postsecondary institutions and the work force. The NELS:88/2000 supplies information on a range of topics including school, work, home experiences, the role of parents and peers, neighborhood characteristics, educational and occupational aspirations, and other student perceptions
In multiple years of the study, students completed achievement tests in four areas: reading comprehension, mathematics, science, and social studies. In addition to data collected from students, the NELS:88/2000 contains extensive survey information from parents, teachers, and school administrators.

**Base-Year Study**

The base-year study of the NELS:88/2000 dataset employed a two-stage probability design to select a nationally representative sample of eighth grade students within schools. A stratified, proportional-to-size sampling method, with oversampling of private schools, was used to select a pool of 1,734 schools representing approximately 39,000 schools nationally. These schools were stratified based on school type, geographic location, and a variable denoting urbanization. A total of 1,052 schools, 815 public schools and 237 private schools, provided usable data for students and school administrators. From this sampling of schools, 26,432 students were randomly selected for participation, with 24,599 students ultimately participating in the NELS:88 base-year study, representing an average of 23 eighth graders from each participating school.

Among the 24,599 students who participated in the NELS:88 base-year study, Hispanic and Asian/Pacific Islander students were oversampled to allow for an adequate sample size of these subgroups in future analyses. The complex sampling design employed in the NELS:88/2000 requires the use of weights to adjust for oversampling of certain groups and nonresponse.

Mathematics, science, English/language arts, and social studies teachers who taught selected students in the spring of 1988 were eligible for participation in the teacher portion of the NELS:88 base-year study. To ensure that teachers from the four subject
areas were represented in survey responses across the various school types, geographic locations, and urbanicity, sample schools were assigned one of the following combinations of curriculum areas: science and English, science and social studies, mathematics and English, or mathematics and social studies. This sampling technique yielded a total of 1 to 19 teachers per school completing the base-year teacher questionnaire, with an average of 5.5 teachers per school. In addition to teacher questionnaires, the head administrator (i.e., principal, headmaster, or headmistress) of each selected school completed a questionnaire.

One parent or guardian of each eighth grade participant was asked to complete a questionnaire, regardless of whether the child resided in a one-parent or two-parent home. Specifically, the parent or guardian who was “best-informed” about the child’s educational activities was asked to complete the parent questionnaire. This sampling technique was equivalent to self-selection.

First Follow-up Study

The first follow-up study was conducted in 1990 when most sample members were high school sophomores. Similar to the base-year study, the first follow-up study included information from students, teachers, and administrators. Although there were a number of similarities to the base-year study, a number of changes were made to the follow-up study. One change was the inclusion of a “freshened” sample of students, which allowed for trend comparisons of high school sophomores between the High School and Beyond Survey of 1980 (HS&B) and the NELS:88. Other changes included new components of the study: a dropout study, a base-year ineligible study, and a high
school effectiveness study. An additional difference in the first follow-up study was that parents were not surveyed.

Again, the student sample was selected in a two-stage design. The first stage consisted of a subsample of students who had participated in the base-year study. In an effort to include students who were either out of the country or not in the eighth grade in 1988, the first follow-up study was “freshened” to include other high school sophomores. Because the period between 1988 and 1990 represented a transition from middle school to high school for most participants, the first follow-up study was faced with the issue of 25,988 students attending nearly 3,967 schools as opposed to the 1,052 schools represented in the base-year study. The National Center for Education Statistics (NCES) addressed this issue by selecting a sampling method that preserved statistical efficiency while minimizing costs. Nearly 75% of the students (19,568 of 25,988) attended a total of 908 schools, with at least 11 base-year students per school. These students remained in the first follow-up sample. Students attending the remaining 3,059 schools were selected based on a sampling probability related to the number of base-year participants attending a particular school. In the end, 20,706 students were included in the first follow-up study (Curtin et al., 2002).

**Second Follow-up Study**

The NELS:88 second follow-up study was conducted in 1992 when most respondents were high school seniors. Many of the same components utilized in the first follow-up study were used in the second follow-up study. Similar to the first follow-up study, a freshened sample of students who were not in the eighth grade in the spring of 1988 or in the tenth grade in the spring of 1990 were included in the study. Unlike the
first follow-up study, a subsample of parents from the base-year study completed questionnaires, as did parents of 1990 and 1992 freshened students who were new to the study. In addition to the student and parent questionnaires, the second follow-up study included questionnaires from administrators and one teacher, either a science or mathematics teacher. The final sample size for the second follow-up study was 18,209 students (Curtin et al., 2002).

**Third Follow-Up Study**

The third follow-up study was conducted in the spring of 1994, two years after most participants had graduated from high school. By 1994, participants were involved in a range of activities from postsecondary education to the labor market. For the first time in the survey's history, computer-assisted telephone interviews (CATI) were employed for data collection purposes. Personal interviews were conducted with selected respondents who required intensive tracking.

The sample for the third follow-up study was created by dividing the second follow-up sample into 18 groups, based on participants’ response history, dropout status, school type, race, test score, socioeconomic status, and freshened status. Each sampling group was assigned a selection probability, with each respondent within a sampling group given a selection probability proportional to the respondent’s second follow-up weight. The third follow-up study had a final sample size of 15,875 individuals (Curtin et al., 2002).

**Fourth Follow-Up Study**

The fourth follow-up study began in January 2000, when most respondents were 26 years old. The primary data collection method for the fourth and final follow-up was
CATI, although computer-assisted personal interviews were used with telephone nonrespondents. In a cost-saving measure, a subsampling design was employed to reduce the number of third follow-up respondents who were likely to be difficult to locate. This subsampling design, as with each NELS:88 sampling design, requires the use of sample weights to account and correct for oversampling and nonresponse. In addition to information collected from survey respondents, the fourth follow-up study included a transcript study. The transcript study collected and analyzed more than 16,020 postsecondary transcripts from some 3,213 postsecondary institutions, recording course-taking behaviors and postsecondary achievement and degree attainment. The fourth and final follow-up study had a sample size of 12,144 individuals (Curtin et al., 2002).

Instrumentation

To maintain consistency with previous NCES education longitudinal studies, items from the National Longitudinal Study of the High School Class of 1972 (NLS-72), the High School and Beyond Longitudinal Study (HS&B), and other NCES studies, such as the National Assessment of Educational Progress (NAEP), the Second International Math Study (SIMS), and the Schools and Staffing Survey (SASS), were used in the construction of the NELS:88 questionnaires, as appropriate (Curtin et al., 2002). The base-year through second follow-up student questionnaires were self-administered, 60-minute questionnaires, covering a range of topics on background information, school experiences and activities, educational and occupational aspirations, and peer relationships. One year before each data collection wave, student questionnaires were field-tested and subsequently revised based on field-test results.
The self-administered parent questionnaire gathered information on family demographics, parental aspirations, and educational resources and support. The self-administered school administrator questionnaire captured school characteristics, student characteristics, teacher characteristics, school policies and programs, and school climate indicators. This study utilized information from student questionnaires, the base-year parent questionnaire, and the base-year school administrator questionnaire.

During the base-year through second follow-up studies, students completed an achievement test battery in addition to the self-administered questionnaire. The battery was developed by Educational Testing Service (Curtin et al., 2002) with very specific design objectives and criteria (Rock & Pollack, 1991). First, the assessment was to include four content areas: Reading, Mathematics, Science, and History/Citizenship/Geography, and was to be administered within 90 minutes, including time for instructions. The mathematics test was to have sufficient item overlap with the 10th grade 1980 High School and Beyond Longitudinal Study (HS&B) mathematics test and the NAEP mathematics test. Additionally, the mathematics test was to focus on conceptual understandings and problem solving skills in arithmetic, algebra, and geometry. Another criterion for the test battery was broad coverage in the reading passages to include content, as well as racial and gender diversity. Lastly, the mathematics and reading assessments were to have sufficient reliability to support the use of Item Response Theory (IRT) and guard against possible floor and ceiling effects.

Rock and Pollack (1991) reported that the test battery “met or exceeded all of its psychometric objectives” (p. iii). “Speededness indices for tests” by racial/ethnic group and gender showed the test could be administered in the allotted time, with no fewer than
88% of a student group reaching the last item on any one of the four subject tests. Internal consistency reliabilities based on coefficient Alpha for each subject test were also reported by race/ethnicity and gender. On the reading test, internal consistency reliabilities ranged from .77 to .85, with a total reliability of .84. The mathematics test had reliabilities ranging from .84 to .92, with a total reliability of .90. The science test had reliabilities ranging from .62 to .78, with a total reliability of .75. The social studies test had reliabilities ranging from .76 to .86, with a total reliability of .83. The internal consistency reliabilities for each the reading, mathematics, and science tests exceeded the reliabilities for the comparable tests from the 1980 HS&B.

Variables and Measures

This study examined the talent development process of Black and White students who exhibited academic potential. Because talent development is a process that occurs over many years, this analysis utilized data collected from the base-year, first follow-up, second follow-up, and fourth follow-up studies. Although the NELS:88/2000 collected data from students, parents, teachers, and administrators, this analysis primarily relied on student-collected data. However, some data collected from parents and school administrators were also utilized in this analysis. This section describes how the variables for this analysis were conceptualized and operationalized. Appendix A provides a visual representation of the operationalization of variables described in this section.

1 Françoys Gagné (personal communication, February 26, 2009) provided a detailed critique of the variables and measures relative to the Differentiated Model of Giftedness and Talent. His feedback greatly enhanced the operationalization of variables.
Selection Criterion

Academic Potential

The Differentiated Model of Giftedness and Talent (DMGT) defines giftedness as natural abilities in at least one ability domain at a level that places an individual in the top 10% of age peers. In accordance with this definition and the growing body of research that supports the recognition of domain-specific giftedness (VanTassel-Baska, 2005), academic potential in this study, was operationalized by selecting Black and White students who scored in the top 10% on any one of the four achievement tests administered in the base-year of the NELS:88.

In an effort to better reflect emerging identification recommendations, and to capture potential differences in the talent development process among Black and White students, the top 10% of Black students and the top 10% of White students were selected using within-racial group achievement test scores. Although this idea departs from Gagné’s (2009) definition of giftedness in the strictest sense, it is aligned with the federal definition of talented, which suggests that students should be compared with those of similar experience and environment (U.S. Department of Education, 1993). Moreover, Lohman (2005a) has recommended that in addition to using valid and reliable aptitude measures for all students, decisions about potential for academic excellence should be made by comparing “each student’s score only to the scores of other students who share similar learning opportunities or background characteristics. In other words, identification of aptitude should be made within such groups” (p. 349).

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2 As the NELS:88 does not include IQ scores, achievement test scores were used as proxies. While achievement test scores are not a perfect correlate for IQ, substantial overlap exists between aptitude and achievement (Lohman, 2006).
Students who scored in the top 10% within their racial group on any of the variables BY2XRIRR, BY2XMIRR, BY2XSIRR, or BY2XHIRR were identified as exhibiting academic potential. These variables measured the Item Response Theory (IRT) estimated number right on the reading, mathematics, science, and social studies achievement tests respectively. Item Response Theory (IRT) calibrates tests on the same scale, which allows for the calculation of group and individual level academic gains (Rock & Pollack, 1991). Two additional indicators were created denoting the level of academic potential. One indicator identified students as scoring in the top 10%, top 5%, and the top 1% on any one of the achievement tests. The second indicator identified students as scoring in the 90th to 94th percentile, the 95th to 98th percentile, or the 99th percentile on any one of the achievement tests. The analytic sample for this analysis was restricted to students who exhibited academic potential at one of these levels.

Dependent Variables

In this analysis, two measures of success were utilized, educational degree attainment and occupational prestige. For purposes of this study, these measures correspond to the talented component of the DMGT (Gagné, 2009). Recall that in the year 2000, 12 years had passed since NELS:88 participants had been in the eighth grade. As such, ample time had elapsed for students to attain a bachelor’s degree, and possibly even an advanced degree. Occupational prestige allowed for relatively prestigious occupations, which do not require a bachelor’s degree, to be included as a measure of success.
Educational Degree Attainment

Two NCES-derived variables, F4HSDIPL and F4HHDG, were used in combination to create variables representing educational degree attainment. The first variable F4HSDIPL indicates whether the respondent had a high school diploma or equivalent as of the year 2000. The second variable, F4HHDG, takes on values from 1 to 6 and indicates the highest postsecondary degree earned, anchored at (1) denoting “some PSE, no degree attained” and (6) denoting “Ph.D. or a professional degree.” These two variables were combined to form two new variables. BACHORMORE is a dichotomous variable set equal to one if the respondent attained a bachelor’s degree or higher and set equal to zero if the respondent attained less than a bachelor’s degree. DEGREE is a trichotomous variable that captures advanced degrees, with less than a bachelor’s degree (0), at most a bachelor’s degree (1), and an advanced degree (2).

Occupational Prestige

An item in the fourth follow-up questionnaire asked respondents, “I would like you to answer the following question for your primary or most important job. What is/was your job title?” Respondents’ verbatim answers were translated into one of 41 occupational codes using a computer-assisted lookup list. The variable F4BXOCCD takes on the values of 1 to 42, representing these various job titles. Values within this variable have no substantive meaning; larger values do not necessarily correspond to “higher” or more prestigious job titles. To address this issue, occupational prestige scores were utilized in the study. Occupational codes of (41) and (42) indicated that the respondent was a homemaker or otherwise unemployed, respectively. Prestige scores for individuals with those two occupational codes were set missing.
Occupational prestige scores are used as one element in the construction of socioeconomic index (SEI). Earlier measures of SES, including the base-year SES variable from the NELS:88, relied on Duncan’s (1961) SEI (National Center for Education Statistics, 2004). Because the index was from 1961, it did not include new occupations and job titles represented in the 1980 U.S. Census. Nakao and Treas (1990) updated Duncan’s occupational prestige scores and subsequently updated SEI (Nakao & Treas, 1994). Later measures of SES within the NELS:88 allow the researcher to select either Duncan’s SEI, or Nakao and Treas’ SEI, which is based on Nakao and Treas’ (1990) occupational prestige scores. Occupational titles listed in the variable F4BXOCCD were recoded using Nakao and Treas prestige scores. Means were calculated for occupational codes that contained more than one job title. Occupation codes, descriptors, sample inclusion job titles, and calculated prestige scores are presented in Appendix B.

Independent Variables

Background Characteristics

Background characteristics such as race, gender, and socioeconomic status consistently have been shown to impact educational experiences and outcomes, including talent development. This section presents the operationalization of each of these variables.

Race/ethnicity. A student’s race or ethnicity (F4RACE) was measured based on their response to the question, “Which best describes you?” Response choices included: Asian, Pacific Islander; Hispanic; Black (non-Hispanic); White (non-Hispanic); and Native-American, Alaskan. The analytic sample for this study was limited to respondents
who self-identified as Black (non-Hispanic) or White (non-Hispanic). A dichotomous race variable, BLACK, was created with Black set equal to one and White set equal to zero. This coding made White students the reference group.

*Gender.* Responses to the question, “What is your sex?” (F4SEX) were used to create the gender variable. This dummy variable was coded with male set equal to one and female set equal to zero. This recoding made females the reference group.

*Socioeconomic status.* Two base-year socioeconomic status variables were used in this analysis. Due to an error in the initial calculation of base-year SES, a measure from the second follow-up study was employed. The first variable, F2SES1, is a composite variable constructed by NCES using information from the base-year parent questionnaire. This variable used a combination of mother’s education, father’s education, mother’s occupation, father’s occupation, and family income to create a continuous SES variable, with values ranging from -3.09 to 2.75. This standardized variable has an approximate mean of zero, and an approximate standard deviation of one. The second variable, F2SES1Q, indicates the quartile into which F2SES1 falls. A value of (1) represents the lowest SES quartile, and a value of (4) represents the highest SES quartile. This variable was also used in the analysis where appropriate.

*Parent’s education.* This variable represents the highest level of education attained by either of the respondent’s parents. It is an NCES-constructed variable from two base-year parent questions. When parent data were not supplied by either parent, student data were utilized to construct the variable. The variable BYPARED takes on values ranging from (1) to (6), with higher values representing a higher educational attainment level. “Did not finish high school” corresponds to a value of (1), “some
college” corresponds to a value of (3), while “Ph.D., M.D., other” corresponds to a value of (6).

**Intrapersonal Catalysts**

The intrapersonal catalysts in the DMGT (Gagné, 2009) are divided into physical and mental traits, as well as goal management. Physical traits include elements such as height and slenderness. These traits are particularly vital in domains such as music, dance, and athletics, but are less vital in academic potential. Physical traits also include race and gender; however, in this analysis, these elements are captured under background characteristics. Mental traits include temperament, personality, and resilience. Each of these elements is important in talent development. Goal management, consists of three subcomponents, awareness, motivation, and volition. Numerous variables from the NELS:88/2000 were utilized to operationalize intrapersonal catalysts. In some instances, variables representing the same construct were combined to create a single score.

**Mental Traits**

The base-year student questionnaire included a series of questions measuring how respondents felt about themselves. The *NELS:88 User Manual* indicates that these questions measure self-concept and locus of control (Curtin et al., 2002). Each of these questions started with the stem, “How do you feel about the following statements?” and included statements such as “I feel good about myself,” “I don’t have enough control over the direction my life is taking,” and “At times I think I am no good at all.” The

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3 This author disagrees with the placement of race and gender as intrapersonal catalysts, as it fails to acknowledge the social construction of race, as well as the meaning and significance of both race and gender (Glenn, 2004).
answer choices were “strongly agree,” “agree,” “disagree,” and “strongly disagree,” scored on a scale from 1 to 4 respectively.

The variables BYLOCUS2 and BYCNCPT2 are NCES created composite variables representing locus of control and self-concept, respectively. Some variables were reverse coded in the construction of the composites. The variable BYLOCUS2 takes on values ranging from -2.51 to 1.52, with higher values representing a higher, more internal locus of control. The variable BYCNCPT2 takes on values ranging from -2.91 to 1.23, with higher values representing a higher esteem. Both of these standardized variables have approximate means of zero and approximate standard deviations of one.

Goal Management

Gagné’s (2009) current concept of goal management has evolved over iterations of the DMGT, and replaces what was previously called self-management (Gagné, 2004, 2008). In an earlier description of self-management, this subcomponent was said to “give structure and efficiency to the talent development process” (Gagné, 2008, p. 225). Previous descriptors under this subcomponent included terms such as concentration, work habits, initiative, scheduling, resource and time allocation, and self-regulation (Gagné, 2003, 2004).

Motivation. Motivation and volition are distinguished from one another in the DMGT, with motivation referring to goal-identification activities and volition referring to goal-attainment activities (Gagné, 2009). One question, F1S38, aligned with Gagné’s (2009) conception of motivation. This question asked students, “How important are good grades to you,” to which students could reply, “not important” (1), “somewhat important” (2), “important” (3) or “very important” (4).
Volition. Students were asked in the base-year questionnaire how often they came to class and found themselves without pencil or paper (when needed), books (when needed), or completed homework (when assigned). Response options to these questions included “usually,” “often,” “seldom,” or “never” on a scale ranging from 1 to 4, respectively. Although not a perfect match, these questions, BYS78A-BYS78C, most closely aligned with Gagné’s concept of volition as it relates to time allocation, effort, and self-regulation. Additional variables that measured volition were: how much time the respondent spent watching television during the weekdays (FlS45A), and how much time the respondent spent on homework during the week (FlS36A2). Because several questions were used to capture volition, either a composite score or statistical analysis was conducted to combine variables.

A number of questions were asked in the first follow-up student questionnaire about students’ willingness to work hard. Students were asked, “Do you feel it is ‘OK’ for you to… a) work hard for good grades, b) ask challenging questions, and c) solve problems using new ideas, to which they could respond “yes” or “no.” Other questions included, “How often do you feel it is ‘OK’ for you to… d) cheat on tests, and e) copy someone else’s homework. Students could respond on a scale ranging from “often” (1) to “never” (4).

Environmental Catalysts

The environmental catalysts in the DMGT (Gagné, 2009) are comprised of milieu, individuals, and provisions. Several variables representing these subcomponents of the environmental catalysts are incorporated within the NELS:88 data. A description of the variables used to operationalize those elements of the model follows below.
Milieu

Milieu incorporates “macroscopic” level, as well as “microscopic” level surroundings. These surroundings are geographic, demographic, sociological, and neighborhood, and denote access to services and resources (Gagné, 2009). Socioeconomic status is also included under this subcomponent; however, in this analysis it has been captured under background characteristics.

Familial. Two variables from the base-year student questionnaire encapsulate Gagné’s notion of familial milieu, or home capital and resources. These variables, BYS35H and BYS35M asked students, “Which of the following does your family have in the home…?” h) computer and m) more than 50 books. Answer choices were “have” (1) and “do not have” (2). The response “do not have” was recoded and set equal to zero.

School characteristics. Several variables measured base-year school characteristics: urbanicity; public, Catholic, or private school; minority concentration; and poverty concentration. These variables respectively are: G8URBAN, G8CTRL, G8MINOR, and G8LUNCH. The urbanicity variable was recoded as a dummy variable with suburban schools representing the reference group. The variable G8CTRL was recoded as a dichotomous variable with Catholic and other private schools collapsed into one private school category. This coding made public schools the reference group. The percentage minority and the percentage poverty variables are measured on an ordinal scale with each score representing a range of percentages. For example, a score of (5) on the variable G8MINOR denotes that a school had a student population that was between 41% and 60% minority. Both G8MINOR and G8LUNCH were recoded as dummy variables, with low minority or poverty concentration being less than or equal to 20%,
and high concentration being greater than 20%. In both cases, low concentration was set equal to zero and high concentration set equal to one. This coding made low concentration the reference group.

**School climate.** Additional variables measured the school’s milieu, or what is more typically referred to as the school climate. The variables appeared in the base-year study and asked students questions about school spirit, discipline, and disruption problems at the school. Each question began with the stem, “How much do you agree with each of the following statements about your school and teachers?” The answer choices for each of the questions were “strongly agree” (1), “agree” (2), “disagree” (3), and “strongly disagree” (4). Several variables were reverse coded such that favorable responses had higher values. A statistical analysis was conducted to combine correlated variables, since a series of questions measured school climate or milieu.

**Individuals**

Parents, teachers, peers, and mentors have each been identified in the DMGT and the empirical research base as having an impact on the talent development process. The NELS:88/2000 does not contain specific questions relative to a mentor. Therefore, mentors were excluded from this analysis. Variables relative to parents, teachers/guidance counselors, and peers appeared throughout the student, parent, and teacher questionnaires. However, student perceptions of parent and teacher support may in fact be more important in the talent development process than adults’ perceptions of the support they provide. For that reason, student questionnaires were the primary source for variables in this section.
Parents. Due to the large number of students who responded “do not know” when asked about their parents’ educational aspirations for them, parents’ educational expectations were obtained from the parent questionnaire. This variable (BYP76) asked parents, “How far in school do you expect your eighth grader to go?” Response options were anchored at (1) “less than high school diploma” and (12) “Ph.D., M.D.” Parental educational expectations were recoded as a dummy variable set equal to one if at least one parent wanted the student to complete a bachelor’s degree or higher, and zero otherwise.

The remaining parent variables came from student questionnaires and included parent-student discussions about educational issues and activities, and the degree to which parents provided structure and rules. Some of these questions included: “Since the beginning of the school year, how often have you discussed school activities or events of particular interest to you with either or both of your parents/or guardians?” and “How often do your parents or guardians check on whether you have done your homework?” Because several questions were used to capture parent supervision and support, a statistical analysis was conducted to combine correlated variables and create a composite score. Parent-student discussions questions were combined to create an index score.

Teachers. The base-year study had two types of questions relative to counselors and teachers. The first was the degree to which students obtained academic and career planning information from counselors and teachers. These variables (BYS51**) asked students, “Since the beginning of this school year, have you talked to a counselor at your school, a teacher at your school, or another adult relative or adult friend⁴ (other than your

⁴“Another adult relative or adult friend” was not included in this analysis.
parents), for any of the following reasons?” Possible reasons included “to get information about high schools or high school programs” (BYS51AA/ BYS51AB), “to help improve your academic work in school right now” (BYS51CA/ BYS51CB), and “for counseling on personal problems” (BYS51HA/ BYS51HB). Each question could be answered “yes” or “no.” New variables were created to denote whether the student talked to either a teacher or a counselor about each topic. An index variable, summed the previously created variables, represented the extent to which the student talked to a teacher or counselor about academic and/or career planning. This variable took on values ranging from (0) to (6).

The second type of teacher questions contained on the base-year student questionnaire asked about the quality of teaching and the quality of student-teacher relationships. Each question stem began, “How much do you agree with each of the following statements about your school and teachers?” Statements included, “students get along well with teachers” (BYS59A), “the teaching is good” (BYS59F), and “most of my teachers really listen to what I have to say” (BYS59J). The answer choices for each of the questions were “strongly agree” (1), “agree” (2), “disagree” (3), and “strongly disagree” (4). Several variables were reverse coded so that more favorable responses had higher values. Once again, a statistical analysis combined correlated variables to create a composite score.

Peers. The first follow-up study included a number of questions about peers’ educational and social values. Each of these questions (F1S70A-F1S70L) began with the stem, “Among the friends you hang out with, how important is it to…” Some of these questions included, “study” (F1S70B), “finish high school” (F1S70D), and “have a
steady boyfriend/girlfriend” (F1S70G). Answer choices for each of these questions were “not important” (1), “important” (2), and “very important” (3). Negative statements were reverse coded so that more favorable responses had higher values. A statistical analysis combined correlated variables to create a score.

Provisions

An established body of research has shown that participation in special programs such as gifted programs and Advanced Placement coursework is positively associated with educational outcomes. Additional research has shown that engaged students who participate in extracurricular activities, whether sports-related or not, have improved outcomes. In accordance with the DMGT, variables related to programs and activities were included in this analysis.

Programs. Second follow-up variables asked students retrospectively whether they ever participated in an Advanced Placement program (F2S13E) or a program for the gifted and talented (F2S13J). The answer choices for these questions were “yes” (1) or “no” (2). The “no” response was recoded and set equal to zero. While the DMGT (F. Gagné, personal communication, February 26, 2009) makes a distinction between what schools offer (provisions) and activities students select (developmental process), this analysis captured Advanced Placement programs under provisions. Placing AP programs in the developmental process presupposes that the only potential barrier to AP participation is the student himself or herself.

Activities. The first follow-up study included a question about school-sponsored extracurricular activities. This variable (F1S42) asked students, “In a typical week, how
much total time do you spend in all SCHOOL-SPONSORED extracurricular activities?"

Response options were anchored at none (0) and 20 hours or more per week (5).

Procedures

Several steps were undertaken in the successful completion of this study. This
section describes those steps as phases in the study. These phases correspond to what
would typically be called procedures.

Preliminary Phase

Longitudinal research has a long history within the field of gifted education and is
best suited to examine the predictive validity of academic potential (Subtonik & Arnold,
1994, 2000). This study was initially conceptualized utilizing the Education Longitudinal
However, talent development occurs over an extended period of time. With the most
recent data collection wave in 2006, it was determined that a sufficient amount of time
had not elapsed in the ELS:2002 to adequately capture the talent development process.
As a result, the NELS:88/2000 was selected as the most suitable data source for this
analysis.

Phase 1

The DMGT (Gagné, 1985, 1995, 2003, 2009) is said to have laid the foundation
for a focus on talents within the field of gifted education (Feldhusen, 2001) and captures
many of the elements Csikszentmihalyi et al. (1993) found to be instrumental in the talent
development process (Moon, 2006). As a comprehensive and well-recognized talent
development theory in gifted education, the DGMT was selected as the theoretical and
conceptual framework for the study. The next step was to determine how to best translate and operationalize the theory onto the NELS:88/2000 data set.

Investigating talent development using the DMGT and secondary data analysis required fluency in both the theory and the NELS:88/2000 data set. To accomplish this, numerous ideations of the DMGT were analyzed, as well as more than 1,500 variables contained in the public-use NELS:88/2000 data set. Content analysis is defined as "a generic name for a variety of means of textual analysis that involve comparing, contrasting, and categorizing a corpus of data in order to test hypotheses" (Schwandt, 2007, p. 41, in original). This type of analysis was conducted on various versions of the DMGT to identify both big picture concepts and recurring descriptors of components in the model. These concepts and descriptors were compared with questions in the NELS:88/2000. Potentially relevant variables were chosen using this method.

**Phase 2**

To refine the list of potentially relevant variables, big picture concepts and recurring descriptors of components of the DMGT were constantly compared to NELS:88/2000 questions. Variables were color-coded to represent various components of the DMGT. Questions believed to best reflect the model in practice were selected for further analysis. This process was used iteratively to further refine the variables list. At this point, the *NELS:88/2000 Data Files and Electronic Codebook (ECB)* (National Center for Education Statistics, 2004) was utilized to facilitate tagging, adding, and deleting variables based on their relevance to the conceptual framework, as well as empirical research on educational outcomes and talent development. As variables were
continually assessed to determine their appropriateness for this study, consideration was
given to how the variables would be operationalized, recoded, and analyzed.

Phase 3

This phase involved verifying that the selected variables represented various
components of the DMGT, given the limitations of superimposing the theory onto an
existing data set. Additionally, this phase verified the appropriateness of the
operationalization of variables selected for analysis. Verification was conducted in a two­
part process tantamount to expert validation. Two types of experts were consulted for
validity purposes: content experts and methodological experts. Content experts provided
feedback about variable selection based on their understanding of the DMGT and the
talent development process. Methodological experts, with experience in secondary data
analysis, provided feedback as to the operationalization of variables and data analysis
techniques.

One content expert was the dissertation advisor, who is recognized as a leader in
the field of gifted education and is the past president of the National Association for
Gifted Children. She has published extensively within the field, including publications on
the talent development process. Based on her feedback, additional refinement was made
to the variables list. The second content expert was Françoys Gagné, the theorist who
created the Differentiated Model of Giftedness and Talent. His feedback was sought to
verify that selected variables captured major components of his theory, given the
limitations of secondary data analysis. Two methodological experts were consulted to
validate the operationalization of variables, as well as the appropriateness of the data
reduction and analysis techniques. While Appendix A provides operational definitions of
all of the variables employed in this study, Table 2 aligns components of the DMGT with sample NELS:88/2000 question stems.
Table 2

Alignment of Sample NELS:88/2000 Question Stems With the DMGT

<table>
<thead>
<tr>
<th>DMGT Component</th>
<th>NELS:88/2000 Question Stem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Intrapersonal Catalysts</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Mental Traits</strong></td>
<td>• How do you feel about the following statements?</td>
</tr>
<tr>
<td></td>
<td>o I don't have enough control over the direction my life is taking.</td>
</tr>
<tr>
<td></td>
<td>o When I make plans, I am almost certain I can make them work.</td>
</tr>
<tr>
<td></td>
<td>o I feel good about myself.</td>
</tr>
<tr>
<td></td>
<td>o On the whole, I am satisfied with myself.</td>
</tr>
<tr>
<td><strong>Motivation</strong></td>
<td>• How important are good grades to you?</td>
</tr>
<tr>
<td><strong>Volition</strong></td>
<td>• Do you feel it is ‘OK’ for you to work hard for good grades?</td>
</tr>
<tr>
<td></td>
<td>• How often do you feel it is ‘OK’ for you to cheat on tests?</td>
</tr>
<tr>
<td></td>
<td>• How often do you come to class and find yourself WITHOUT pencil or paper (when needed)?</td>
</tr>
<tr>
<td></td>
<td>• During the school year, how many hours a day do you USUALLY watch TV or videotapes (on weekdays)?</td>
</tr>
</tbody>
</table>
Table 2 (continued)

**Alignment of Sample NELS:88/2000 Question Stems With the DMGT**

<table>
<thead>
<tr>
<th>DMGT Component</th>
<th>NELS:88/2000 Question Stem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environmental Catalysts</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Milieu</strong></td>
<td></td>
</tr>
<tr>
<td>• Which of the following does your family have in your home?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o More than 50 books.</td>
</tr>
<tr>
<td>• NCES constructed variables that classify the school by:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o Type (public, Catholic, other private).</td>
</tr>
<tr>
<td></td>
<td>o Urbanicity (urban, suburban, rural).</td>
</tr>
<tr>
<td>• How much do you agree with each of the following statements about your school and teachers?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>o There is real school spirit.</td>
</tr>
<tr>
<td></td>
<td>o Other students often disrupt class.</td>
</tr>
<tr>
<td><strong>Individuals</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Parents</strong></td>
<td></td>
</tr>
<tr>
<td>• How far in school do you expect your eighth grader to go?</td>
<td></td>
</tr>
<tr>
<td>• How often do your parents or guardians check on whether you have done your homework?</td>
<td></td>
</tr>
<tr>
<td>• Since the beginning of the school year, how often have you discussed selecting courses or programs at school with either or both of your parents/or guardians?</td>
<td></td>
</tr>
</tbody>
</table>
### Table 2 (continued)

**Alignment of Sample NELS:88/2000 Question Stems With the DMGT**

<table>
<thead>
<tr>
<th>DMGT Component</th>
<th>NELS:88/2000 Question Stem</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teachers</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Since the beginning of this year have you talked to a counselor or teacher to get information about high schools or high school programs?</td>
</tr>
<tr>
<td></td>
<td>• How much do you agree with each of the following statements about your school and teachers?</td>
</tr>
<tr>
<td></td>
<td>o The teaching is good.</td>
</tr>
<tr>
<td></td>
<td>o Teachers are interested in students.</td>
</tr>
<tr>
<td><strong>Peers</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Among the friends you hang out with, how important is it to...</td>
</tr>
<tr>
<td></td>
<td>o Get good grades?</td>
</tr>
<tr>
<td></td>
<td>o Have a steady boyfriend/girlfriend?</td>
</tr>
<tr>
<td><strong>Provisions</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Have you ever been in any of the following kinds of courses or programs in high school?</td>
</tr>
<tr>
<td></td>
<td>o A program for the gifted and talented.</td>
</tr>
<tr>
<td></td>
<td>• In a typical week, how much total time do you spend on all SCHOOL-SPONSORED extracurricular activities?</td>
</tr>
</tbody>
</table>

Phase 4

Once expert validation was attained, a final tagged variable file and codebook was created using the *Electronic Codebook* (ECB). The tagged variable file was imported into *SPSS* because the ECB only supports *SAS* and *SPSS* statistical packages. However, *SPSS* is unable to handle the complex survey design utilized in NELS:88/2000 (Curtin et al., 2002). Consequently, *SPSS* was used as a mechanism to import the data into *Stata* statistical software. Once data were imported into *Stata*, missing values and other variables were recoded. A missing data analysis was conducted to determine whether listwise deletion or an imputation method was the most appropriate method to address missing data. Data reduction techniques were further utilized to determine the use of selected variables. Once Human Subjects approval was attained, missing data addressed, and data reduction techniques applied, the analysis was conducted in the order of the research questions.

Data Management

Several data management issues had to be addressed before the data analysis could be conducted. This section describes those data management issues, as well as the processes for addressing them. This section begins with a description of the analytic sample, and then continues with a discussion about missing data. The section concludes with a description of index and scale constructions.

*Analytic Sample*

The NELS:88/2000 fourth follow-up study had a sample size of 12,144 individuals. The purpose of the current study was to examine talent development among Black and White students who exhibited academic potential. As such, the analytic sample
for this study excluded a substantial number of NELS:88/2000 fourth follow-up respondents. Several filters were used to attain the analytic sample. Those filters are discussed sequentially. First, academic potential in this study was defined as performing in the within race, top decile on any one of four base-year achievement tests. Students who did not participate in the base-year study were excluded from this analysis (N=11,384). Further, students who participated in the base-year study, but did not complete any of the achievement tests were excluded from this analysis (N=10,983).

Because this study sought to examine talent development among Black and White students, respondents who were either Asian, Pacific Islander; Hispanic; or Native American, Alaska Native were excluded from this analysis (N=8,725). The sample was further reduced, excluding students who did score in the top decile (N=1,977). One additional filter was used to obtain the analytic sample. The complex survey design of the NELS:88/2000 requires the use of panel weights to account for oversampling, nonresponse, and proportionality in the student population. The panel weight utilized in this study applies to students who participated in all five of the NELS:88 data collection waves. Therefore, students who did not participate in each wave were excluded from the analysis (N=1,916).

The analytic sample for this study (N=1,916) included Black students (N=202) and White students (N=1,714) who scored in their within race top decile on any one of four achievement tests. The two-stage probability design utilized in the NELS:88/2000 creates a nationally representative sample of 1988 eighth grade students. Using the fourth follow-up panel weight in this study allows for inferences to be made about the total
population of Black and White spring 1988 eighth graders who exhibited academic potential (Curtin et al., 2002).

**Missing Data**

"Missing data are a frequent complication of any real-world study" (Horton & Kleinman, 2007, p. 79). Citing an anonymous reviewer of their article, Peugh and Enders (2004) referred to missing data as a "dirty little secret" of educational research (p. 540). Although statisticians have reported on the ramifications of missing data in empirical research for more than two decades (e.g., Little & Rubin, 1987), and have even proposed preferred methods for handling missing data, there appears to be little consistency within the research base on how missing data are presented and addressed. Interestingly, this issue is not limited to educational research.

Burton and Altman (2004) conducted an analysis of how missing data were reported and addressed in a number of high-impact, non-review clinical cancer journals. Their findings were similar to Peugh and Enders’ (2004) review of missing data within educational research, with an inadequate discussion about missing data, and a reliance on outdated and biased techniques for handling missing data. In this study, an attempt was made to follow recommendations for reporting and addressing missing data. This section briefly presents the types of missing data, the presence of missing data in this analysis, and a review of the method chosen for handling missing data.

**Missing Data Types**

There are several types of missing values. In some circumstances, values may be missing by design. In other circumstances, survey items may not apply to a specific subpopulation. This is frequently referred to as a valid or legitimate skip. More
frequently, respondents fail to answer all of the questions in a survey. When missing data are present, it is necessary to check assumptions about the nature of the missingness. The terminology, missing completely at random (MCAR), was introduced by Rubin in 1976 (as cited in Peugh & Enders, 2004). This concept describes a variable whose missing value is neither related to the value of the variable itself, nor to any of the other variables in the dataset (Allison, 2002; Graham, 2009; Schafer & Graham, 2002).

The MCAR assumption can be tested by comparing the pattern and amount of missingness by key variables. Acock (2005) reported that the MCAR assumption is often unreasonable for family studies. A more relaxed assumption, and possible a more realistic assumption (Acock) is that data are missing at random (MAR). This concept describes a variable whose missing value is unrelated to the value itself, after controlling for other variables in the dataset (Acock; Allison, 2002; Graham, 2009). There is no test for the MAR assumption without additional information on the missing values (Horton & Kleinman, 2007; Peugh & Enders, 2004; Schafer & Graham, 2002).

**Missing Data Analysis**

A missing data analysis was conducted on the analytic sample to determine the pattern and amount of missingness. Among the 1,916 students in the analytic sample, several variables contained no missing data: school type (public or private), urbanicity, mathematics achievement test score, socioeconomic status, high school diploma status, and gender. No observations were missing on race by nature of the method used to obtain the analytic sample. Appendix C shows the means and standard deviations of key variables utilized in this analysis, as well as the percentage of missingness.
Cohen, Cohen, West, and Aiken (2003) have indicated that 3% or less missing data on any given variable is a relatively small amount. The vast majority of variables utilized in this analysis contained less than 3% missing values. The maximum amount of missingness occurred on the parents’ educational expectation variable, with 3.9% of all observations missing. Between 2.9% and 3.3% of the peers variables were missing. The variables denoting whether students had ever participated in a gifted program or Advanced Placement program contained 3% and 3.3% missing values, respectively. In terms of the outcome variables, bachelor’s degree attainment contained no missing data and occupational prestige contained 2.9% missing data.

The assumption of whether values were missing completely at random (MCAR) was tested by examining the average number of missing observations by key variables such as race, gender, school type, urbanicity, socioeconomic status, and degree attainment (see Table 3). In general, there was a small amount of missingness by grouping variables. The average number of missing items among White students ($M = 0.73$, $SD = 2.53$) was smaller than the average number of missing items among Black students ($M = 1.61$, $SD = 3.95$). This difference was statistically significant $t(220) = -3.10$, $p = .002$. An analysis of variance showed a statistically significant difference in the average number of missing items by urbanicity, $F(2, 1913) = 5.97$, $p = .003$. An analysis of variance also showed a statistically significant difference in the number of missing items by degree attainment, $F(2, 1913) = 6.44$, $p = .002$. These statistically significant differences on the average number of missing items by grouping variables violated the missing completely at random (MCAR) assumption.
Table 3

*Missing Values Analysis for the Analytic Sample by Key Grouping Variables*

<table>
<thead>
<tr>
<th>Grouping Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>0.73</td>
<td>2.53</td>
<td>( t(220) = -3.10, p = .002 )</td>
</tr>
<tr>
<td>Black</td>
<td>1.61</td>
<td>3.95</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>0.85</td>
<td>2.86</td>
<td>( t(1879) = 0.41, p = .679 )</td>
</tr>
<tr>
<td>Male</td>
<td>0.80</td>
<td>2.59</td>
<td></td>
</tr>
<tr>
<td>School Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public</td>
<td>0.79</td>
<td>2.73</td>
<td>( t(1178) = -0.66, p = .511 )</td>
</tr>
<tr>
<td>Private</td>
<td>0.88</td>
<td>2.71</td>
<td></td>
</tr>
<tr>
<td>Urbanicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suburban</td>
<td>0.67</td>
<td>2.21</td>
<td>( F(2, 1913) = 5.97, p = .003 )</td>
</tr>
<tr>
<td>Urban</td>
<td>1.17</td>
<td>3.53</td>
<td></td>
</tr>
<tr>
<td>Rural</td>
<td>0.73</td>
<td>2.56</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quartile 1 (lowest)</td>
<td>1.26</td>
<td>3.30</td>
<td>( F(3, 1912) = 2.00, p = .112 )</td>
</tr>
<tr>
<td>Quartile 2</td>
<td>1.01</td>
<td>3.36</td>
<td></td>
</tr>
<tr>
<td>Quartile 3</td>
<td>0.77</td>
<td>2.70</td>
<td></td>
</tr>
<tr>
<td>Quartile 4 (highest)</td>
<td>0.73</td>
<td>2.42</td>
<td></td>
</tr>
<tr>
<td>Degree Attainment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than bachelor’s</td>
<td>1.12</td>
<td>3.44</td>
<td>( F(2, 1913) = 6.44, p = .002 )</td>
</tr>
<tr>
<td>Bachelor’s</td>
<td>0.69</td>
<td>2.28</td>
<td></td>
</tr>
<tr>
<td>Master’s or higher</td>
<td>0.51</td>
<td>1.96</td>
<td></td>
</tr>
</tbody>
</table>

Multiple Imputation

Listwise deletion removes all cases with any missing values from an analysis. Although listwise deletion can greatly reduce the sample size, it remains an appropriate method to address missing data when data are MCAR. However, when this assumption is violated, listwise deletion can produce biased estimates (Acock, 2005; Allison, 2002; Peugh & Enders, 2004). Only 73% of all observations in the analytic sample had complete data. Moreover, Table 3 demonstrates that the MCAR assumption was not met. The data in this analysis were assumed to be missing at random (MAR).

Alternative methods for addressing missing data include pairwise deletion, mean substitution, dummy variable adjustment, and single imputation (see Acock, 2005 for a non-technical presentation on missing data). Although these traditional methods continue to be utilized today, none of them are particularly better than listwise deletion, and many produce greater bias in estimates (Allison, 2002; Graham, 2009). For example, mean substitution replaces all missing values with the mean value. This leads to a smaller amount of variance within the dataset and biases the estimates.

Modern methods for addressing missing data include expectation maximization (EM) and multiple imputation (MI). Expectation maximization (EM) is “an iterative procedure that produces maximum likelihood estimates” (Graham, 2009, p. 555). While superior to traditional methods for missing data, there are two primary criticisms against EM. Graham has cautioned, “Although EM provides excellent parameter estimates, the lack of convenient standard errors means that EM is not good particularly for hypothesis testing” (p. 556). Further, because EM relies on a single imputation, standard errors are typically underestimated, which in turn overestimates precision (Acock, 2005, p.1019).
Multiple imputation (MI) was first proposed by Rubin in 1987 (as cited in Peugh & Enders, 2004). It has emerged as a flexible approach to address the issue of missing values. This is a three step-procedure, beginning with generating a pre-specified number of datasets. The resulting dataset contains $m$, multiple-imputed datasets. These datasets are then combined to produce $m$ different estimates. The estimates are then pooled to produce a final, reported estimate. There is no absolute rule for the number of imputations, although 5-10 are typical. In this analysis, MI was performed using a free, user-created Stata program called ice (Royston, 2005a, 2005b). Both independent and dependent variables were included in the MI prediction model (Allison, 2002; Graham, 2009).

A total of five imputations produced five multiply-imputed datasets. Estimates in this analysis rely on those five datasets. Appendix C presents the means and standard deviations after imputation. Due to the relatively small amount of missingness on any one variable, the means and standard deviations are virtually the same. Small changes can be detected in the variables that presented the larger amounts of initial missing data, such as parents’ educational expectations and variables related to peers.

**Data Reduction**

Talent development is a complex process. The Differentiated Model of Giftedness and Talent (DMGT; Gagné, 2009) attempts to capture that complexity through components and subcomponents within the model. Identifying questions from the NELS:88/2000 that appeared to align with the DMGT yielded more than 60 variables. Data reduction techniques were utilized to reduce the number of variables and improve reliability. One such technique, exploratory factor analysis (EFA), seeks to find factors
that explain the maximum amount of common variance (Bryant & Yarnold, 1995; Tabachnick & Fidell, 2007). Exploratory factor analysis was used in this analysis to create factors among the related independent variables, as outlined in Appendix A. In circumstances where EFA was inappropriate, or the results were unsatisfactory, summed index variables were created. This section describes the processes employed to reduce the number of variables utilized in the study.

**Volition**

Several base-year and first follow-up questions were identified as potentially capturing the concept of volition as defined in the DMGT. Three variables indicating whether it was okay to: 1) work hard for grades, 2) ask challenging questions, and 3) solve problems using new ideas, were excluded from the EFA because their dichotomous nature made them inappropriate for inclusion (Kim & Mueller, 1978). Instead, a summed index was created using the three variables.

Exploratory factor analysis was conducted on the remaining volition variables to determine the statistical relationship (See Appendix A). Principal components factors yielded less than satisfactory results. Although three factors loaded according to Kaiser’s rule, the third factor had an extremely low reliability ($\alpha = .28$). The items in this factor were amount of time spent on homework and amount of time spent watching television. These two items were removed and a second EFA conducted. A summary of the resulting EFA appears in Table 4. Although time spent on homework, and time spent watching television were removed from the EFA, they were retained individually because of their potential contribution to understanding talent development.
### Table 4

*Summary of Exploratory Factor Analysis on Volition Items*

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Preparedness</th>
<th>Academic Honesty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Come to class without pencil/paper</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>Come to class without books</td>
<td>.77</td>
<td></td>
</tr>
<tr>
<td>Come to class without homework</td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>Think it’s okay to cheat on tests</td>
<td>.89</td>
<td></td>
</tr>
<tr>
<td>Think it’s okay to copy homework</td>
<td>.89</td>
<td></td>
</tr>
<tr>
<td>Cronbach’s Alpha</td>
<td>.62</td>
<td>.73</td>
</tr>
</tbody>
</table>

School Climate

School climate variables, representing the school milieu, included questions about school spirit, rules for behavior, feeling safe, and the extent of disruptive behavior. An initial EFA, using principal components, produced three factors using Kaiser’s rule. The first factor was composed of three items measuring other students’ disruptive behavior. The second factor was composed of school spirit, fair discipline, and feeling safe at school. The third factor consisted of a single item, “rules for behavior are strict.” These three factors accounted for 60% of the variance; however, the second factor had low reliability (α = .43). Items from the second and third factors were removed, resulting in one factor representing other students’ disruptive behavior. This factor accounted for 56% of the variance. Table 5 presents factor loadings for the three items that remained.

Table 5

Summary of Exploratory Factor Analysis on Students’ Disruptive Behavior Items

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Disruptive Behavior</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other students often disrupt class</td>
<td>.75</td>
</tr>
<tr>
<td>Student disruptions inhibit learning</td>
<td>.75</td>
</tr>
<tr>
<td>Misbehaving students often get away with it</td>
<td>.74</td>
</tr>
<tr>
<td>Cronbach’s Alpha</td>
<td>.60</td>
</tr>
</tbody>
</table>

Parents

Several questions from the base-year study measured the extent to which students discussed educational programs, plans, and activities with their parents. These variables were summed to create an index. Four questions asked students how often their parents checked their homework, required chores, limited television watching, and limited going out with friends. Exploratory factor analysis showed one factor with a reliability of .52. This factor only accounted for 41% of the variance. As opposed to retaining the factor, a parental structure index variable was created by summing the four parental structure questions. In addition, a squared parental structure variable was created to allow for the possibility that too much parental structure inhibits talent development (Csikszentmihalyi et al., 1993).

Teachers

Several base-year questions asked the extent to which students talked with a counselor and a teacher about high school planning and programs, career planning, and improving school work. These variables were recoded to denote that a student talked with either a counselor or teacher, and then summed to create a variable denoting the extent to which the respondent talked with teachers/counselors. Additional questions asked whether the teaching is good, whether teachers are interested in students, and the degree to which teachers listen. Factor loadings are presented in Table 6. Although the amount of variance explained is relatively low (52%), the reliability is high (α = .81).
Table 6

Summary of Exploratory Factor Analysis on Student-Teacher Relations Items

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Student-Teacher Relations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students get along with teachers</td>
<td>.64</td>
</tr>
<tr>
<td>The teaching is good</td>
<td>.75</td>
</tr>
<tr>
<td>Teachers are interested in students</td>
<td>.82</td>
</tr>
<tr>
<td>Teachers praise effort when I work hard</td>
<td>.71</td>
</tr>
<tr>
<td>I feel “put down” by my teachers</td>
<td>.61</td>
</tr>
<tr>
<td>Teachers listen to what I have to say</td>
<td>.77</td>
</tr>
<tr>
<td>Cronbach’s Alpha</td>
<td>.81</td>
</tr>
</tbody>
</table>


Peers

The first follow-up study contained a series of questions that asked respondents about the importance of certain activities among the friends they “hang out with.”

Exploratory factor analysis was conducted on these 11 items, producing three factors. The first two factors were easily interpretable, representing peers’ educational orientation and social orientation respectively. The third factor contained three items: the importance of religion, volunteering, and having a job. Reliability was increased (α = .51), after “having a job” was dropped from the factor (α = .59). Moreover, the resulting factor could more easily be characterized as “community engagement.” Factor loadings are presented in Table 7. The three factors explain 59% of the variation.
It is interesting to note that playing sports negatively loaded on the second factor. The other items in that factor had been reversed coded. Playing sports had not been reverse coded, given the research base which suggests participation in extracurricular activities is positively associated with academic outcomes.

Table 7

*Summary of Exploratory Factor Analysis on Peers Items*

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Peers' Academic Orientations</th>
<th>Peers' Social Orientations</th>
<th>Peers' Community Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Important to attend classes regularly</td>
<td>.78</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important to study</td>
<td>.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important to play sports</td>
<td>- .56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important to get good grades</td>
<td>.77</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important to be popular</td>
<td></td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>Important to finish high school</td>
<td>.74</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Important to have a steady boyfriend/girlfriend</td>
<td></td>
<td>.73</td>
<td></td>
</tr>
<tr>
<td>Important to be willing to party</td>
<td></td>
<td>.68</td>
<td></td>
</tr>
<tr>
<td>Important to continue education past high school</td>
<td></td>
<td>.75</td>
<td></td>
</tr>
<tr>
<td>Important to participate in religious activities</td>
<td></td>
<td></td>
<td>.82</td>
</tr>
<tr>
<td>Important to do community work</td>
<td></td>
<td></td>
<td>.81</td>
</tr>
<tr>
<td>Cronbach’s Alpha</td>
<td>.83</td>
<td>.62</td>
<td>.59</td>
</tr>
</tbody>
</table>

Data Analysis

This study employed two primary statistical methods to address the research questions: descriptive statistics and multivariate analyses. Table 8 describes the cluster of variables and data analysis techniques used to answer each research question.

Table 8

*Research Questions With Corresponding Variables and Data Analysis*

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Variables/Clusters</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How do the top 10% of Black students and the top 10% of White students compare on key variables relevant to talent development?</td>
<td>• Independent variables (background characteristics, intrapersonal catalysts, environmental catalysts)</td>
<td>• Exploratory factor analysis</td>
</tr>
<tr>
<td>2. How do educational degree attainment and occupational prestige differ among Black and White students who exhibit varying levels of academic potential?</td>
<td>• Dependent variables (educational degree attainment, occupational prestige scores)</td>
<td>• Descriptive statistics (means, standard deviations, percentages) • Inferential statistics ($t$-tests)</td>
</tr>
</tbody>
</table>
### Table 8 (continued)

**Research Questions With Corresponding Variables and Data Analysis**

<table>
<thead>
<tr>
<th>Research Question</th>
<th>Variables/Clusters</th>
<th>Data Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. What talent development factors are most influential in predicting educational degree attainment among Black and White students who exhibit varying levels of academic potential?</td>
<td>• Selection criterion, dependent variable, independent variables</td>
<td>• Exploratory factor analysis</td>
</tr>
<tr>
<td>4. What talent development factors are most influential in predicting occupational prestige among Black and White students who exhibit varying levels of academic potential?</td>
<td>• Selection criterion, dependent variable, independent variables</td>
<td>• Exploratory factor analysis</td>
</tr>
<tr>
<td></td>
<td>• Multiple logistic regression analysis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Multiple linear regression analysis</td>
<td></td>
</tr>
</tbody>
</table>
Exploratory factor analysis reduced the number of variables into a smaller number of correlated variables. Appendix A presents the variables that were utilized in this study, as well as the operationalization for those variables. The first and second research questions were addressed using descriptive statistics, including means and standard deviations for ordinal variables. Proportions were calculated for categorical variables. In addition, inferential statistics, including t-tests and Chi-square tests were used to determine group differences.

The third and fourth research questions were addressed using multivariate techniques. Some of the same techniques were used to address both questions. To address the overarching question of which factors are most influential in predicting success, the independent variables were analyzed in clusters or blocks as described below.

Block 1: Background Characteristics
(i.e., race, gender, socioeconomic status, parent’s education)

Block 2: Level of Academic Potential
(i.e., 90th – 94th percentile, 95th – 98th percentile, 99th percentile)

Block 3: Intrapersonal Catalysts
(i.e., mental traits, motivation, volition)

Block 4: Environmental Catalysts
(i.e., milieu, individuals, provisions)

The order in which blocks were introduced into the model was based on Gagné’s (2003, 2009) assertions about what matters most in talent development.

In the third research question, the dependent variable, BACHELORS, was a dichotomous variable, taking on the value of one if the respondent had attained a
bachelor's degree or higher and zero otherwise. Logistic regression analysis, a model frequently used when the dependent variable is dichotomous (Greene, 2008; Long, 1997; Menard, 1995), was employed to address this research question. This technique uses maximum likelihood estimation to predict the dependent variable based on the independent variables (Greene; Long; Menard).

The fourth research question was addressed in a manner quite similar to the third question. The major difference in the analyses rests with the nature of the dependent variable. Unlike the BACHELORS variable, the occupational prestige variable PRESTIGE is interval. This makes linear regression analysis an appropriate choice. To that end, multiple linear regression was conducted to address this research question.

Ethical Safeguards

Approval for this study was obtained from The College of William and Mary Protection of Human Subjects Committee. Because this study employed secondary data analysis of an existing large-scale, public-use dataset, it was found to be exempt from formal review. Prior to making the NELS:88/2000 available for public use, the National Center for Education Statistics undertook numerous precautions to maintain confidentiality. High risk variables determined to pose a disclosure risk were either altered or suppressed on the public-use files (Curtin et al., 2002). This included variables that uniquely identified individuals or schools, such as geocodes, zip codes, and extreme outliers. In addition, neither high school transcript data nor post secondary transcript data are available on the public-use file.
CHAPTER FOUR: RESULTS

The purposes of this study were to investigate how well academic potential predicts future success and how intrapersonal and environmental factors impact the talent development process. The Differentiated Model of Giftedness and Talent (DMGT; Gagné, 2009) provided the theoretical and conceptual framework through which the talent development process was viewed. The two outcomes variables in this analysis were educational degree attainment and occupational prestige scores. Two degree attainment variables were utilized in this study. One was a dichotomous variable representing whether at least a bachelor’s degree was earned. The other was a trichotomous variable taking on one of three values representing less than a bachelor’s degree, at most a bachelor’s degree, and an advanced degree.

Data from the public-use National Education Longitudinal Study of 1988 (NELS:88) base-year through fourth follow-up studies were used to answer the following research questions:

1. How do the top 10% of Black students and the top 10% of White students compare on key variables relevant to talent development?

2. How do educational degree attainment and occupational prestige differ among Black and White students who exhibit varying levels of academic potential?

3. What talent development factors are most influential in predicting educational degree attainment among Black and White students who exhibit varying levels of academic potential?
4. What talent development factors are most influential in predicting occupational prestige among Black and White students who exhibit varying levels of academic potential?

Descriptive statistics, t-tests, and Chi-square tests were used to answer the first two research questions. Multiple logistic regression analysis was used to answer the third research question, and multiple linear regression analysis was used to answer the fourth research question. This chapter presents the results of the study organized by research question.

How Academic Potential Was Identified

Students were identified as having academic potential in this study if they scored in the top 10%, within their racial group, on any one of four achievement tests administered as part of the base-year NELS:88. Using within racial group test scores allowed students to be compared to peers who had similar opportunities to learn (Lohman, 2005a). What was the impact of using within racial group scores? What were the criteria for identifying academic potential among Black students in comparison to White students?

Table 9 presents the criteria used for identifying academic potential by race. At every level of academic potential, in every area of identification, the criteria for Black students were lower than the criteria for White students. In mathematics for example, Black students' achievement test scores ranged from 16.38 to 63.02. These students were identified in the top 10% if their score was at or above 44.19. In contrast, White students' achievement test scores ranged from 16.5 to 66.81. These students were identified in the
top 10% if their score was at or above 54.93. In general, the criteria used to identify Black students at the top 1% were comparable to the criteria used to identify White students at the top 5%.
Table 9

*Test Criteria for Identifying Levels of Academic Potential*

<table>
<thead>
<tr>
<th></th>
<th>White</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Top 10%</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>40.17</td>
<td>34.80</td>
</tr>
<tr>
<td>Mathematics</td>
<td>54.93</td>
<td>44.19</td>
</tr>
<tr>
<td>Science</td>
<td>26.27</td>
<td>21.74</td>
</tr>
<tr>
<td>History/Citizenship/Geography</td>
<td>36.36</td>
<td>32.79</td>
</tr>
</tbody>
</table>

| **Top 5%**         |       |       |
| Reading            | 42.63 | 37.86 |
| Mathematics        | 58.88 | 49.46 |
| Science            | 28.05 | 23.83 |
| History/Citizenship/Geography | 38.25 | 34.85 |

| **Top 1%**         |       |       |
| Reading            | 43.83 | 42.63 |
| Mathematics        | 64.20 | 58.53 |
| Science            | 30.91 | 27.94 |
| History/Citizenship/Geography | 41.30 | 38.03 |

Academic potential was also identified in this study by meeting the test criteria on any one of four base-year achievement tests. Allowing for students to be identified in this manner acknowledged the growing body of literature on the existence of domain-specific talent. But how prevalent was domain-specific talent among the analytic sample? Figure 2 presents the percentage of students in the analytic sample identified as having academic potential by the number of identification criteria met. Seven percent of students who scored in the top 10% within their racial group met the identification criteria on all four achievement tests, meaning that these students scored in their within race top 10% on the reading, mathematics, science, and history tests. This is in comparison to 54% of students who met the identification criteria by scoring in the top 10% within their racial group on only one achievement test.
Figure 2: Percentage of Students Identified by the Number of Identification Criteria Met

Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.
Description of the Analytic Sample

The analytic sample in this study consisted of 1,916 students who exhibited academic potential. Of these students, 1,714 were White and 202 were Black. The complex study design utilized in the NELS:88/2000 allows for inferences to be made to a larger population of students across the entire country. This group of 1,916 students who exhibited academic potential represents more than 523,700 Black and White eighth graders in 1988 who exhibited academic potential. This is the group to which inferences are made in this study.

Before presenting the distribution of students who exhibited academic potential by racial group and levels of potential, recall how levels of academic potential were operationalized within the context of this study. The analytic sample was limited to Black and White students who scored in the top 10% within their racial group on any one of four achievement tests. This group scored within their racial group at the 90th percentile or better, and is referred to as the top 10%. The top 5% refers to students who scored within their racial group at the 95th percentile or better. The top 1% refers to students who scored within their racial group at the 99th percentile or better. This constitutes one way in which the term levels of academic potential was operationalized in this study.

The second way levels of academic potential were operationalized was by examining percentile bands: the 90th – 94th percentile represents one band; the 95th – 98th percentile represents another band; and the 99th percentile represents yet another band. Although defined differently, these two methods for identifying levels of academic potential allowed for distinctions to be made among students. It is important to note that the top 1% in the first method is equivalent to the highest percentile band in the second
method. Table 10 shows the unweighted number of Black and White students who exhibited academic potential. Of the 1,916 students in the analytic sample, 746 scored between their 90th and 94th within race percentile on at least one achievement test, and 785 scored between their 95th and 98th within race percentile on at least one achievement test. A total of 385 students scored at the 99th within race percentile on at least one achievement test.

Table 10

*Unweighted Frequency Distribution of Students Who Exhibited Academic Potential*

<table>
<thead>
<tr>
<th>Percentile Band</th>
<th>N (unweighted)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>White</td>
</tr>
<tr>
<td>90th - 94th percentile</td>
<td>663</td>
</tr>
<tr>
<td>95th - 98th percentile</td>
<td>699</td>
</tr>
<tr>
<td>99th percentile</td>
<td>352</td>
</tr>
<tr>
<td>Total</td>
<td>1,714</td>
</tr>
</tbody>
</table>

Results for Research Question #1

What were the characteristics of Black and White students who exhibited academic potential? Among these students who exhibited academic potential, White students comprised 87% of the sample in comparison to Black students who comprised 13% of the sample. Overall, the sample was more likely to be male (55%) and reside in the suburbs (48%). Nearly 70% of these students were enrolled in at least one advanced, enriched, or accelerated core course during the eighth grade. These students were much more likely to have participated in an Advanced Placement (AP) program during their schooling (64%) than to have participated in a gifted program (40%).

The locus of control, self concept, and socioeconomic status variables were all standardized within the NELS:88/2000 dataset, with an approximate mean of zero and standard deviation of one. The positive mean values for each of these variables indicates that students who exhibited academic potential had a higher locus of control \( M = 0.25, SE = 0.02 \) and a higher self concept \( M = 0.18, SE = 0.02 \) than typical students. In addition, students who exhibited academic potential came from wealthier families \( M = 0.49, SE = 0.03 \), with one-half standard deviation above the mean representing nearly the 70th percentile of wealth.

The typical student in the analytic sample indicated that grades were important or very important to them, with a mean of 3.56 on a 4-point Likert scale. In terms of how these students spent their time, the average student in the sample spent 4 to 6 out-of-school hours each week completing homework, watched between 1 to 3 hours of television daily, and spent 1 to 4 hours each week in school-sponsored extracurricular
activities. On average, 87% of the parents of students who exhibited academic potential expected their children to attain at least a bachelor’s degree.

Comparing the top 10% of Black students and the top 10% of White students on key variables relevant to talent development, there were both similarities and differences. Overall, the top 10% of Black students and the top 10% of White students were quite similar on measures of motivation, volition, and the proportion of students identified by subject area. For example, grades were nearly equally important to both groups of students, with Black students indicating that grades were slightly more important to them than White students. In terms of preparedness, Black students had slightly lower rates of preparedness, academic honesty, and academic orientation in comparison to their White counterparts; however, none of these differences were statistically significant.

Overall, the proportion of Black and White students identified as exhibiting academic potential by subject area was similar. For example, although Black students were identified as having academic potential in history ($M = 0.51, SE = 0.07$) more frequently than White students ($M = 0.44, SE = 0.02$), the difference was not statistically significant, $t(650) = -0.95, p = .34$. Other similarities between Black and White students who exhibited academic potential included a comparable rate of attending private schools, a similar level of parental structure and supervision in the home, and similar perceptions of other students’ bad behavior.

Just as similarities existed between Black and White students who exhibited academic potential, differences existed as well. Black and White students varied considerably on average achievement test scores, with White students scoring higher on each achievement test. White students came from wealthier families than did Black
students. This is evidenced on every indicator associated with socioeconomic status, including parents' education attained, having a computer in the home, and attending a high minority or high poverty school. Table 11 presents means and standard errors for the total group of Black and White students who exhibited academic potential, as well as means and standard errors presented by race.
Table 11

Descriptive Statistics of Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SE)</th>
<th>White (M, SE)</th>
<th>Black (M, SE)</th>
<th>Total (M, SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Achievement Test Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td></td>
<td>37.91 (0.18)</td>
<td>32.82 (0.74)</td>
<td>37.25 (0.21)</td>
</tr>
<tr>
<td>Mathematics</td>
<td></td>
<td>51.38 (0.32)</td>
<td>40.80 (1.91)</td>
<td>50.01 (0.42)</td>
</tr>
<tr>
<td>Science</td>
<td></td>
<td>25.09 (0.12)</td>
<td>20.99 (0.48)</td>
<td>24.56 (0.14)</td>
</tr>
<tr>
<td>History/Citizenship/Geography</td>
<td></td>
<td>35.37 (0.13)</td>
<td>33.50 (0.66)</td>
<td>35.13 (0.14)</td>
</tr>
<tr>
<td><strong>Proportion Identified by Subject Area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>0.43 (0.02)</td>
<td>0.44 (0.07)</td>
<td>0.43 (0.02)</td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>0.42 (0.02)</td>
<td>0.41 (0.07)</td>
<td>0.42 (0.02)</td>
<td></td>
</tr>
<tr>
<td>Science</td>
<td>0.43 (0.02)</td>
<td>0.47 (0.07)</td>
<td>0.44 (0.02)</td>
<td></td>
</tr>
<tr>
<td>History/Citizenship/Geography</td>
<td>0.44 (0.02)</td>
<td>0.51 (0.07)</td>
<td>0.45 (0.02)</td>
<td></td>
</tr>
<tr>
<td><strong>Number of Areas Identified</strong></td>
<td></td>
<td>1.73 (0.03)</td>
<td>1.84 (0.14)</td>
<td>1.74 (0.03)</td>
</tr>
<tr>
<td><strong>Background Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blacka</td>
<td>0.00 (0.00)</td>
<td>1.00 (0.00)</td>
<td>0.13 (0.02)</td>
<td></td>
</tr>
<tr>
<td>Malea</td>
<td>0.55 (0.01)</td>
<td>0.52 (0.07)</td>
<td>0.55 (0.02)</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic statusb</td>
<td>0.53 (0.02)</td>
<td>0.07 (0.08)</td>
<td>0.49 (0.03)</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic status (quartiles)</td>
<td>3.29 (0.03)</td>
<td>2.67 (0.12)</td>
<td>3.21 (0.03)</td>
<td></td>
</tr>
<tr>
<td>Parents' education</td>
<td>3.89 (0.04)</td>
<td>3.34 (0.13)</td>
<td>3.82 (0.04)</td>
<td></td>
</tr>
</tbody>
</table>
Table 11 (continued)

Descriptive Statistics of Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>White</th>
<th>Black</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental Traits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locus of control&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.27 (0.02)</td>
<td>0.09 (0.08)</td>
<td>0.25 (0.02)</td>
</tr>
<tr>
<td>Self concept&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.16 (0.02)</td>
<td>0.28 (0.09)</td>
<td>0.18 (0.02)</td>
</tr>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades important</td>
<td>3.55 (0.32)</td>
<td>3.58 (0.08)</td>
<td>3.56 (0.02)</td>
</tr>
<tr>
<td>Volition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preparedness&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-0.01 (0.03)</td>
<td>-0.09 (0.09)</td>
<td>-0.02 (0.03)</td>
</tr>
<tr>
<td>Academic honesty&lt;sup&gt;b&lt;/sup&gt;</td>
<td>-0.05 (0.03)</td>
<td>-0.09 (0.12)</td>
<td>-0.05 (0.03)</td>
</tr>
<tr>
<td>Academic orientation</td>
<td>2.94 (0.01)</td>
<td>2.91 (0.03)</td>
<td>2.93 (0.01)</td>
</tr>
<tr>
<td>Homework time</td>
<td>3.08 (0.06)</td>
<td>2.79 (0.19)</td>
<td>3.04 (0.06)</td>
</tr>
<tr>
<td>Television time</td>
<td>2.26 (0.05)</td>
<td>3.28 (0.28)</td>
<td>2.39 (0.06)</td>
</tr>
<tr>
<td>Materials in the Home</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.62 (0.02)</td>
<td>0.51 (0.08)</td>
<td>0.60 (0.02)</td>
</tr>
<tr>
<td>More than 50 books&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.97 (0.01)</td>
<td>0.90 (0.05)</td>
<td>0.96 (0.01)</td>
</tr>
</tbody>
</table>
Table 11 (continued)

*Descriptive Statistics of Students Who Exhibited Academic Potential*

<table>
<thead>
<tr>
<th>Variable</th>
<th>White</th>
<th>Black</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suburban (reference)(^a)</td>
<td>0.51 (0.03)</td>
<td>0.33 (0.07)</td>
<td>0.48 (0.03)</td>
</tr>
<tr>
<td>Urban(^a)</td>
<td>0.21 (0.03)</td>
<td>0.55 (0.07)</td>
<td>0.25 (0.03)</td>
</tr>
<tr>
<td>Rural(^a)</td>
<td>0.29 (0.02)</td>
<td>0.13 (0.03)</td>
<td>0.27 (0.02)</td>
</tr>
<tr>
<td>Private(^a)</td>
<td>0.20 (0.03)</td>
<td>0.18 (0.06)</td>
<td>0.20 (0.03)</td>
</tr>
<tr>
<td>High minority(^a)</td>
<td>0.18 (0.02)</td>
<td>0.81 (0.04)</td>
<td>0.27 (0.02)</td>
</tr>
<tr>
<td>High poverty(^a)</td>
<td>0.27 (0.02)</td>
<td>0.66 (0.07)</td>
<td>0.32 (0.02)</td>
</tr>
<tr>
<td><strong>School Climate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other students' bad behavior(^b)</td>
<td>-0.04 (0.04)</td>
<td>-0.07 (0.11)</td>
<td>-0.05 (0.04)</td>
</tr>
<tr>
<td><strong>Parents</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent discussions</td>
<td>6.33 (0.06)</td>
<td>5.79 (0.27)</td>
<td>6.26 (0.07)</td>
</tr>
<tr>
<td>Parental structure</td>
<td>7.99 (0.08)</td>
<td>7.97 (0.34)</td>
<td>7.99 (0.08)</td>
</tr>
<tr>
<td>Parental structure squared</td>
<td>69.53 (1.31)</td>
<td>69.12 (5.22)</td>
<td>69.48 (1.31)</td>
</tr>
<tr>
<td>Parents' educational expectations</td>
<td>0.88 (0.01)</td>
<td>0.81 (0.06)</td>
<td>0.87 (0.01)</td>
</tr>
</tbody>
</table>
Table 11 (continued)

Descriptive Statistics of Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>White</th>
<th>Black</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Teachers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talk to teachers</td>
<td>3.55 (0.07)</td>
<td>4.36 (0.22)</td>
<td>3.65 (0.07)</td>
</tr>
<tr>
<td>Student-teacher relations(^b)</td>
<td>-0.09 (0.03)</td>
<td>-0.09 (0.20)</td>
<td>-0.09 (0.04)</td>
</tr>
<tr>
<td><strong>Peers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peers' academic orientation(^b)</td>
<td>-0.03 (0.03)</td>
<td>0.07 (0.13)</td>
<td>-0.02 (0.03)</td>
</tr>
<tr>
<td>Peers' social orientation(^b)</td>
<td>0.02 (0.05)</td>
<td>-0.01 (0.13)</td>
<td>0.02 (0.04)</td>
</tr>
<tr>
<td>Peers' community engagement(^b)</td>
<td>-0.01 (0.03)</td>
<td>0.18 (0.15)</td>
<td>0.01 (0.04)</td>
</tr>
<tr>
<td>Peers' steady job importance</td>
<td>1.89 (0.32)</td>
<td>2.18 (0.07)</td>
<td>1.92 (0.02)</td>
</tr>
<tr>
<td><strong>Provisions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any accelerated courses (base-year)(^a)</td>
<td>0.68 (0.02)</td>
<td>0.75 (0.05)</td>
<td>0.69 (0.02)</td>
</tr>
<tr>
<td>Ever in AP(^a)</td>
<td>0.65 (0.02)</td>
<td>0.59 (0.07)</td>
<td>0.64 (0.02)</td>
</tr>
<tr>
<td>Ever in gifted program(^a)</td>
<td>0.41 (0.02)</td>
<td>0.31 (0.07)</td>
<td>0.40 (0.02)</td>
</tr>
<tr>
<td>Time in extracurricular activities</td>
<td>1.94 (0.06)</td>
<td>1.94 (0.18)</td>
<td>1.94 (0.06)</td>
</tr>
</tbody>
</table>

Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.
\(^a\)Dichotomous variable takes on a value of zero or one. The mean represents the proportion.
\(^b\)Standardized normal variable with approximate mean of zero and approximate standard deviation of one.
As indicated, the top 10% of Black students and the top 10% of White students varied considerably on demographic measures including socioeconomic status, urbanicity, and the proportion of students attending high minority and high poverty concentration schools. Some of the mean differences on key variables relevant to talent development are compared in Table 12. A series of t-tests were conducted in order to compare Black and White students who exhibited academic potential. To control for the increased risk of a Type I error resulting from multiple comparisons, an adjustment was utilized, setting the alpha level at .01. This adjustment was slightly less conservative than the Bonferroni adjustment, but allowed for a consistent alpha level when multiple t-tests were conducted.

One of the most noticeable differences between Black and White students who exhibited academic potential was in their average achievement test scores. Recall that within racial group test scores were used as the criteria for determining academic potential. White students scored significantly higher than Black students on each the reading, mathematics, and science tests at the $p < .001$ level. Other statistically significant differences included attending high minority and poverty schools, with Black students being more likely to attend schools with both high minority and high poverty concentrations; and amount of time spent watching television, with Black students watching significantly more television than their White counterparts. Interesting to note, participation rates among Black and White students who exhibited academic potential in Advanced Placement programs and gifted programs were not statistically different. Similarly, there was no statistical difference in parents' educational expectations by race.
Table 12

*Mean Differences Between Black and White Students on Key Variables Relevant to Talent Development*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean Difference</th>
<th>Standard Error</th>
<th>Lower Bound</th>
<th>Upper Bound</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Achievement Test Score</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading</td>
<td>5.09***</td>
<td>0.76</td>
<td>3.13</td>
<td>7.05</td>
</tr>
<tr>
<td>Mathematics</td>
<td>10.57***</td>
<td>1.94</td>
<td>5.57</td>
<td>15.58</td>
</tr>
<tr>
<td>Science</td>
<td>4.10***</td>
<td>0.50</td>
<td>2.82</td>
<td>5.38</td>
</tr>
<tr>
<td>History/Citizenship/Geography</td>
<td>1.87**</td>
<td>0.67</td>
<td>0.13</td>
<td>3.61</td>
</tr>
<tr>
<td>Locus of control</td>
<td>0.18**</td>
<td>0.08</td>
<td>-0.02</td>
<td>0.39</td>
</tr>
<tr>
<td>Self concept</td>
<td>-0.12</td>
<td>0.09</td>
<td>-0.36</td>
<td>0.12</td>
</tr>
<tr>
<td>Television time</td>
<td>-1.02***</td>
<td>0.28</td>
<td>-1.75</td>
<td>-0.30</td>
</tr>
<tr>
<td>High minority</td>
<td>-0.63***</td>
<td>0.04</td>
<td>-0.74</td>
<td>-0.52</td>
</tr>
<tr>
<td>High poverty</td>
<td>-0.40***</td>
<td>0.07</td>
<td>-0.57</td>
<td>-0.22</td>
</tr>
<tr>
<td>Parents' educational expectations</td>
<td>0.07</td>
<td>0.07</td>
<td>-0.10</td>
<td>0.24</td>
</tr>
<tr>
<td>Talk to teachers</td>
<td>-0.80***</td>
<td>0.23</td>
<td>-1.39</td>
<td>-0.21</td>
</tr>
<tr>
<td>Ever in AP</td>
<td>0.06</td>
<td>0.07</td>
<td>-0.13</td>
<td>0.25</td>
</tr>
<tr>
<td>Ever in gifted program</td>
<td>0.10</td>
<td>0.07</td>
<td>-0.08</td>
<td>0.28</td>
</tr>
</tbody>
</table>

*Source:* National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.

*a Mean difference = (White – Black)

** p < .01

*** p < .001
While Table 11 demonstrates that White students came from families who were much more wealthy ($M = 0.53$, $SE = 0.02$) than their Black counterparts ($M = 0.07$, $SE = 0.08$), $t(653) = 5.52$, $p < .001$, an easier way to interpret this difference is to examine the socioeconomic status by quartiles. Table 13 presents the socioeconomic status quartiles and the urbanicity of students who exhibited academic potential by race. Since White students comprised 87% of the total sample, if academic potential was distributed equally across socioeconomic status we would expect approximately 22% of White students to come from each of the four socioeconomic status groups. Similarly, since Black students comprised 13% of the total sample, if academic potential was distributed equally across socioeconomic status we would expect approximately 3% of Black students to come from each of the four socioeconomic status groups.

While academic potential was relatively equally distributed across socioeconomic quartiles among Black students, that was not the case among White students. More than half of all White students who exhibited academic potential came from families in the highest socioeconomic quartile. In fact, White students from the highest socioeconomic quartile were 10 times more likely to exhibit academic potential than White students from the lowest socioeconomic quartile. Examining the distribution of both socioeconomic quartiles and urbanicity by race, differences between Black and White students were statistically significant at the $p < .001$ level.
Table 13

*Socioeconomic Status and Urbanicity Among Students Who Exhibited Academic Potential*

<table>
<thead>
<tr>
<th>Variable</th>
<th>White Students</th>
<th>Black Students</th>
<th>Total</th>
<th>Test Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Socioeconomic Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quartile 1 (lowest)</td>
<td>0.04</td>
<td>0.02</td>
<td>0.06</td>
<td>Design-based $F(2.64, 1731.45) = 9.32^{***}$</td>
</tr>
<tr>
<td>Quartile 2</td>
<td>0.14</td>
<td>0.03</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Quartile 3</td>
<td>0.22</td>
<td>0.04</td>
<td>0.27</td>
<td></td>
</tr>
<tr>
<td>Quartile 4 (highest)</td>
<td>0.47</td>
<td>0.03</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>0.87</td>
<td>0.12</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

| Urbanicity          |                |                |       |                           |
| Urban               | 0.18           | 0.07           | 0.25  | Design-based $F(1.60, 1046.81) = 17.14^{***}$ |
| Suburban            | 0.44           | 0.04           | 0.48  |                           |
| Rural               | 0.25           | 0.02           | 0.27  |                           |
| Total               | 0.87           | 0.13           | 1.00  |                           |

*Source:* National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.

*Note:* Values represent cell proportions.

*Rows and columns may not sum to 1 due to rounding error.*

*** $p < .001$
Results for Research Question #2

Two outcome measures were utilized in this study, educational degree attainment and occupational prestige. This research question examined both of these outcome measures among Black and White students who exhibited varying levels of academic potential. Again, a series of t-tests were conducted in order to make comparisons. The alpha level was set at .01 to control for the increased risk of a Type I error and to maintain consistency with the first research question.

Educational Degree Attainment

Overall, White students who exhibited academic potential were more likely to attain a bachelor’s degree or higher (62%) than their Black counterparts (45%), although this difference was insignificant once corrections for multiple comparisons were made, \( t \ (653) = 2.42, p = .016 \). Figure 3 compares bachelor’s degree attainment by race and level of academic potential. Examining the graph within each level of academic potential facilitates answering the question about whether race matters. Comparing the graph across the levels of academic potential facilitates answering the question whether levels of academic potential matter.

Answering the question of whether race matters, White and Black students who scored within their racial group at the 95th to 98th percentile had similar rates of bachelor’s degree attainment at 59% and 57% respectively. Although White students (60%) who scored within their racial group at the 90th to 94th percentile attained a bachelor’s degree at a higher rate than did Black students (40%) at the same level of academic potential, that difference was not statistically significant, \( t \ (653) = 2.20, \)
$p = .028$. On the other hand, differences in college completion by race at the highest level of academic potential were statistically significant, $t (653) = 2.75, p = .006$, with only 32% of Black students who scored within race at the 99th percentile on at least one achievement test attaining a bachelor's degree, in comparison to 72% of White students.

Answering the question of whether levels of academic potential matter, 60% of White students who scored within race at the 90th to 94th percentile attained a bachelor's degree in comparison to 72% of White students who scored within race at the 99th percentile on at least one achievement test. This difference was statistically significant, $t (653) = -3.30, p = .001$. Among Black students, those who scored within race at the 95th to 98th percentile were more likely to attain a bachelor's degree than students at any other level of academic potential.

Surprisingly, only 32% of Black students who scored in their within race 99th percentile on at least one achievement test attained a bachelor's degree. It should be noted that the unweighted sample size in this category was $n = 33$. Although this sample size exceeds the recommended $n = 30$, these results should be interpreted with caution. Despite this unexpectedly low rate of degree attainment among Black students at the highest level of academic potential, differences in degree attainment between the 95th to 98th percentile and the 99th percentile were not statistically significant $t (653) = 1.50, p = .134$. This may be because the amount of variation among Black students at the highest level of academic potential was larger than for any other group.
Figure 3: Bachelor’s Degree Attainment by Race and Level of Academic Potential

Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.
What about advanced degree attainment relative to levels of academic potential? Were students who scored at the 99th percentile on at least one achievement test more likely to attain an advanced degree than students who scored at the 90th to 94th percentile? Before addressing this question, the unweighted sample size for Black students who attained an advanced degree was $n = 17$. If this small unweighted sample size was examined relative to levels of potential, an already small $n$ would be subdivided into three levels of academic potential. It was determined that this unweighted sample size was too small for advanced degree attainment comparisons by race. Consequently, this question is answered by examining advanced degree attainment by levels of academic potential among White students only.

Students with the highest level of academic potential were more likely to complete at most a bachelor's degree (62%) in comparison to students representing other levels of academic potential. Differences between students at the middle level of academic potential (95th to 98th percentile) and the highest level of academic potential (99th percentile) were statistically significant $t (653) = -2.71, p = .007$. Among White students, there were no appreciable differences in advanced degree attainment by level of academic potential, $t (653) = -1.30, p = .194$. Figure 4 displays advanced degree attainment by levels of potential among White students.
Figure 4: Educational Degree Attainment Among White Students by Levels of Academic Potential

Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.
Overall, there were no differences in occupational prestige scores by race or level of academic potential. Among students who exhibited academic potential, White students had a slightly higher mean occupational prestige score ($M = 50.77, SE = 0.37$) than did Black students ($M = 48.31, SE = 1.15$), although the difference was not statistically significant $t (518) = 2.01, p = 0.04$. To better contextualize these average scores, protective services and criminal justice administration had an occupational prestige score of 48.40, in comparison to supervisory, office, and administration managers who had an occupational prestige score of 51.19 (see Appendix B for a listing of occupation codes, sample inclusions, and assigned occupational prestige scores).

Despite the large and statistically significant differences in educational degree attainment among the top 1% of White and Black students, there were no statistically significant differences in their mean occupational prestige scores $t (381) = 0.95, p = .34$. Examining occupational prestige among the various levels of academic potential, without regard for race, yielded similar results. Students who scored at the 90th to 94th percentile ($M = 49.66, SE = 0.51$) had a lower mean occupational prestige score than did students who scored at the 99th percentile ($M = 51.32, SE = 0.91$). These mean differences were not statistically significant, $t (305) = -1.63, p = .10$.

By race, there was no more than a four-point differential in occupational prestige scores between levels of academic potential, with the largest difference in prestige scores occurring among students in the top 1%. By percentile rank, there was no more than a two-point differential in occupational prestige scores. Table 14 shows mean occupational prestige scores by race and level of academic potential.
Table 14

*Mean Occupational Prestige Scores by Race and Level of Academic Potential*

<table>
<thead>
<tr>
<th>Variable</th>
<th>M (SE)</th>
<th>White</th>
<th>Black</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top 10%</td>
<td>50.77 (0.37)</td>
<td>48.31 (1.15)</td>
<td>50.45 (0.36)</td>
<td></td>
</tr>
<tr>
<td>Top 5%</td>
<td>51.36 (0.44)</td>
<td>48.13 (1.72)</td>
<td>50.95 (0.47)</td>
<td></td>
</tr>
<tr>
<td>Top 1%</td>
<td>51.80 (0.75)</td>
<td>47.93 (3.98)</td>
<td>51.32 (0.91)</td>
<td></td>
</tr>
<tr>
<td>Percentile Rank</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90th – 94th Percentile</td>
<td>49.82 (0.57)</td>
<td>48.59 (0.91)</td>
<td>49.66 (0.51)</td>
<td></td>
</tr>
<tr>
<td>95th – 98th Percentile</td>
<td>51.16 (0.56)</td>
<td>48.22 (1.64)</td>
<td>50.78 (0.54)</td>
<td></td>
</tr>
<tr>
<td>99th Percentile</td>
<td>51.80 (0.75)</td>
<td>47.93 (3.98)</td>
<td>51.32 (0.91)</td>
<td></td>
</tr>
</tbody>
</table>

*Source:* National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.
Considering the potential impact extreme values have on means, occupational prestige scores were also examined by grouping occupations into "low," "medium," and "high" occupational groups. To create these three occupational groups, occupational prestige scores were first arranged from least to greatest. Then natural breaks in the scores were used in combination with equally dividing the range of scores to create the three groups.

The lowest occupational prestige score, 24.66, corresponds to laborers such as grounds keepers, maintenance workers, and custodians. The highest occupational prestige score, 73.13, corresponds to legal professionals such as lawyers and judges (see Appendix B for a listing of occupation codes, sample inclusions, and assigned occupational prestige scores). The range of scores divided by three is approximately 16. Correspondingly, the low occupational prestige group was created to have scores less than 40. The medium occupational prestige group was created to have scores ranging from 40 to less than 57. The high occupational prestige group was created to have scores greater than or equal to 57.

Figure 5 compares occupational prestige groupings by race. Examining the low end of the distribution, White students (18%) who exhibited academic potential were less likely to participate in the lowest occupational prestige group than Black students (23%), although the difference was not statistically significant, \( t (421) = -0.68, p = .50 \).

Examining the high end of the distribution, White students (28%) who exhibited academic potential were more likely to participate in the highest occupational prestige group than Black students (17%). This difference was statistically significant, \( t (421) = 2.71, p = .007 \).
Figure 5: Occupational Prestige Groupings by Race

Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.
What about occupational prestige groupings by levels of academic potential? Were students who scored within their racial group at the 99th percentile more likely to participate in higher prestige occupations? Figure 6 compares occupational prestige groupings by levels of academic potential. Examining the distribution of occupational prestige groupings shows only slight differences in participation by levels of academic potential. Students who scored within their racial group at the 90th to 94th percentile were least likely to participate in the higher occupational prestige group (24%). Students who scored at the 95th to 98th percentile (29.0%) and students who scored at the 99th percentile (28.5%) were nearly equally likely to participate in the highest occupational prestige group. Overall, differences in occupational prestige groupings by levels of academic potential were not statistically significant.
Figure 6: Occupational Prestige Groupings by Levels of Academic Potential

*Source:* National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.
Results for Research Question #3

What talent development factors are most influential in predicting educational degree attainment among Black and White students who exhibit varying levels of academic potential? This question parallels Gagne’s (2003, 2009) question of “What makes a difference?” He has theorized that giftedness matters most in talent development, followed by the intrapersonal, developmental process, and environmental components.

The developmental process is described as “the systematic pursuit by talentees, over a significant period of time, of a structured program of activities aimed at a specific excellence goal” (Gagne, 2009, p.67). The developmental process includes a level of purpose and intentionality that NELS:88/2000 questions were unable to capture. As a result, the development process was not analyzed in this study. The remaining components of the DMGT were analyzed in this study.

To address this research question, separate logistic regression analyses were conducted on Black and White students who exhibited academic potential. Variables were entered into each regression model in sequential blocks, representing components of the Differentiated Model of Giftedness and Talent, in the order Gagne posits matters most. Background characteristics were entered into the models first, followed by levels of potential, then intrapersonal catalysts, and finally environmental catalysts.

In each of these analyses, the dependent variable was a dichotomous variable which took on a value of one to indicate that the student attained at least a bachelor’s degree, and zero to indicate that the student did not attain at least a bachelor’s degree. Coefficients in each model are presented in terms of odds ratios (OR). These coefficients
measure the impact of each variable on the likelihood of attaining a bachelor’s degree or higher, and are interpreted as increasing or decreasing the odds of attaining a bachelor’s degree, holding all other variables constant.

An odds ratio of exactly one corresponds to no impact on degree attainment. An odds ratio of less than one indicates a decrease in the odds of attaining a bachelor’s degree or more when the independent variable increases by one unit. An odds ratio greater than one indicates an increase in the odds of attaining a bachelor’s degree when the independent variable increases by one unit (Menard, 1995). For example, an odds ratio of 1.43 would signify a 43% increase in the odds of attaining at least a bachelor’s degree in response to a one-unit change in a particular independent variable. An odds ratio of 0.72 would signify a 28% decrease in the odds of attaining at least a bachelor’s degree in response to a one-unit change in a particular independent variable. Magnitudes of positive and negative effects can be compared by taking the reciprocal of the negative effect (Long, 1997). Odds ratios can then be compared to determine the most influential predictors (Tabachnick & Fidell, 2007). Statistical significance was determined in this research question using a .05 level.

**Predicting Educational Degree Attainment Among White Students**

Table 15 presents results from the sequential logistic regression analyses for White students. The first model included only background characteristics, such as gender and socioeconomic status. Results from that model indicated that both gender and socioeconomic status mattered in predicting bachelor’s degree attainment. Being a male placed a student at-risk for attaining a bachelor’s degree. The odds ratio for being a male indicated a 46% decrease in the odds of attaining a bachelor’s degree, holding all other
variables constant. This value was statistically significant, $t (652) = -4.11, p < .001$. Socioeconomic status was also statistically significant ($OR = 2.77, p < .001$), with the odds ratio indicating that a student whose socioeconomic status was one full standard deviation above the mean had a 177% increase in the odds of attaining a bachelor’s degree. Comparing the respective negative and positive effects of being a male and socioeconomic status, socioeconomic status had a greater impact on bachelor’s degree attainment. Parents’ highest level of education was not a significant predictor of their child’s educational degree attainment.

In addition to the background characteristics examined in the first model, the second model included levels of potential. The odds ratio for being in the 90th to 94th percentile was 1.05. Membership in this group indicated a slight increased odds of attaining a bachelor’s degree in comparison to a student who scored in the 95th to 98th percentile reference group. This odds ratio ($OR$) was neither substantive nor significant. Being in the 99th percentile, however, increased the odds of completing college by 55%. This result was statistically significant ($OR = 1.55, p = .046$) at the .05 level.

The third and fourth models added the intrapersonal and environmental components from the DMGT, respectively. Introducing the intrapersonal catalysts in the third model made membership in the 99th percentile group no longer statistically significant in terms of its impact on degree attainment. Among the newly included intrapersonal variables, the importance of good grades was both large and statistically significant ($OR = 2.15, p < .001$). Holding all else constant, the more important good grades were, the greater the odds of attaining a bachelor’s degree or higher. Other
statistically significant intrapersonal variables included preparedness ($OR = 1.24$, $p = .006$) and the amount of time spent on homework ($OR = 1.09$, $p = .030$).

The fourth and final model added the environmental component including the home and school milieu, parents, teachers, peers, and provisions. Although homework time had been statistically significant in the third model, it was no longer significant once the environmental catalysts were added to the model. Attending a private school increased the odds of bachelor’s degree attainment ($OR = 1.74$, $p = .014$), as did participating in an Advanced Placement program ($OR = 2.10$, $p < .001$). In terms of the impact of peers, having peers with an academic orientation increased the odds of bachelor’s degree attainment, while having peers for whom holding a steady job was important decreased the odds of bachelor’s degree attainment. Participation in extracurricular activities also increased the odds of degree attainment.

Answering the question of what matters most in degree attainment for White students who exhibited academic potential, socioeconomic status matters most. The remaining factors in decreasing order of importance were: participating in AP, the importance of good grades, attending a private school, being a male, the importance to peers in having a steady job, peers’ academic orientation, extracurricular activities, and preparedness. None of the other variables in the final model were statistically significant predictors of degree attainment, despite the fact that some of the non-significant odds ratios were larger in magnitude than some of the significant odds ratios.
Table 15

Odds Ratio of Attaining a Bachelor’s Degree or Higher Among White Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>SE</td>
<td>Odds Ratio</td>
<td>SE</td>
</tr>
<tr>
<td>Background Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malea</td>
<td>0.54***</td>
<td>0.08</td>
<td>0.56***</td>
<td>0.08</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td>2.78***</td>
<td>0.44</td>
<td>2.73***</td>
<td>0.41</td>
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<tr>
<td>Parents’ education</td>
<td>1.03</td>
<td>0.08</td>
<td>1.03</td>
<td>0.08</td>
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<tr>
<td>Levels of Potential</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>90th – 94th Percentilea</td>
<td>1.05</td>
<td>0.18</td>
<td>1.05</td>
<td>0.19</td>
</tr>
<tr>
<td>99th Percentilea</td>
<td>1.55*</td>
<td>0.34</td>
<td>1.36</td>
<td>0.29</td>
</tr>
<tr>
<td>Intrapersonal Component</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Locus of control</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Self concept</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grades important</td>
<td>2.15***</td>
<td>0.25</td>
<td>1.78***</td>
<td>0.21</td>
</tr>
</tbody>
</table>
Table 15 (continued)

Odds Ratio of Attaining a Bachelor's Degree or Higher Among White Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th></th>
<th>Model 2 Levels of Potential</th>
<th></th>
<th>Model 3 Intrapersonal</th>
<th></th>
<th>Model 4 Environmental</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
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<td>Odds Ratio</td>
<td>SE</td>
<td>Odds Ratio</td>
<td>SE</td>
<td>Odds Ratio</td>
<td>SE</td>
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<tr>
<td>Preparedness</td>
<td>1.24**</td>
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<td></td>
<td></td>
<td>1.20*</td>
<td>0.09</td>
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<td></td>
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<tr>
<td>Academic honesty</td>
<td>0.91</td>
<td>0.07</td>
<td></td>
<td></td>
<td>0.90</td>
<td>0.07</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic orientation</td>
<td>1.11</td>
<td>0.22</td>
<td></td>
<td></td>
<td>1.02</td>
<td>0.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homework time</td>
<td>1.09*</td>
<td>0.04</td>
<td></td>
<td></td>
<td>1.02</td>
<td>0.04</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Television time</td>
<td>1.02</td>
<td>0.07</td>
<td></td>
<td></td>
<td>1.09</td>
<td>0.07</td>
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<td>Environmental Component</td>
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<td></td>
</tr>
<tr>
<td>Computer^a</td>
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<td>0.90</td>
<td>0.13</td>
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<td></td>
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<tr>
<td>Books^a</td>
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<td>1.39</td>
<td>0.60</td>
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<td>Urban^a</td>
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<td></td>
<td>0.69</td>
<td>0.15</td>
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<tr>
<td>Rural^a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.18</td>
<td>0.23</td>
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</tr>
<tr>
<td>Private^a</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.74*</td>
<td>0.39</td>
<td></td>
<td></td>
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</tbody>
</table>
Table 15 (continued)

**Odds Ratio of Attaining a Bachelor’s Degree or Higher Among White Students Who Exhibited Academic Potential**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>High Minority(^a)</td>
<td></td>
<td></td>
<td></td>
<td>0.87 0.20</td>
</tr>
<tr>
<td>High Poverty(^a)</td>
<td></td>
<td></td>
<td></td>
<td>1.12 0.21</td>
</tr>
<tr>
<td>Other students’ bad behavior</td>
<td></td>
<td></td>
<td></td>
<td>1.08 0.09</td>
</tr>
<tr>
<td>Parent discussions</td>
<td></td>
<td></td>
<td></td>
<td>1.02 0.05</td>
</tr>
<tr>
<td>Parental structure</td>
<td></td>
<td></td>
<td></td>
<td>1.16 0.15</td>
</tr>
<tr>
<td>Parental structure squared</td>
<td></td>
<td></td>
<td></td>
<td>0.99 0.01</td>
</tr>
<tr>
<td>Parents’ educ. expectations</td>
<td></td>
<td></td>
<td></td>
<td>1.29 0.28</td>
</tr>
<tr>
<td>Talk to teachers</td>
<td></td>
<td></td>
<td></td>
<td>1.01 0.05</td>
</tr>
<tr>
<td>Student-teacher relations</td>
<td></td>
<td></td>
<td></td>
<td>1.17 0.10</td>
</tr>
<tr>
<td>Peers’ academic orientation</td>
<td></td>
<td></td>
<td></td>
<td>1.27* 0.12</td>
</tr>
<tr>
<td>Peers’ social orientation</td>
<td></td>
<td></td>
<td></td>
<td>0.95 0.08</td>
</tr>
</tbody>
</table>
Table 15 (continued)

Odds Ratio of Attaining a Bachelor’s Degree or Higher Among White Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>SE</td>
<td>Odds Ratio</td>
<td>SE</td>
</tr>
<tr>
<td>Peers’ comm. engagement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peers’ steady job importance</td>
<td></td>
<td></td>
<td>0.71**</td>
<td>0.08</td>
</tr>
<tr>
<td>Any accelerated courses</td>
<td></td>
<td></td>
<td>1.05</td>
<td>0.19</td>
</tr>
<tr>
<td>Ever in APa</td>
<td></td>
<td></td>
<td>2.10***</td>
<td>0.37</td>
</tr>
<tr>
<td>Ever in gifted programa</td>
<td></td>
<td></td>
<td>1.06</td>
<td>0.19</td>
</tr>
<tr>
<td>Extracurricular activities time</td>
<td></td>
<td></td>
<td>1.23***</td>
<td>0.06</td>
</tr>
</tbody>
</table>

Model F-Statistic

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odds Ratio</td>
<td>35.14***</td>
<td>21.79***</td>
<td>16.17***</td>
<td>8.57***</td>
</tr>
</tbody>
</table>

Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.

* Dichotomous variable. Odds ratio represents the effect of membership.
* * p < .05
** ** p < .01
*** *** p < .001
Predicting Educational Degree Attainment Among Black Students

Table 16 presents results from the sequential logistic regression analyses for Black students. Results from the first model indicated that only socioeconomic status was a statistically significant predictor of bachelor's degree attainment. Although being a male placed a student at-risk for attaining a bachelor's degree, the odds ratio was not statistically significant \((OR = 0.64, p = .392)\). Socioeconomic status was statistically significant and substantive \((OR = 3.05, p = .013)\), with the odds ratio indicating that a student whose socioeconomic status was one full standard deviation above the mean had a 205% increase in the odds of attaining a bachelor's degree.

The second model introduced levels of potential in addition to background characteristics. Being a member of the 90th to 94th percentile or the 99th percentile decreased students' odds of attaining a bachelor's degree relative to the 95th to 98th percentile, all other things held constant. This indicates that students in the 95th to 98th percentile were most successful in attaining a bachelor's in comparison to the other groups. Despite the decreased odds of attaining a bachelor's degree among the other two levels of potential, the impacts were not statistically significant.

Among the intrapersonal catalysts introduced in the third model, only two were statistically significant, locus of control and amount of time spent watching television. The odds ratio for locus of control indicated that a one standard deviation increase in locus of control decreased the odds of attaining a bachelor's degree or higher by 68% \((OR = 0.32, p = .037)\). In other words, Black students who possessed a higher or more internal locus of control had decreased odds of attaining at least a bachelor's degree in comparison to Black students who possessed a lower, more external locus of control.
This result is counterintuitive, as was the result of increased television watching. Watching more television increased the odds of attaining a bachelor's degree or higher ($OR = 1.81, p = .002$).

Once the environmental catalysts were added in the fourth model, socioeconomic status was no longer statistically significant, although the odds ratio was still substantive ($OR = 1.98, p = .210$). While the odds ratio for socioeconomic status decreased, many of the environmental factors associated with socioeconomic status were statistically significant. For example, having a computer in the home, living in an urban district, and attending a private school were all statistically significant, with the magnitude of their respective odds ratios being large. In addition to these variables being statistically significant, participating in a gifted program increased the odds of attaining a bachelor's degree. Surprisingly, more frequent talks with a teacher or counselor decreased the odds of attaining a bachelor's degree. A word of caution is in order in interpreting the results of the fourth model. Although there is no fixed criterion for the ratio of minimum number of observations to number of predictors in logistic regression analysis, some have suggested a 10 to 1 ratio (Tabachnick & Fidell, 2007). The fourth model had a sample size of $N=202$ and included 35 predictors, failing to meet this criterion.

Answering the question of what matters most in degree attainment for Black students who exhibited academic potential, attending an urban school matters most. The remaining factors in decreasing order of importance were: attending a private school, the importance of good grades, having a computer in the home, participating in a gifted program, the amount of time spent watching television, the amount of time spent doing homework, and frequency of talking to teachers. None of the other variables in the final
model were statistically significant predictors of degree attainment, including socioeconomic status.
Table 16

*Odds Ratio of Attaining a Bachelor’s Degree or Higher Among Black Students Who Exhibited Academic Potential*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>SE</td>
<td>Odds Ratio</td>
<td>SE</td>
</tr>
<tr>
<td>Background Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>0.64</td>
<td>0.33</td>
<td>0.66</td>
<td>0.32</td>
</tr>
<tr>
<td>90th – 94th Percentile(^a)</td>
<td>0.59</td>
<td>0.36</td>
<td>0.44</td>
<td>0.25</td>
</tr>
<tr>
<td>99th Percentile(^a)</td>
<td>0.40</td>
<td>0.24</td>
<td>0.62</td>
<td>0.37</td>
</tr>
<tr>
<td>Intrapersonal Component</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locus of control</td>
<td>0.32*</td>
<td>0.17</td>
<td>0.33</td>
<td>0.28</td>
</tr>
<tr>
<td>Self concept</td>
<td>2.19</td>
<td>1.05</td>
<td>1.67</td>
<td>0.89</td>
</tr>
<tr>
<td>Grades important</td>
<td>1.26</td>
<td>0.57</td>
<td>5.42*</td>
<td>3.57</td>
</tr>
</tbody>
</table>
Table 16 (continued)

Odds Ratio of Attaining a Bachelor’s Degree or Higher Among Black Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
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<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>SE</td>
<td>Odds Ratio</td>
<td>SE</td>
</tr>
<tr>
<td>Preparedness</td>
<td>1.27</td>
<td>0.35</td>
<td>0.96</td>
<td>0.36</td>
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<tr>
<td>Academic honesty</td>
<td>1.11</td>
<td>0.24</td>
<td>1.08</td>
<td>0.29</td>
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<tr>
<td>Academic orientation</td>
<td>2.02</td>
<td>1.65</td>
<td>0.65</td>
<td>0.52</td>
</tr>
<tr>
<td>Homework time</td>
<td>1.19</td>
<td>0.20</td>
<td>1.66*</td>
<td>0.36</td>
</tr>
<tr>
<td>Television time</td>
<td>1.46***</td>
<td>0.19</td>
<td>1.89**</td>
<td>0.36</td>
</tr>
<tr>
<td>Environmental Component</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Computer*</td>
<td></td>
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<tr>
<td>Books*</td>
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</tr>
<tr>
<td>Urban*</td>
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<tr>
<td>Rural*</td>
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<tr>
<td>Private*</td>
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155
Table 16 (continued)

Odds Ratio of Attaining a Bachelor’s Degree or Higher Among Black Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
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<th>Model 4 Environmental</th>
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<td></td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td>High Minority(^a)</td>
<td>0.70</td>
<td>0.68</td>
<td>1.34</td>
<td>0.84</td>
</tr>
<tr>
<td>High Poverty(^a)</td>
<td></td>
<td>0.68</td>
<td></td>
<td>0.34</td>
</tr>
<tr>
<td>Other students’ bad behavior</td>
<td></td>
<td>1.34</td>
<td></td>
<td>1.07</td>
</tr>
<tr>
<td>Parent discussions</td>
<td>0.84</td>
<td></td>
<td></td>
<td>0.70(^*)</td>
</tr>
<tr>
<td>Parental structure</td>
<td>0.34</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parental structure squared</td>
<td></td>
<td></td>
<td></td>
<td>1.60</td>
</tr>
<tr>
<td>Parents’ educ. expectations</td>
<td></td>
<td></td>
<td></td>
<td>1.11</td>
</tr>
<tr>
<td>Talk to teachers</td>
<td>0.70(^*)</td>
<td></td>
<td></td>
<td>0.93</td>
</tr>
<tr>
<td>Student-teacher relations</td>
<td></td>
<td></td>
<td></td>
<td>1.60</td>
</tr>
<tr>
<td>Peers’ academic orientation</td>
<td></td>
<td></td>
<td></td>
<td>1.11</td>
</tr>
<tr>
<td>Peers’ social orientation</td>
<td></td>
<td></td>
<td></td>
<td>0.93</td>
</tr>
</tbody>
</table>
Table 16 (continued)

Odds Ratio of Attaining a Bachelor’s Degree or Higher Among Black Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
<td>Odds Ratio</td>
</tr>
<tr>
<td></td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
<td>SE</td>
</tr>
<tr>
<td>Peers’ comm. engagement</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peers’ steady job importance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any accelerated courses</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever in AP&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever in gifted program&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extracurricular activities time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model F-Statistic</td>
<td>4.98**</td>
<td>3.31**</td>
<td>2.18**</td>
<td>1.80**</td>
</tr>
</tbody>
</table>

Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.

<sup>a</sup>Dichotomous variable. Odds ratio represents the effect of membership.

* $p < .05$
** $p < .01$
*** $p < .001$
Conducting separate logistic regression analyses for the White and Black samples allowed for the possibility that the talent development process manifests itself differently among these two student groups. Although different variables were statistically significant in the final model for the two groups, there was some overlap in variables as well. Figure 5 illustrates "what makes a difference" in terms of overlapping and non-overlapping influential factors that predicted degree attainment for White and Black students. Attending private schools and the importance of grades were influential factors predicting degree attainment in both groups.

Two additional sets of overlapping influential factors are presented in Figure 5, although the factors do not overlap in the strictest sense. While socioeconomic status and attending an urban school are not exactly the same, there is substantial overlap in the two variables, with attending an urban school being a strong indicator of lower socioeconomic status. For that reason, the two variables are shown as overlapping influential factors predicting degree attainment. Similarly, participating in an Advanced Placement program and a gifted program are not exactly the same; however, they both represent access to specialized provisions. For that reason, participating in an Advanced Placement program and a gifted program are also shown as overlapping influential factors predicting degree attainment.
Figure 7: Influential Factors That Predict Educational Degree Attainment Among White and Black Students

As it relates to the Differentiated Model of Giftedness and Talent (DMGT), Gagné (2003, 2009) has maintained that what makes a difference is giftedness, followed by the intrapersonal catalysts, the developmental process, and the environmental catalysts. This study did not examine the developmental process, which includes activities, progress, and investment. However, variables representing every other component of the DMGT were included in the study. Table 17 presents the influential predictors of educational degree attainment in decreasing order of importance, along with their corresponding component of the DMGT.
Table 17

**Influential Predictors of Educational Degree Attainment in the DMGT**

<table>
<thead>
<tr>
<th>Variable</th>
<th>White Students</th>
<th>DMGT Component</th>
<th>Black Students</th>
<th>DMGT Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. SES</td>
<td></td>
<td>Environmental (Milieu)</td>
<td>1. Urban</td>
<td>Environmental (Milieu)</td>
</tr>
<tr>
<td>2. Ever in AP</td>
<td></td>
<td>Environmental (Provisions)</td>
<td>2. Private</td>
<td>Environmental (Milieu)</td>
</tr>
<tr>
<td>3. Grades important</td>
<td></td>
<td>Intrapersonal (Motivation)</td>
<td>3. Grades important</td>
<td>Intrapersonal (Motivation)</td>
</tr>
<tr>
<td>4. Private</td>
<td></td>
<td>Environmental (Milieu)</td>
<td>4. Computer</td>
<td>Environmental (Milieu)</td>
</tr>
<tr>
<td>5. Male</td>
<td></td>
<td>Intrapersonal (Physical Traits)</td>
<td>5. Ever in gifted</td>
<td>Environmental (Provisions)</td>
</tr>
<tr>
<td>6. Job importance to peers</td>
<td></td>
<td>Environmental (Individuals)</td>
<td>6. Television time</td>
<td>Intrapersonal (Volition)</td>
</tr>
<tr>
<td>7. Academic peers</td>
<td></td>
<td>Environmental (Individuals)</td>
<td>7. Homework time</td>
<td>Intrapersonal (Volition)</td>
</tr>
<tr>
<td>8. Extracurricular time</td>
<td></td>
<td>Environmental (Provisions)</td>
<td>8. Talk to teachers</td>
<td>Environmental (Individuals)</td>
</tr>
<tr>
<td>9. Preparedness</td>
<td></td>
<td>Intrapersonal (Volition)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results for Research Question #4

Occupational prestige scores are used as one measure in the calculation of socioeconomic index. In the context of this study, occupational prestige was a measure of success. Occupational prestige scores within the analytic sample ranged from 24.66 to 73.13. The occupational prestige score of 24.66 corresponds to a laborer, such as a grounds keeper, maintenance worker, or garbage collector. The occupational prestige score of 73.13 corresponds to a lawyer or judge. The list of occupation codes, descriptors, and prestige scores are presented in Appendix B.

What talent development factors are most influential in predicting occupational prestige among Black and White students who exhibit varying levels of academic potential? To address this research question, separate linear regression analyses were conducted on Black and White students who exhibited academic potential. As with the previous research question, variables were entered into each regression model in sequential blocks, representing what Gagné (2003, 2009) posits matters most in talent development. Background characteristics were entered into the models first, followed by levels of potential, then intrapersonal catalysts, and finally environmental catalysts.

Predicting Occupational Prestige Among White Students

Table 18 presents results from the sequential linear regression analyses for White students. The first model included only background characteristics, such as gender and socioeconomic status. Results from that model indicated that socioeconomic status was the only statistically significant predictor of occupational prestige ($B = 3.40$, $p < .001$). The interpretation of this coefficient suggests that a one standard deviation increase in socioeconomic status increased the occupational prestige score by 3.40.
Entering levels of potential into the second model had virtually no impact on the coefficients. The constant term slightly increased and the coefficient on the newly added 90th to 94th percentile was negative; however, this coefficient was not statistically significant ($B = -1.27, p = .10$). Controlling for intrapersonal catalysts in the third model changed the coefficient on male from negative to positive. This means holding intrapersonal factors constant, being a male had a positive impact on occupational prestige. In terms of specific intrapersonal factors, both the importance of good grades and being prepared as an eighth grader increased the predicted occupational prestige score, with both coefficients being statistically significant.

The final model for occupational prestige scores showed that socioeconomic status remained a statistically significant and substantive predictor of occupational prestige ($B = 1.96, p = .025$). Additional variables that were statistically significant included preparedness, parental structure, parental structure squared, and the amount of time spent on extracurricular activities. Both an increase in the level of preparedness and an increase in the amount of time spent on extracurricular activities had a positive impact on occupational prestige.

Recall that the parental structure variable was a summed index measuring the extent to which parents checked homework, required chores, limited television time, and limited hanging out with friends. For this variable, higher values represent a greater degree of parental structure and supervision. The parental structure squared variable is literally the square of the parental structure variable, which allows for the possibility that too much structure can negatively impact talent development (Csikszentmihalyi et al., 1993). The interpretation of the coefficients on the parental structure variables indicate
that as parental structure increased, so did the predicted occupational prestige score – to a point. Too much parental structure had a diminishing impact on occupational prestige.

Influential predictors of educational degree attainment had the same directional impact on occupational prestige in the final model, although they were not statistically different from zero. For example, the importance of good grades had a positive impact on the occupational prestige score, but failed to be statistically significant \( (B = 1.16, p = .098) \). Ever participating in Advanced Placement increased the occupational prestige score, but again, failed to be statistically significant \( (B = 1.76, p = .054) \) at the .05 level.
### Table 18

**Regression Results on Occupational Prestige Scores Among White Students Who Exhibited Academic Potential**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE B</td>
<td>B</td>
<td>SE B</td>
</tr>
<tr>
<td><strong>Background Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male⁴</td>
<td>-0.46</td>
<td>0.76</td>
<td>-0.51</td>
<td>0.75</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td>3.40***</td>
<td>0.82</td>
<td>3.41***</td>
<td>0.82</td>
</tr>
<tr>
<td>Parents' education</td>
<td>-0.10</td>
<td>0.38</td>
<td>-0.15</td>
<td>0.38</td>
</tr>
<tr>
<td><strong>Levels of Potential</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90th – 94th Percentile⁴</td>
<td>-1.27</td>
<td>0.76</td>
<td>-1.13</td>
<td>0.77</td>
</tr>
<tr>
<td>99th Percentile⁴</td>
<td>0.16</td>
<td>0.92</td>
<td>-0.26</td>
<td>0.88</td>
</tr>
<tr>
<td><strong>Intrapersonal Component</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locus of control</td>
<td>1.14</td>
<td>0.84</td>
<td>0.82</td>
<td>0.86</td>
</tr>
<tr>
<td>Self concept</td>
<td>-0.35</td>
<td>0.79</td>
<td>-0.45</td>
<td>0.74</td>
</tr>
<tr>
<td>Grades important</td>
<td>1.90*</td>
<td>0.74</td>
<td>1.16</td>
<td>0.70</td>
</tr>
</tbody>
</table>
### Regression Results on Occupational Prestige Scores Among White Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>Preparedness</td>
<td>0.85</td>
<td>0.36</td>
<td>0.81</td>
<td>0.38</td>
</tr>
<tr>
<td>Academic honesty</td>
<td>0.33</td>
<td>0.40</td>
<td>0.32</td>
<td>0.41</td>
</tr>
<tr>
<td>Academic orientation</td>
<td>0.71</td>
<td>0.98</td>
<td>0.87</td>
<td>0.99</td>
</tr>
<tr>
<td>Homework time</td>
<td>-0.09</td>
<td>0.25</td>
<td>-0.28</td>
<td>0.23</td>
</tr>
<tr>
<td>Television time</td>
<td>-0.32</td>
<td>0.25</td>
<td>-0.10</td>
<td>0.26</td>
</tr>
<tr>
<td>Environmental Component</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Books&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Private&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

166
Table 18 (continued)

Regression Results on Occupational Prestige Scores Among White Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Minority&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>High Poverty&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
<td>-1.30</td>
</tr>
<tr>
<td>Other students’ bad behavior</td>
<td></td>
<td></td>
<td></td>
<td>0.23</td>
</tr>
<tr>
<td>Parent discussions</td>
<td></td>
<td></td>
<td></td>
<td>0.47</td>
</tr>
<tr>
<td>Parental structure</td>
<td></td>
<td></td>
<td></td>
<td>1.38*</td>
</tr>
<tr>
<td>Parental structure squared</td>
<td></td>
<td></td>
<td></td>
<td>-0.10*</td>
</tr>
<tr>
<td>Parents' educ. expectations</td>
<td></td>
<td></td>
<td></td>
<td>1.98</td>
</tr>
<tr>
<td>Talk to teachers</td>
<td></td>
<td></td>
<td></td>
<td>-0.00</td>
</tr>
<tr>
<td>Student-teacher relations</td>
<td></td>
<td></td>
<td></td>
<td>-0.63</td>
</tr>
<tr>
<td>Peers’ academic orientation</td>
<td></td>
<td></td>
<td></td>
<td>0.75</td>
</tr>
<tr>
<td>Peers’ social orientation</td>
<td></td>
<td></td>
<td></td>
<td>0.28</td>
</tr>
</tbody>
</table>
### Table 18 (continued)

**Regression Results on Occupational Prestige Scores Among White Students Who Exhibited Academic Potential**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE B</td>
<td>B</td>
<td>SE B</td>
</tr>
<tr>
<td>Peers’ comm. engagement</td>
<td>0.27</td>
<td>0.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peers’ steady job importance</td>
<td>-0.20</td>
<td>0.53</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any accelerated courses</td>
<td>0.09</td>
<td>0.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever in AP(^a)</td>
<td>1.76</td>
<td>0.90</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever in gifted program(^a)</td>
<td>-0.34</td>
<td>0.89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extracurricular activities time</td>
<td>0.58*</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONSTANT TERM</td>
<td>49.63***</td>
<td>1.34</td>
<td>50.30***</td>
<td>1.40</td>
</tr>
</tbody>
</table>

Model F-Statistic: 13.93*** 9.48*** 6.84*** 4.74***

*Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.  
\(^a\)Dichotomous variable. Coefficient represents the effect of membership.  
*\(p < .05\)  
**\(p < .01\)  
***\(p < .001\)
Predicting Occupational Prestige Among Black Students

Table 19 presents results from the sequential linear regression analyses for Black students. Before discussing the results from the models, a few words of caution are in order. Overall, the regression model did not fit well, as evidenced by the insignificant model F-statistics. These insignificant model F-statistics indicated that the null hypothesis stating that all of the model coefficients were simultaneously equal to zero could not be rejected. Moreover, the degrees of freedom ranged from a mere 9 to 13.

The first model included only background characteristics, such as gender and socioeconomic status. Being a male had a large, negative, statistically significant impact on the occupational prestige score ($B = -3.84, p = .033$). None of the other predictors in the model were statistically significant. Adding levels of academic potential in the second model failed to improve the model statistic, with an insignificant F-statistic. In addition, none of the added predictors were statistically significant. Although the third and fourth models produced barely significant F-statistics, only the male variable was statistically significant in the third model. None of the variables were statistically significant in the final model, although being male, self concept, attending a private school, parents’ educational expectations, and participating in a gifted program produced the most profound impacts on occupational prestige.
Table 19

*Regression Results on Occupational Prestige Scores Among Black Students Who Exhibited Academic Potential*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE B</td>
<td>B</td>
<td>SE B</td>
</tr>
<tr>
<td>Background Characteristics</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>-3.84*</td>
<td>1.80</td>
<td>-3.96*</td>
<td>1.85</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td>2.09</td>
<td>1.73</td>
<td>2.11</td>
<td>1.65</td>
</tr>
<tr>
<td>Parents' education</td>
<td>0.07</td>
<td>0.93</td>
<td>0.10</td>
<td>0.92</td>
</tr>
<tr>
<td>Levels of Potential</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90th – 94th Percentile</td>
<td>1.15</td>
<td>1.72</td>
<td>1.40</td>
<td>1.74</td>
</tr>
<tr>
<td>99th Percentile</td>
<td>0.40</td>
<td>3.22</td>
<td>2.18</td>
<td>2.26</td>
</tr>
<tr>
<td>Intrapersonal Component</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locus of control</td>
<td>1.84</td>
<td>1.95</td>
<td>0.54</td>
<td>1.97</td>
</tr>
<tr>
<td>Self concept</td>
<td>1.87</td>
<td>1.35</td>
<td>2.63</td>
<td>1.45</td>
</tr>
<tr>
<td>Grades important</td>
<td>-0.12</td>
<td>1.23</td>
<td>-0.46</td>
<td>1.37</td>
</tr>
</tbody>
</table>
Table 19 (continued)

*Regression Results on Occupational Prestige Scores Among Black Students Who Exhibited Academic Potential*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>SE B</td>
<td>B</td>
<td>SE B</td>
</tr>
<tr>
<td>Preparedness</td>
<td>-0.68</td>
<td>0.85</td>
<td>-0.70</td>
<td>0.80</td>
</tr>
<tr>
<td>Academic honesty</td>
<td>-0.83</td>
<td>0.74</td>
<td>-0.43</td>
<td>0.71</td>
</tr>
<tr>
<td>Academic orientation</td>
<td>-1.88</td>
<td>2.94</td>
<td>-1.78</td>
<td>2.72</td>
</tr>
<tr>
<td>Homework time</td>
<td>0.24</td>
<td>0.55</td>
<td>0.13</td>
<td>0.53</td>
</tr>
<tr>
<td>Television time</td>
<td>0.74</td>
<td>0.54</td>
<td>0.51</td>
<td>0.51</td>
</tr>
</tbody>
</table>

**Environmental Component**

- Computer\(^a\)                  | -0.89  | 1.76 |
- Books\(^a\)                     | 1.48   | 2.90 |
- Urban\(^a\)                     | -1.40  | 1.84 |
- Rural\(^a\)                     | -1.79  | 2.73 |
- Private\(^a\)                   | -2.16  | 2.15 |
Table 19 (continued)

Regression Results on Occupational Prestige Scores Among Black Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1 Background</th>
<th>Model 2 Levels of Potential</th>
<th>Model 3 Intrapersonal</th>
<th>Model 4 Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Minority</td>
<td></td>
<td></td>
<td></td>
<td>-0.43 2.12</td>
</tr>
<tr>
<td>High Poverty</td>
<td></td>
<td></td>
<td></td>
<td>-0.78 1.98</td>
</tr>
<tr>
<td>Other students’ bad behavior</td>
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<td></td>
<td></td>
<td>-0.82 0.83</td>
</tr>
<tr>
<td>Parent discussions</td>
<td></td>
<td></td>
<td></td>
<td>-0.51 0.49</td>
</tr>
<tr>
<td>Parental structure</td>
<td></td>
<td></td>
<td></td>
<td>2.03 1.55</td>
</tr>
<tr>
<td>Parental structure squared</td>
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<td></td>
<td></td>
<td>-0.10 0.11</td>
</tr>
<tr>
<td>Parents’ educ. expectations</td>
<td></td>
<td></td>
<td></td>
<td>2.13 2.27</td>
</tr>
<tr>
<td>Talk to teachers</td>
<td></td>
<td></td>
<td></td>
<td>-0.10 0.46</td>
</tr>
<tr>
<td>Student-teacher relations</td>
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<td></td>
<td></td>
<td>0.60 0.76</td>
</tr>
<tr>
<td>Peers’ academic orientation</td>
<td></td>
<td></td>
<td></td>
<td>-0.29 0.95</td>
</tr>
<tr>
<td>Peers’ social orientation</td>
<td></td>
<td></td>
<td></td>
<td>0.71 0.96</td>
</tr>
</tbody>
</table>
Table 19 (continued)

Regression Results on Occupational Prestige Scores Among Black Students Who Exhibited Academic Potential

<table>
<thead>
<tr>
<th>Variable</th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Background</td>
<td>Levels of Potential</td>
<td>Intrapersonal</td>
<td>Environmental</td>
</tr>
<tr>
<td>Peers’ comm. engagement</td>
<td>0.10</td>
<td>49.92***</td>
<td>49.34***</td>
<td>50.35***</td>
</tr>
<tr>
<td>Peers’ steady job</td>
<td>-1.33</td>
<td>1.40</td>
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<td>0.13</td>
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<td>Any accelerated courses</td>
<td>0.39</td>
<td>2.20</td>
<td>2.66</td>
<td>2.66</td>
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<tr>
<td>Ever in AP&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.13</td>
<td>1.63</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ever in gifted program&lt;sup&gt;a&lt;/sup&gt;</td>
<td></td>
<td></td>
<td>2.66</td>
<td></td>
</tr>
<tr>
<td>Extracurricular activities time</td>
<td>0.01</td>
<td>0.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONSTANT TERM</td>
<td>49.92***</td>
<td>49.34***</td>
<td>50.35***</td>
<td>46.63***</td>
</tr>
<tr>
<td>Model F-Statistic</td>
<td>1.65</td>
<td>1.46</td>
<td>1.91*</td>
<td>2.37***</td>
</tr>
</tbody>
</table>

<sup>a</sup>Dichotomous variable. Coefficient represents the effect of membership.

*p < .05

**p < .01

***p < .001

Source: National Education Longitudinal Study of 1988. Tabulations by the Author. Data are weighted by F4PNLWT panel weight.
Summary of Findings by Research Question

This chapter presented the results from four research questions about the talent development process among a racially diverse group of students who exhibited academic potential. This section provides a brief summary of findings by research question.

Research Question #1

How do the top 10% of Black students and the top 10% of White students compare on key variables relevant to talent development?

- On average, the top 10% of Black students scored lower than their White counterparts on every achievement test: reading, mathematics, science, and history/citizenship/geography.

- The top 10% of Black students had a lower, more external locus of control in comparison to their White counterparts.

- The top 10% of Black students were much more likely to come from a lower socioeconomic status family than the top 10% of White students. In addition, Black students were much more likely to attend an urban, high minority, high poverty school.

- The top 10% of Black students and the top 10% of White students were similar on a number of key variables, including self concept, participation in Advanced Placement and gifted programs, and parents’ educational expectations.
Research Question #2

How do educational degree attainment and occupational prestige differ among Black and White students who exhibit varying levels of academic potential?

- Black and White students who scored within their racial group at the 95th to 98th percentile had similar rates of bachelor’s degree attainment, at 57% and 59% respectively. Differences in degree attainment among Black and White students were more pronounced at the 90th to 94th percentile and the 99th percentile, with White students being more likely to attain a bachelor’s degree or higher. Differences were statistically significant among the 99th percentile.

- Comparing bachelor’s degree attainment among White students at varying levels of academic potential, 60% of students who scored within their racial group at the 90th to 94th percentile attained a bachelor’s degree in comparison to 72% of students who scored within their racial group at the 99th percentile. This difference was statistically significant.

- Among Black students who exhibited varying levels of academic potential, those who scored within their racial group at the 95th to 98th percentile were most likely to attain a bachelor’s degree (57%). Only 32% of Black students who scored within their racial group at the 99th percentile attained a bachelor’s degree; however, differences in degree attainment by levels of academic potential were not statistically significant.

- White students who scored within their racial group at the 99th percentile were no more likely to attain an advanced degree than White students who scored within their racial group at the 90th to 94th percentile.
• The average occupational prestige score \((M = 50.45, SE = 0.36)\) among the analytic sample roughly corresponded to that of a supervisory, office or administration manager. Slight differences existed in mean occupational prestige scores between Black and White students and the various levels of academic potential; however, none of these differences were statistically significant.

• Examining the distribution of “low,” “medium,” and “high” occupational prestige groupings by race, White students (28%) who exhibited academic potential were more likely to participate in the highest occupational prestige group than Black students (17%). This difference was statistically significant.

• Although students who scored within their racial group at the 90th to 94th percentile were least likely to participate in the highest occupational prestige group, differences in occupational prestige groupings by levels of academic potential were not statistically significant.

Research Question #3

What talent development factors are most influential in predicting educational degree attainment among Black and White students who exhibit varying levels of academic potential?

• Attending an urban school and being in a lower socioeconomic status group were the most influential factors in predicting educational degree attainment for Black and White students respectively. Both of these factors decreased the odds of attaining a bachelor’s degree in comparison to their respective reference groups.
• Attending a private school, participating in an Advanced Placement or gifted program, and grades being important were all positive influential predictors of bachelor’s degree attainment for both Black and White students.

• Other positive influential predictors of degree attainment for Black students were having a computer in the home, increased time spent on homework, and increased time spent watching television. Talking to teachers was a negative influential predictor of degree attainment for this group.

• For White students, having more academically oriented peers, spending more time on extracurricular activities, and being prepared were positive influential predictors of degree attainment. Being a male and having peers for whom having a job was important were negative influential predictors of degree attainment.

• Matching influential predictors of educational degree attainment with components of the Differentiated Model of Giftedness and Talent (DMGT) showed that environmental catalysts mattered most in educational degree attainment for both Black and White students, followed by the intrapersonal catalysts. Overall, levels of academic potential within the top 10% of performance were not influential predictors of educational degree attainment.

  Research Question #4

  What talent development factors are most influential in predicting occupational prestige among Black and White students who exhibit varying levels of academic potential?

• Among White students, socioeconomic status was the strongest predictor of occupational prestige scores, with membership in higher socioeconomic status
groups increasing occupational prestige. Other positive predictors of occupational prestige among this group of students included preparedness, amount of time spent on extracurricular activities, and parental structure – up to a point.

- Among Black students, variables contained in this analysis failed to adequately predict occupational prestige scores, with none of the variables in the final model being statistically significant. Moreover, an insignificant model F-statistic in the first and second models failed to show that the model coefficients were simultaneously different from zero.
CHAPTER FIVE: DISCUSSION, CONCLUSIONS, AND IMPLICATIONS

The purposes of this study were to examine how well academic potential predicts success, and to examine how factors impact the talent development process among a diverse group of learners. Despite broader conceptions of giftedness and the emergence of the talent development paradigm within the field of gifted education, relatively little empirical research exists on the talent development process, particularly among diverse learners. The national need for talent necessitates a more comprehensive and nuanced understanding about talent development.

The Differentiated Model of Giftedness and Talent (DMGT; Gagné, 1985, 1995, 2003, 2009) served as the theoretical and conceptual framework through which the talent development process was viewed. Although previous studies have utilized this model as a conceptual framework, few studies, if any have attempted to operationalize the model holistically. This analysis sought to do just that, providing important feedback relative to what some consider to be both a groundbreaking and comprehensive model of the talent development process (Feldhusen, 2001; Moon, 2006). This endeavor was particularly timely given Coleman’s (2006a) recent assertion that few theories actually guide our research efforts within the field of gifted education.

Using descriptive and multivariate analyses, this study employed secondary data analysis of the National Education Longitudinal Study of 1988 (NELS:88) to address four research questions:

1. How do the top 10% of Black students and the top 10% of White students compare on key variables relevant to talent development?
2. How do educational degree attainment and occupational prestige differ among Black and White students who exhibit varying levels of academic potential?

3. What talent development factors are most influential in predicting educational degree attainment among Black and White students who exhibit varying levels of academic potential?

4. What talent development factors are most influential in predicting occupational prestige among Black and White students who exhibit varying levels of academic potential?

Longitudinal research designs continue to be most appropriate in examining the predictive validity of potential (Subotnik & Arnold, 2000). Utilizing an existing large-scale dataset facilitated the study of a special subpopulation, gifted students of color.

This study sought to make several contributions to the field of gifted education by examining questions key to improving our understanding about the talent development process. First, this study examined talent development among a diverse group of students, representing various racial groups and domains of academic potential. Next, in accordance with the DMGT, this study utilized a broader conception of giftedness, identifying students who scored in the top 10% relative to their peers. Then, this study used within racial group ranking to identify potential. Then, this study provided a virtual empirical test of a nearly 25 year-old theory within the field of gifted education. Lastly, this study attempted to address what has been outlined as critical issues relative to the state of research in gifted education. In each of these areas of inquiry, this study informs the conversation in terms of cultivating talent and facilitating optimal outcomes.
This chapter begins with a discussion of the findings, placing them into a larger educational context. The discussion centers on the interpretation of findings, including how those findings are situated relative to the literature base, and the significance of the findings relative to the intended contributions of the study. Following the discussion, conclusions are presented. The chapter then concludes with implications for policy, practice, and research.

Discussion

Consequences of a Broader Conception of Giftedness

The manner in which giftedness was ‘identified’ in this study represented a departure from tradition on two fronts. First, students who scored in the top 10% on any one of four achievement tests were identified as having academic potential. This criterion for identification recognized the growing body of research on the existence of domain-specific talent (VanTassel-Baska, 2005). Second, this study used within racial group test scores to identify academic potential (Lohman, 2005a). Neither of these identification methods was without consequences. This section explores how a broader conception of giftedness impacted this study.

Recognizing academic potential among students who scored in the top 10% on any one of four achievement tests assumes the existence of domain-specific talent. But do the findings from this study support the concept of domain-specific talent? Yes, findings from this study strongly support the concept of domain-specific talent, suggesting that not only is domain-specific talent real, it is prevalent. More than half of the students identified in this study as exhibiting academic potential met the criteria based on only one achievement test score. Nearly one-quarter of the students identified as exhibiting
academic potential met the criteria based on two achievement test scores. Had a more
traditional measure of identification been utilized in this study, overlooking students who
met the criteria based on one or two tests, 78% of students would have been missed.
Moreover, if the criteria for identifying academic potential had been limited to students
who scored in the top 10% on all four achievement tests, only 7% of students would have
been identified. This finding is consistent with findings from Konstantopoulos, Modi, and
Hedges (2001), who using NELS:88 data identified an unweighted sample size of 709
students scoring in the 97th percentile (or the top 3%) on a composite measure combining
mathematics and reading achievement test scores. Using the top 10% criteria on any one
of four achievement tests within this study identified an unweighted sample size of 1,916
students, more than 2.5 times the number of students identified in Konstantopoulos et al.

Within racial group test scores were also utilized within this study to identify
academic potential. This method for identifying giftedness facilitated recognizing
academic potential among a larger group of Black students. Within this study, 13% of the
students who exhibited academic potential were Black. This rate of representation is
more than double the 5.4% Black representation in the study Konstantopoulos and
colleagues (2001) conducted, and is more aligned with the reported 14.7% of Black
school-aged children in 1990 (Snyder et al., 2008).

Overwhelmingly, mean test scores for White students were significantly higher
than mean test scores for Black students. This finding is consistent with Ferguson (2007)
and KewalRamani et al. (2007). In general, test scores identifying Black students at the
top 1% were comparable to test scores identifying White students at the top 5%.
Correspondingly, Black students who scored within their racial group at the 90th to 94th percentile would have never been identified using more traditional cutoff scores.

Overall, the consequences of a broadened conception of giftedness, was a broadened representation among the gifted. Using a broadened conception translated into a larger group of students identified as exhibiting academic potential. These identified students were more diverse, racially, socioeconomically, and across talent domains. On the one hand, recognizing more students with potential is an incredible achievement. It responds to the nation’s needs to grow more talent. It makes the federal definition of gifted a reality. It addresses the perpetual underrepresentation of Black students in gifted education (Donovan & Cross, 2002; Ford, 1998; Ford et al., 2008b). It removes the exclusivity and structural barriers that have existed in gifted education (Morris, 2002). On the other hand, recognizing more talent requires an investment of time and resources (Bloom, 1985; Csikszentmihalyi et al., 1993). Simply recognizing talent without cultivating it and contributing to its development is educationally immoral.

The Context of Academic Potential

Who were the students who exhibited academic potential? What were their demographic characteristics? What was the context of their lives? The typical spring 1988 eighth grader who exhibited academic potential came from a comfortable, suburban, middle-class family, with their family mean socioeconomic status representing the 70th percentile of wealth. The overwhelming majority of these students came from homes with more than 50 books and some 60% of them had a computer in their home. Parents of these students talked with their children regularly about school-related activities and concerns and had high educational aspirations for them, expecting them to
attain a bachelor’s degree at a minimum. In many regards, typical students in this sample were demographically similar to typical students in the *Talented Teenagers* study (Csikszentmihalyi et al., 1993).

In terms of the context of their education, the typical student had a relatively homogenous school experience in terms of both racial and economic diversity. Only 27% of students who exhibited academic potential attended what might be considered diverse schools, where more than 20% of the student body was students of color. Given the relatively liberal manner in which high minority and high poverty were operationalized in this study, one might have expected a larger percentage of students to have attended “high” minority or “high” poverty concentration schools. Findings from this study suggested otherwise. Overall, students who exhibited academic potential attended racially and socioeconomically segregated schools. This finding is consistent with the general body of literature lamenting the degree to which America’s schools continue to be racially and socioeconomically divided (see Orfield & Lee, 2004, 2006), creating an even greater chasm between the haves and the have nots (Lleras, 2008).

Students who exhibited academic potential overwhelmingly participated in talent development offerings through their schools, such as being enrolled in an enriched or accelerated core course (69%), being in Advanced Placement (AP) (64%), or being in a gifted program (41%). An incredible 85% of students participated in at least one of these provisions. The rate of AP participation in this study is consistent with Bleske-Rechek et al. (2004), who reported that over 75% of students from Cohorts 2 through 5 of the Study of Mathematically Precocious Youth (SMPY) had participated in AP. Although the rate of AP participation is lower in this current study than the SMPY study, the SMPY study
used more selective criteria, identifying only those students who scored in the top 1% on the SAT. The finding of differences in participation rates by provision within this current study demonstrated that many more students participated in AP or an enriched or accelerated course than a gifted program. This finding begs the question, what made these students capable of or appropriately suited for AP or accelerated core courses, but not so well suited for a gifted program? Advanced Placement has been argued to be an appropriate talent development option for gifted students (VanTassel-Baska, 2001). If gifted programs are comparably appropriate (Hertzog, 2003), why the 23 percentage point differential in participation rates? Does this difference represent a difference in philosophy, or a difference in infrastructure, funding, and access?

There is a continued debate in the literature base about how well gifted students fare in terms of their self concept relative to their more academically typical peers (see Assouline & Colangelo, 2006; Cross, Cross, & Davis, 2009). Findings from this study support the opinion that high-ability students primarily feel good about themselves. Overall, spring 1988 eighth graders who exhibited academic potential had high self concept and high locus of control in comparison to the larger population of spring 1988 eighth grade students. These students were academically oriented and grades were important to them. These findings are consistent with findings from Who Are America’s Gifted (Konstantopoulos, et al., 2001), which also utilized NELS:88 data.

While these findings represent the general context of education for spring 1988 eighth graders who exhibited academic potential, the context differed substantially by race. Findings from this study indicate that Black students who displayed academic potential resided in urban communities, and attended high minority and high poverty
schools. Remarkably, 81% of Black students in this study attended schools identified as high minority in comparison to only 18% of White students. Similarly, 66% of Black students attended high poverty schools in comparison to 27% of White students. These differences were both substantive and statistically significant, are consistent with national data (Planty et al., 2008), and speak to the growing resegregation of American schools (Orfield & Lee, 2004, 2006). In 1966, Coleman and his colleagues reported similar rates of segregation, with almost 90% of all White 1st and 12th graders attending schools with a racial composition that was at least 80% White. More than 40 years later, national data, as well as the findings from this study, indicate that the nation is still plagued by segregation in schools.

A number of interesting findings emerged from this study relative to the similarities and differences between Black and White students on intrapersonal catalysts and social capital measures. Consistent with other findings, Black students in this study spent less time on homework and more time watching television than their White counterparts (Ferguson, 2007). They were less likely to have had more than 50 books in their homes and less likely to have had a computer. Black students had a higher self concept than their White counterparts, but a lower locus of control. VanTassel-Baska, Olszewski-Kubilius, and Kulieke (1994) reported that among seventh and eighth grade students, Black gifted students had a higher self esteem than White gifted students. As it relates to differences in locus of control by race within this study, some researchers have expressed concerns about Black students’ lower locus of control, particularly among Black students who underachieve, suggesting that they feel less able to effect change in their lives (Ford, 1996). Possibly, instead of reflecting a belief about Black students’
inability to enact change within their lives, this lower locus of control among Black students may reflect their understanding about structural barriers associated with race and class. In that case, a lower locus of control would represent a measured dose of reality as opposed to a loss of agency.

The Predictive Validity of Potential and the Complexity of Success

One of the major purposes of this study was to determine the predictive validity of academic potential. How well does academic potential predict success? In simple terms, these findings suggest not as well as we would like. Many would agree that the attainment of a bachelor’s degree is a reasonable measure of success for students who scored in the top 10% on achievement tests. Astoundingly, only 60% of students who exhibited academic potential attained a bachelor’s degree or more by the time they were 26 years old. What happened to the remaining 40%? If academic potential is in fact a good predictor of success, we would expect more than 60% of students to have earned a bachelor’s degree. Even among students at the highest level of academic potential, only 67% attained at least a bachelor’s degree. Maybe success, even as measured by the modest standard of bachelor’s degree attainment, is much more complex than a simple correlation with academic potential.

Differences existed in degree attainment by race, although for the most part those differences were not statistically significant, and in one case, degree attainment was nearly identical. Among students who scored within their racial group at the 95th to 98th percentile, the percentage of Black and White students who completed a bachelor’s degree or more was 57% and 59% respectively. For Black students who scored within their racial group at the 99th percentile, only 32% completed a bachelor’s degree or more.
in comparison to 72% of White students at the same level of academic potential. This finding is truly disturbing, and represents a lower degree attainment for Black students in this group than for Black students who scored at the 90th to 94th percentile and Black students who scored at the 95th to 98th percentile. While these degree attainment rates are appreciably less than we might predict based on the academic potential exhibited when these students were eighth graders, their success must be placed within the larger context of educational degree attainment within the nation.

When the NELS:88 ended in the year 2000, the typical respondent was 26 years old. Among 25- to 29-year olds nationally at that time, 34% of Whites and 18% of Blacks had attained a bachelor’s degree or higher (Snyder et al., 2008). So while the educational degree attainment findings of this study point to a lower degree of success than hoped for, it represents an absolute improvement over the general state of the nation. Specifically, 62% of White students in this study attained a bachelor’s degree or higher, which is an 82% gain over the national statistics. Forty-five percent of Black students in this study attained a bachelor’s degree or higher, which is a 150% gain over the national statistics. And many of these students would not have been identified as gifted using traditional cut-off scores and measures! Although students with academic potential have not achieved the level of success imagined, they may be better off than initially thought. The larger question then becomes, why are we failing so many of our nation’s top academic achieving students in terms of degree attainment, and how can we improve?

Occupational prestige scores varied widely among spring 1988 eighth grade students who exhibited academic potential, participating in occupations as diverse as laborers and medical practice professionals (e.g., physicians, dentists, and veterinarians).
The mean occupational prestige score in this study was 50.45, which roughly translates to an occupation in medical services such as a licensed professional nurse, medical/dental assistant, or paramedic; or a supervisory, office or administration manager. Overall, these mean occupational prestige scores were stable across race and levels of academic potential. One may have expected to see differences, particularly among the levels of potential, but that was not the case.

Examining rates of participation in “low,” medium,” and “high” occupational prestige groupings revealed that Black students who exhibited academic potential were more likely to participate in the low occupational prestige group and less likely to participate in the high occupational prestige group than their White counterparts. Specifically, 17% of Black students participated in high occupational prestige group in comparison to 28% of White students. This difference was statistically significant and is consistent with educational degree attainment findings in this study.

While differences existed in occupational prestige groupings by race, they did not exist by levels of academic potential. Congruent with the educational degree attainment findings in this study, students who exhibited academic potential were more likely to participate in the higher occupational prestige group than the general population of Spring 1988 eighth graders. However, within the analytic, there were no statistically significant differences between the occupational prestige groupings of students who scored at the 90th to 94th percentile, the 95th to 98th percentile, and the 99th percentile. This finding is incredibly important in terms of the predictive validity of academic potential and the complexity of success. This finding suggests that academic potential is an important predictor of early occupational success, but only up to a point. The 90th
percentile is a much lower cut-off score than is typically used in identifying gifted students. When the typical respondent was 26-years old in this study, a student who scored within their racial group at the 90th to 94th percentile was as success occupationally as students who scored within their racial group at the 99th percentile.

What Makes a Difference

One of the purposes of the study was to examine the talent development process, determining facilitators and inhibitors to developed talent. Questions this study attempted to answer included: What factors are most important in predicting talent? How does the talent development process differ among Black and White students who exhibited academic potential? Additionally, this study sought to provide critical feedback to the Differentiated Model of Giftedness and Talent (DMGT), particularly as it relates to Gagné’s question, what makes the difference?

Educational Degree Attainment

This study identified a number of hazards to the emergence of talent, with low socioeconomic status being the greatest hazard. Whether the hazard of socioeconomic status manifested itself through socioeconomic quartiles or residing in an urban community, poverty thwarts the emergence, recognition, and cultivation of talent. This finding is consistent across studies and decades. In 1966, Coleman and colleagues found a strong relationship between socioeconomic status and academic achievement. Specific to educational degree attainment, Buchanan (2006) found socioeconomic status to be the greatest predictor of educational attainment, irrespective of race, and Walpole (2003) found socioeconomic status to be an important predictor of graduate school attendance.
Within the context of this study, more than 50% of the White students who exhibited academic potential came from families at the highest socioeconomic quartile, in comparison to less than 5% of White students from the lowest socioeconomic quartile. While Black students were more equally represented across socioeconomic strata, attending an urban school, which is associated with socioeconomic status, was a large negative predictor of educational degree attainment. As a matter of fact, attending an urban school was the strongest predictor of degree attainment. Other socioeconomic-related predictors of educational degree attainment for Black students included attending a private school and having a computer in the home. Both of these were positive predictors of degree attainment; attending a private school and having a computer in the home increased the odds of attaining a bachelor’s degree or higher.

Common predictors of degree attainment for Black and White students included attending a private school and the importance of good grades, with both predictors increasing the odds of attaining a bachelor’s degree or higher. Provisions were also common important predictors of degree attainment for students who exhibited academic potential. Among White students, participating in an Advanced Placement program increased the likelihood of attaining a bachelor’s degree. Among Black students, participating in a gifted program increased the likelihood of attaining a bachelor’s degree. This finding of special programs positively impacting educational degree attainment is consistent with studies both within and outside of gifted education. Adelman (2006) reported that students who participated in a rigorous secondary curriculum were more likely to complete college. Bleske-Rechek and colleagues (2004) found that students who participated in AP were more likely to attain an advanced degree. In general, students
who have participated in these types of offerings reported being better prepared for
college (Henfield et al., 2008; Hertzog, 2003; Reis & Díaz, 1999).

It is interesting to note that while provisions were important predictors of
educational degree attainment for both groups, participating in gifted programs were
more important for Black students and participating in AP was important for White
students. One potential explanation for why AP programs were important for White
students and gifted programs were more important to Black students relates to timing.
Students typically are identified gifted by the eighth grade, whereas students typically
participate in AP programs during their 11th or 12th grade year. Given the numerous
hazards for Black students relative to their attaining a bachelor’s degree or more,
participation in a provision earlier in their schooling may be more important for them.

How students spent their time was a significant predictor of degree attainment for
both Black and White students. This finding is consistent with major talent development
studies (Bloom, 1985; Csikszentmihalyi et al., 1993). For White students, increased time
spent participating in extracurricular activities increased the likelihood of attaining a
bachelor’s degree. For Black students, increased homework time and increased television
time increased the likelihood of attaining a bachelor’s degree. Increased television time
as a positive predictor of degree attainment is inconsistent with previous findings,
particularly Bloom’s (1985) and Csikszentmihalyi and colleagues’ (1993) assertion that
talented youth are careful about how they spend their leisure time. As counterintuitive as
the television finding in this study seems, increased television watching among Black
students may represent a wise alternative to the realities of day-to-day urban living.
Students who watch more television are home, as opposed to participating in the negative activities so frequently apparent in urban communities.

**Occupational Prestige**

In terms of occupational prestige scores, there is much more ambiguity in the results from this study. For White students, a few variables were statistically significant predictors of occupational prestige. Once again, socioeconomic status was the largest predictor of this measure of success. In addition to socioeconomic status, measures of parental structure, preparedness, and time in extracurricular activities were statistically significant predictors of occupational prestige. Among Black students, there were no statistically significant predictors of occupational prestige, although being a male, increased self concept, and participating in a gifted program impacted occupational prestige most substantially.

The findings from the occupational prestige models raise a number of questions. There are several potential reasons for the variables being less successful predictors of occupational prestige than for educational degree attainment. One possibility is that occupational prestige is a more complex, nuanced phenomenon where factors that adequately predict educational degree attainment fail to adequately predict prestige. A second possibility is that as 26-year olds, sample participants simply have not had enough time to participate in prestigious occupations. Another possibility is that ultimately networks and connections help younger people get prestigious jobs, as opposed to talent development factors. Finally, it might be the case that the collapsed occupation variables utilized in the study failed to adequately distinguish between the more and less prestigious occupations in which students who exhibited academic potential participated.
Gagné (2009) posed the question, “What makes the difference?” He has maintained that giftedness, intrapersonal catalysts, the developmental process, and environmental catalysts matter most in talent development, in that order. Findings from this study suggest otherwise. For the most part, giftedness failed to be a substantial or statistically significant predictor of success. There were relatively few and primarily small differences between levels of academic potential on educational degree attainment. In terms of intrapersonal catalysts, the importance of grades was a strong and statistically significant predictor of educational degree attainment among both Black and White students. Other important intrapersonal predictors were preparedness, and measures related to time management.

Overwhelmingly, findings from this study suggest that what makes a difference in talent development is the environment. Milieu was the largest predictor of educational degree attainment for both Black and White students, although the manifestation of milieu was different in the two groups. For White students, socioeconomic status was the greatest predictor of attaining a bachelor’s degree or more, with higher socioeconomic status increasing the odds of degree attainment. For Black students, attending an urban school was the greatest predictor of attaining a bachelor’s degree or more, with attending an urban school decreasing the odds of degree attainment.

Attending a private school increased the odds of bachelor’s degree attainment for both Black and White students. A convincing argument could easily be mounted that attending an urban school, and the ability to attend private school are factors associated with socioeconomic status. So possibly a more accurate answer to what makes a
difference in predicting educational degree attainment is socioeconomic status. This finding is consistent with Coleman and colleagues’ (1966) seminal work. In addition to the milieu, provisions and individuals were influential in the talent development process. In terms of providing critical feedback to the Differentiated Model of Giftedness and Talent, it would be that context matters, possibly even more than giftedness.

Conclusions

More than 15 years ago the federal government declared, “Outstanding talents are present in children and youth from all cultural groups, across all economic strata” (U.S. Department of Education, 1993). While there is little doubt that outstanding talents exist across all cultural groups and economic strata, the real question is to what extent is the nation recognizing and cultivating those talents? Results from this study indicate that talented students overwhelmingly come from well-educated, middle class, suburban families who have access to educational resources. This is particularly the case among talented White students, with more than half of these students hailing from families in the highest socioeconomic quartile. Additionally, talented White students overwhelmingly attend low-minority, low-poverty schools. These findings indicate a failure to make the federal government’s 15-year old assertion of talent across cultural groups and economic strata a reality.

Despite continued efforts within the field of gifted education to remove the stigma of elitism and the barriers to identification, the realism of the context of education has failed to match the idealism of educational goals. However, this study presents three viable solutions to address the perpetual underrepresentation of Black and low-income students in gifted education. Results from this study indicate that by recognizing domain-
specific talent and using within racial group ranking, a more demographically representative group of talent can be identified. While neither of these recommendations for identification is new, they have not been widely embraced. One conclusion of this study is that a lower threshold for identification, in conjunction with domain-specific talent and within group ranking, can be successful in addressing one of the perennial issues in gifted education, underrepresentation.

Although within racial group ranking produces differential identification criteria, findings from this study indicate that the pervasive achievement gap apparent at identification diminishes in long-term outcomes, and in some cases disappears altogether. Even when educational degree attainment rates differ by race, bachelor’s degree attainment among Black students who are identified gifted using nontraditional criteria far exceeds national rates among Black 25- to 29-year olds. Similar findings exist in terms of rates of participation in high occupational prestige groups. A conclusion from this study is that lowered cutoff levels on standardized instruments do not necessarily produce reduced long-term educational and life outcomes.

In terms of factors that impact the talent development process, low socioeconomic status and related indicators appear to be the biggest inhibitors to talent identification, talent development, and educational degree attainment. Whether socioeconomic status manifests itself in urbanicity or the ability to attend private schools, poverty’s impact is both cruel and long-lasting. Consistent with findings from some 40 years ago, a major conclusion of this study is that higher socioeconomic status levels are the greatest predictors of success. Removing the barriers of poverty and providing true access for all of the nation’s students, regardless of race, ethnicity, socioeconomic status, or gender
may in fact be the greatest thing we can do to affect students’ individual and collective lives (Burney & Beilke, 2008).

Talent development does not occur in a vacuum. In fact, talent development is an incredibly complex process that is difficult to box and wrap for consumption. The Differentiated Model for Giftedness and Talent (DMGT; Gagné, 1985, 1995, 2003, 2009) is one model that attempts to capture that complexity. Findings from this study indicate that many of the factors represented in the DMGT play an important role in talent development. Where findings from this study depart from the DMGT is in the question, “What makes a difference?” Socioeconomic status as the greatest predictor of success leads to the conclusion that the environment matters most in talent development.

Implications for Policy, Practice, and Research

Unfortunately, talent does not always will out. However, there are things that can be done to facilitate the development of talent. While a broadened conception of giftedness may go a long way in opening the doors of access to the provisions that positively impact measures of success, access must be accompanied by sustained and systemic support. This section presents implications of the study relative to policy, practice, and research. Together these three pieces comprise the foundation for the support of talent development.

Implications for Policy and Practice

Several major policy and practice implications emerge from this study. Some are specifically related to gifted education, while others have implications for gifted education and general education alike. This study utilized a broader conception of giftedness, employing a lower threshold for identification, using within racial group
rankings, and recognizing domain-specific talent. Findings from this study indicate that looking for more potential allows for more potential to be recognized. A broader conception of giftedness yields a more demographically representative population of gifted students.

Given the inexact science of identifying potential (Borland, 2008; Tannenbaum, 1983), policies for identification should err on the side of inclusion. National reports cite a need to find and maintain talent. Inclusive identification policies respond to the nation’s need to identify more talent across all cultural and socioeconomic groups. Recognizing more talent places the nation in a better position to remain competitive. Not only does identifying more talent serve the needs of the nation, possibly more importantly, it serves the needs of the people. Growing talent within every cultural, ethnic, socioeconomic, and gender group facilitates people being able to solve their own problems from their own perspective.

A second implication that results from the manner in which academic potential was identified in this study relates to domain-specific talent. Instead of attempting to create a generation of generalists, maybe we should focus on domain-specific talent. Findings from this study indicate that domain-specific talent is real. Corresponding policies must be in place to support the identification, nurturance, and development of domain-specific talent. Students who do well in mathematics should be identified in mathematics, and their talent nurtured in mathematics. Similarly, students who do well in social studies should be identified in social studies, and their talent nurtured in social studies.
Inclusive gifted identification policies require substantial training and support for teachers, counselors, and administrators. Teachers have historically served as gatekeepers for gifted programs (Ford, 1998). Findings from this study suggest that access is an important first step in the procurement of provisions. A third implication of this study is that educators need meaningful professional development opportunities that assist them in identifying talent across cultural groups and socioeconomic strata. These professional development experiences must also incorporate the concept of domain-specific talent. Educators need an improved understanding of how talent manifests, including the fact that some students may possess outstanding talent in only one or two domains.

More than simply understanding the concept of domain-specific talent, high-quality teachers, who have strong content knowledge, are needed to cultivate and nurture talent. A fourth implication of this study is that teachers must possess domain-specific knowledge at a level that facilitates students’ optimal growth and development. Talented students require talented teachers. This implication is important for teacher recruitment, preparation, and retention. In addition to teachers who possess domain-specific knowledge, students need access to experts and professionals in their talent area. This suggests the need to establish strong community relationships, as well as domain-specific mentorship programs.

A fifth implication calls for a shift in focus from early indicators of the achievement gap to an emphasis on long-term educational and life outcomes. Findings from this study demonstrate that substantial differences in Black and White students’ base-year achievement test scores diminish when examining educational degree attainment and occupational prestige. Students who never would have been identified as
gifted using traditional criteria perform well on measures of success. While it remains important to recognize the achievement gap at every level, in all areas, this study suggests that it may be more important to provide the access and support necessary for the types of long-term outcomes we desire for our nation’s children. Not to minimize the magnitude or impact of the achievement gap, this implication simply suggests that our efforts and resources may best be spent supporting measures that improve long-term goals.

Specifically, findings from this study indicate that access and support must be provided relative to quality schools and programs. Low socioeconomic status and attending an urban school are influential predictors of educational degree attainment, with both factors negatively impacting degree attainment. On the other hand, attending a private school and participating in an Advanced Placement (AP) or gifted program positively impact degree attainment. These findings might lead one to ask, what makes suburban schools, private schools, and participation in AP and gifted programs better, such that they positively impact educational degree attainment? The answer is quality.

Both suburban and private schools tend to have greater resources, lower student-teacher ratios, higher quality teachers, and less teacher turnover. Similarly, AP and gifted programs tend to have more experienced teachers, with greater content knowledge. There tends to be a greater level of student engagement, challenge, and rigor. The unambiguous implication that emerges is a call for urban school reform. Urban public schools must be made comparable to the most high-quality, successful private and suburban schools. This will require a tremendous investment of time and resources. Facilities need improvement, high-quality teachers need to be recruited and retained, and wide-spread, high-quality program offerings need to be made available.
In addition to urban school reform, programs, services, and supports must be established which move beyond the barriers to talent development. These programs and services should assist students and families in creating protective and facilitative factors for talent development. Yes, public urban schools generally suffer from lower quality than private schools. Yes, gifted programs and AP programs tend to offer greater rigor and challenge. But students, families, and peers also play an important role in the development of talent.

Parents can and should maintain high educational expectations for their children. They can also model for their children, both early and consistently, the value of hard work, good time management, and persistence. These behaviors will encourage students to possess and practice the skills that are important in the development of their own talent. Students must be quite purposeful in how they spend their time, and with whom. Students need to be careful in the peers they select, as having more academic peers positively impacts the likelihood of attaining a bachelor’s degree. Culturally appropriate programs that assist students and families in becoming their own advocates, including successfully navigating talent development will only help a complex process fraught with challenges.

The final implication of this study is related to educational degree attainment. As a nation, we are failing our top students in terms of degree attainment. The educational aspirations of our students far exceed their actual degree attainment. Determining how and why we fail our students in this regard must become a national priority. Supports must be put in place that facilitate degree completion. Earning a bachelor’s degree is a minimal level of success we would expect for students who exhibit academic potential. Given the country’s innovation needs that have been expressed in any number of national
reports, it appears as if a bachelor's degree may represent the minimal level of success for all of the nations' students. Low socioeconomic status is a barrier to talent development and degree completion. Policies should support degree attainment for all students who desire to complete a degree.

**Implications for Research**

As many answers as this study uncovered, it generated new questions. The first portion of this study was descriptive in nature, exploring the consequences of a broader conception of giftedness, and examining the characteristics of and outcomes for students who exhibit academic potential. An important area for future inquiry is long-term outcomes of a broadened conception of giftedness. This study examined outcomes 12 years post-identification, when the typical respondent was 26 years-old. What are the outcomes of students identified as gifted using nontraditional criteria 20 years or 30 years post-identification? Does the achievement gap disappear or reemerge over time?

The National Education Longitudinal Study of 1988 (NELS:88) is one of a series of longitudinal secondary studies sponsored by the federal government. A potentially important area of research would be to examine trends among high-ability learners, using the High School and Beyond Longitudinal Study (HS&B) and the Education Longitudinal Study of 2002 (ELS:2002), in addition to the NELS. Data from the *State of the States in Gifted Education* (National Association for Gifted Children, 2007) could be used as a data source for triangulation and provide additional information about the condition of gifted education. These additional data sources can add a layer of understanding about the context of gifted education, as well as the talent development process.
A policy implication of this study focuses on urban public school reform, improving the quality of the nation's most vulnerable schools. A corresponding implication for research calls for an improved understanding of what makes urban schools negative predictors of educational degree attainment and what makes private schools positive predictors of degree attainment. Can the relative success of suburban and private schools simply be translated to the context of urban public schools? What about successful or Blue Ribbon urban schools? What are the characteristics and practices of those schools? Answers to these questions may provide specific direction in the reform of urban public schools.

One of the greatest challenges in this undertaking was the operationalization of the Differentiated Model of Giftedness and Talent (DMGT) onto the NELS:88/2000. A potential area of inquiry is the creation of a talent development-specific instrument, and more targeted, an instrument aligned with the DMGT. This could enhance the applicability of responses and the connectivity to the field of gifted education. Such an instrument would provide better quality information both in terms of the talent development process, and in terms of the DMGT.

This study was a prediction study, based on association, not causation. As much as this study revealed about predictors of success and identified factors that either supported or impeded talent development, the research design did not allow for conclusions to be drawn about what causes success or failure among students who exhibited academic potential. This study could be greatly enhanced by utilizing propensity score matching, fixed-effects, or instrumental variables. Each of these
techniques better simulates randomization and would in turn allow for more definitive discussions about causation.

Final Thoughts

For all of the educational progress made, there is an enormous amount of work to be done. The sentiment of talent development for all was expressed more than 25 years ago when *A Nation at Risk* declared, “All, regardless of race or class or economic status, are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost” (National Commission on Excellence in Education, 1983, p. 1). That fair chance has been more elusive than we may care to admit. However, the ever-changing demographics of the nation make its realization a national imperative. No one group has exclusive rights to talent. Recognizing that is the first step towards the redemption of a nation seeped in a history of contradiction and inequity. The time has come for us to move beyond the barriers of past (and present) to forge a new nation, one that truly practices its most democratic ideals. Education is a great place to start.
References


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*Journal for the Education of the Gifted, 31*, 7-34.

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## Appendix A

### Operational Definitions of Variables

<table>
<thead>
<tr>
<th>Variable/Cluster</th>
<th>NELS Questions</th>
<th>Operationalization</th>
</tr>
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<tbody>
<tr>
<td><strong>Selection Criterion</strong></td>
<td></td>
<td>Recoded.</td>
</tr>
<tr>
<td>Academic Potential</td>
<td>BY2XRIRR, BY2XMIRR, BY2XSIRR, BY2XHIRR: The reading, mathematics,</td>
<td>2. Repeated the process for the remaining achievement tests.</td>
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<td></td>
<td>science, and history Item Response Theory (IRT) estimated number right</td>
<td>3. Created a binary variable TOP10 that was set equal to 1 if a student scored in the top 10% on any one of the achievement tests, 0 otherwise.</td>
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<tr>
<td></td>
<td>respectively. These are continuous variables with individually reported</td>
<td>4. Repeated steps (1) to (3) above for the top 5% (TOP5).</td>
</tr>
<tr>
<td></td>
<td>means and standard deviations.</td>
<td>5. Repeated steps (1) to (3) above for the top 1% (TOP1).</td>
</tr>
<tr>
<td><strong>Dependent Variables</strong></td>
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<tr>
<td>Educational Degree</td>
<td>F4HSDIPL: NCES derived variable denoting the respondent’s high school diploma,</td>
<td>Recoded. Binary: “Had a diploma or equivalent” set equal to 1, 0 otherwise.</td>
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<tr>
<td>Attainment</td>
<td>GED, or certificate of completion status as of 2000.</td>
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<tr>
<td></td>
<td>(1) = Had a diploma or equivalent</td>
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<td></td>
<td>(2) = Working toward a diploma/equivalent</td>
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</tr>
<tr>
<td></td>
<td>(3) = Neither</td>
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<td></td>
<td>F4HHDG: NCES derived variable constructed using degree type questions.</td>
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<td></td>
<td>(1) = Some PSE, no degree attained</td>
<td>Recoded. F4HSDIPL and F4HHDG were used in combination to determine which respondents had no postsecondary education (PSE).</td>
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<tr>
<td></td>
<td>(2) = Certificate/license</td>
<td>Two different variables were created as follows:</td>
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<tr>
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<td>(3) = Associate’s degree</td>
<td>BACHORMORE (binary) set equal to 1 if the respondent attained at least a bachelor’s degree, otherwise 0;</td>
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<td>(4) = Bachelor’s degree</td>
<td>DEGREE (ordinal) set equal to 0 if the respondent had not earned a bachelor’s degree, 1 if the respondent had attained at most a bachelor’s degree, and 2 if the respondent had attained an advanced degree.</td>
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<td>(5) = Master’s degree/equivalent</td>
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<td></td>
<td>(6) = Ph.D. or a professional degree</td>
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<tr>
<td>Variable/Cluster</td>
<td>NELS Questions</td>
<td>Operationalization</td>
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<tr>
<td>Occupational Prestige</td>
<td>F4BXOCCD: “I would like you to answer the following questions for your primary or most important job. What is/was your job title?” (The interviewer used a computer-assisted lookup list of occupations to code verbatim answers.) (1) = Secretaries and receptionists (2) = Cashiers, tellers, sales clerks (3) = Clerks, data entry (4) = Clerical other (5) = Farmers, foresters, farm laborers (6) = Personal services (7) = Cooks, chefs, bakers, cake decorators (8) = Laborers (other than farm) (9) = Mechanic, repairer, service technicians (10) = Craftsmen (11) = Skilled operatives (12) = Transport operatives (not pilots) (13) = Protective services, criminal justice (14) = Military (15) = Business/financial support services (16) = Financial services professionals (17) = Sales/purchasing (18) = Customer service (19) = Legal professionals (20) = Legal support (21) = Medical practice professionals (22) = Medical licensed professionals (23) = Medical services (24) = Educators-K-12 teachers (25) = Educators-instructors other than K-12 (26) = Human services professionals (27) = Engineers, architects, software engineers (28) = Scientist, statistician professionals (29) = Research assistants/lab technicians (30) = Technical/professional workers, other (31) = Computer systems/related professionals (32) = Computer programmers (33) = Computer/computer equipment operators (34) = Editors, writers, reporters (35) = Performers/artists (36) = Managers-executive (37) = Managers-midlevel (38) = Managers-supervisory, office, other (39) = Health/recreation services (41) = Unemployed-homemakers (42) = Unemployed-other</td>
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<td>Created a variable PRESTIGE to reflect the General Social Survey 1989 update of occupational prestige scores (Nakao &amp; Treas, 1990). When occupations listed in F4BXOCCD could be represented by more than one occupational prestige score, a mean score was calculated. Two codes, representing unemployed, were set missing.</td>
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<tr>
<td>Variable/Cluster</td>
<td>NELS Questions</td>
<td>Operationalization</td>
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<tr>
<td>Independent Variables</td>
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<td><strong>Background Characteristics</strong></td>
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</table>
| Race             | F4RACE: “What best describes you?”
(1) = Asian, Pacific Islander
(2) = Hispanic
(3) = Black, not Hispanic
(4) = White, not Hispanic
(5) = Native American, Alaska Native | The analytic sample included only those respondents who self-identified as Black or White. |
| Gender           | F4SEX: “What is your sex?”
(1) = Male
(2) = Female | Recoded. Male set equal to 1 and Female set equal to 0. Female is the reference group. |
| Socioeconomic Status | F2SES1: NCES constructed variable using base-year father's education, mother's education, father's occupation, mother's occupation, and family income. This variable corrects for an error in the BYSES variable calculation. Standardized variable with a mean of approximately zero and a standard deviation of one. |
|                  | F2SES1Q: Indicates the quartile into which F2SES1 falls.
(1) = Quartile 1 Lowest
(2) = Quartile 2
(3) = Quartile 3
(4) = Quartile 4 Highest | |
| Parents' Education | BYPARED: NCES variable constructed from base-year parent questions. This variable represents the highest level of education attained by either parent.
(1) Did not finish HS
(2) HS graduate or GED
(3) Graduated HS, less than bachelor's
(4) Bachelor's degree
(5) Master's or equivalent
(6) Ph.D., M.D., other | |
<p>| <strong>Intrapersonal Catalysts Mental Traits</strong> | BYCNCPT2: NCES composite of self-concept questions: BYS44A, BYS44D, BYS44E, BYS44H, BYS44I, BYS44J, and BYS44H. Four items, BYS44A, BYS44D, BYS44E, and BYS44H, were reverse coded before computations. |
|                  | BYS44A-BYS44M: “How do you feel about the following statements?” | |</p>
<table>
<thead>
<tr>
<th>Variable/Cluster</th>
<th>NELS Questions</th>
<th>Operationalization</th>
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<tr>
<td><strong>Mental Traits</strong>&lt;br&gt;(continued)</td>
<td>A. I feel good about myself more important than hard work for success&lt;br&gt;D. I feel I am a person of worth, the equal of other people&lt;br&gt;E. I am able to do things as well as most other people&lt;br&gt;H. On the whole, I am satisfied with myself&lt;br&gt;I. I certainly feel useless at times&lt;br&gt;J. At times I think I am no good at all</td>
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<td>B. I don't have enough control over the direction my life is taking&lt;br&gt;C. In my life, good luck is more important than hard work for success&lt;br&gt;F. Every time I try to get ahead, something or somebody stops me&lt;br&gt;G. My plans hardly ever work out, so planning only makes me unhappy&lt;br&gt;K. When I make plans, I am almost certain I can make them work&lt;br&gt;M. Chance and luck are very important for what happens in my life</td>
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<td>BYLOCUS2: NCES composite of locus of control questions: BYS44B, BYS44C, BYS44F, BYS44G, BYS44K, and BYS44M. One item, BYS44K, was reverse coded before computations.</td>
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<tr>
<td></td>
<td>B. I don't have enough control over the direction my life is taking&lt;br&gt;C. In my life, good luck is more important than hard work for success&lt;br&gt;F. Every time I try to get ahead, something or somebody stops me&lt;br&gt;G. My plans hardly ever work out, so planning only makes me unhappy&lt;br&gt;K. When I make plans, I am almost certain I can make them work&lt;br&gt;M. Chance and luck are very important for what happens in my life</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1) = Strongly agree&lt;br&gt;(2) = Agree&lt;br&gt;(3) = Disagree&lt;br&gt;(4) = Strongly disagree</td>
<td></td>
</tr>
<tr>
<td><strong>Goal Management</strong></td>
<td>F1S38: “How important are good grades to you?”&lt;br&gt;(1) = Not important&lt;br&gt;(2) = Somewhat important&lt;br&gt;(3) = Important&lt;br&gt;(4) = Very important</td>
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<tr>
<td>Motivation</td>
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<td>BYS78A-BYS78C: “How often do you come to class and find yourself WITHOUT these things?”&lt;br&gt;A. Pencil or paper (when needed)&lt;br&gt;B. Books (when needed)&lt;br&gt;C. Your homework done (when assigned)&lt;br&gt;(1) = Usually&lt;br&gt;(2) = Often&lt;br&gt;(3) = Seldom&lt;br&gt;(4) = Never</td>
<td>Factor scores based on exploratory factor analysis of the volition variables: BYS78A-BYS78C, F1S11A-F1S11C, F1S12D, F1S12E, F1S36A2, and F1S45A.</td>
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<tr>
<td>Variable/Cluster</td>
<td>NEIS Questions</td>
<td>Operationalization</td>
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<tr>
<td>Volition (continued)</td>
<td>F1S11A-F1S11C: “Do you feel it is ‘OK’ for you to…”</td>
<td>Recoded. “No” set equal to 0.</td>
</tr>
<tr>
<td></td>
<td>A. Work hard for good grades</td>
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<td></td>
<td>B. Ask challenging questions</td>
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<td></td>
<td>C. Solve problems using new ideas</td>
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<tr>
<td></td>
<td>(1) = Yes</td>
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<tr>
<td></td>
<td>(2) = No</td>
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<td></td>
<td>F1S12D, F1S12E: “How often do you feel it is ‘OK’ for you to…”</td>
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<tr>
<td></td>
<td>D. Cheat on tests</td>
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<tr>
<td></td>
<td>E. Copy someone else’s homework</td>
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<tr>
<td></td>
<td>(1) = Often</td>
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</tr>
<tr>
<td></td>
<td>(2) = Sometimes</td>
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<td></td>
<td>(3) = Rarely</td>
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<tr>
<td></td>
<td>(4) = Never</td>
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<td></td>
<td>F1S36A2: “Overall about how much time do you spend on homework EACH WEEK out of school?”</td>
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<tr>
<td></td>
<td>(0) = None</td>
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<tr>
<td></td>
<td>(1) = 1 hour or less</td>
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</tr>
<tr>
<td></td>
<td>(2) = 2-3 hours</td>
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</tr>
<tr>
<td></td>
<td>(3) = 4-6 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4) = 7-9 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5) = 10-12 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(6) = 13-15 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(7) = Over 15 hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>F1S45A: “During the school year, how many hours a day do you USUALLY watch TV or videotapes (on weekdays)?”</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0) = Don’t watch TV</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1) = Less than 1 hour/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) = 1-2 hours/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) = 2-3 hours/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4) = 3-4 hours/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(5) = 4-5 hours/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(6) = More than 5 hours/day</td>
<td></td>
</tr>
<tr>
<td>Environmental Catalysts</td>
<td>BYS35H, BYS35M: “Which of the following does your family have in your home?”</td>
<td>Recoded. “Do not have” set equal to 0.</td>
</tr>
<tr>
<td>Milieu</td>
<td>H. Computer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M. More than 50 books</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1) = Have</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) = Do not have</td>
<td></td>
</tr>
<tr>
<td>Variable/Cluster</td>
<td>NELS Questions</td>
<td>Operationalization</td>
</tr>
<tr>
<td>---------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>School Characteristics</td>
<td><strong>G8CTRL</strong>: NCES created variable that classifies the type of school into public, Catholic, other religious, and nonsectarian private schools, based on the school administrator’s response. (1) = Public school (2) = Catholic school (3) = Private school, other religious (4) = Private school, non-religious</td>
<td><strong>Recoded. Binary</strong>: PRIVATE. Catholic and other private schools collapsed into one category and set equal to 1. Public schools set equal to 0. Public schools are the reference group.</td>
</tr>
<tr>
<td></td>
<td><strong>G8MINOR</strong>: Reflects the percentage of minority students in the eighth grade reported by the school. (0) = None (1) = 1-5 (2) = 6-10 (3) = 11-20 (4) = 21-40 (5) = 41-60 (6) = 61-90 (7) = 91-100</td>
<td><strong>Recoded. Binary</strong>: <strong>HIGHMINORITY.</strong> Schools with more than 20% minority students set equal to 1; otherwise set equal to 0. Low minority is the reference group.</td>
</tr>
<tr>
<td></td>
<td><strong>G8LUNCH</strong>: Categorizes the percentage of free or reduced price lunch at the school calculated from the school questionnaire. (0) = None (1) = 1-5 (2) = 6-10 (3) = 11-20 (4) = 21-30 (5) = 31-50 (6) = 51-75 (7) = 76-100</td>
<td><strong>Recoded. Binary</strong>: <strong>HIGHPOVERTY.</strong> Schools with more than 20% students on free or reduced lunch set equal to 1; otherwise set equal to 0. Low poverty is the reference group.</td>
</tr>
<tr>
<td></td>
<td><strong>G8URBAN</strong>: NCES created variable that classifies the urbanicity of the student’s school using 1980 U.S. Census classifications. (1) = Urban (2) = Suburban (3) = Rural</td>
<td><strong>Recoded. Dummy variables</strong>: <strong>URBAN</strong> and <strong>RURAL.</strong> Suburban schools are the reference group.</td>
</tr>
<tr>
<td>School Climate</td>
<td><strong>BYS59B, BYS59C, BYS59D, BYS59E, BYS59K, BYS59L, BYS59M</strong>: “How much do you agree with each of the following statements about your school and teachers?”</td>
<td><strong>Reverse coded</strong> <strong>BYS59B, BYS59C, and BYS59D</strong> so that favorable responses had higher values. Scores based on exploratory factor analysis.</td>
</tr>
<tr>
<td>Variable/Cluster</td>
<td>NELS Questions</td>
<td>Operationalization</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>School Climate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(continued)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>B. There is real school spirit</td>
<td></td>
</tr>
<tr>
<td></td>
<td>C. Rules for behavior are strict</td>
<td></td>
</tr>
<tr>
<td></td>
<td>D. Discipline is fair</td>
<td></td>
</tr>
<tr>
<td></td>
<td>E. Other students often disrupt class</td>
<td></td>
</tr>
<tr>
<td></td>
<td>K. I don't feel safe at this school</td>
<td></td>
</tr>
<tr>
<td></td>
<td>L. Disruptions by other students get in the way of my learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M. Misbehaving students often get away with it</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1) = Strongly agree</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2) = Agree</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3) = Disagree</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4) = Strongly disagree</td>
<td></td>
</tr>
</tbody>
</table>

**Persons**

**Parents**

BYP76: “How far in school do you expect your eighth grader to go?”
(1) = Less than H.S diploma
(2) = GED
(3) = H.S. graduation
(4) = Vocational, Trade, Business < 1 YR
(5) = Vocational, Trade, Business 1-2 YRS
(6) = Vocational, Trade, 2 YRS or more
(7) = < 2 YRS of college
(8) = 2 / more YRS college
(9) = Finish a 2YR program
(10) = Finish 4/5 YR program
(11) = Master’s degree
(12) = PH.D., M.D.

BYS36A-BYS36C: “Since the beginning of the school year, how often have you discussed the following with either or both of your parents/guardians?”
A. Selecting courses or programs at school
B. School activities or events of particular interest to you
C. Things you've studied in class
(1) = Not at all
(2) = Once or twice
(3) = 3 or more times

BYS38A-BYS38D: “How often do your parents or guardians do the following?”
A. Check on whether you have done your homework
B. Require you to do work or chores around the home
C. Limit the amount of time you can spend watching TV
D. Limit the amount of time for going out with friends on school nights

Recoded. Binary: PEDUCEXP. Parents who expected their eighth grader to complete at least a bachelor’s degree set equal to 1; otherwise set equal to 0.

Recoded. “Not at all” set equal to 0 and the other responses were recoded such that the values range from 0 to 2. Composite index of the collapsed variable represents BYS50A and BYS50B, and BYS36A-BYS36C. The resulting composite took on values ranging from 0 to 8. Exploratory factor analysis of variables: BYS38A-BYS38D.

Reverse coded so that favorable responses had higher values.
<table>
<thead>
<tr>
<th>Variable/Cluster</th>
<th>NELS Questions</th>
<th>Operationalization</th>
</tr>
</thead>
</table>
| Parents (continued) | (1) = Often  
(2) = Sometimes  
(3) = Rarely  
(4) = Never | **BYS50A, BYS50B**: “How often have you talked to the following people about planning your high school program?”  
A. Your father (or male guardian)  
B. Your mother (or female guardian)  
(0) = Not at all  
(1) = Once or twice  
(2) = 3 or more times | Recoded. A new, collapsed variable was created representing whether the respondent talked to either the mother or father. |
| Teachers | **BYS50A, BYS50B**: “How often have you talked to the following people about planning your high school program?”  
A. Counselor  
B. Teacher  
(0) = Not at all  
(1) = Once or twice  
(2) = 3 or more times | Recoded. Binary. Variable was set equal to 1 if the respondent talked to a counselor or a teacher; otherwise set equal to 0. |
|                                                                                 | **BYS51**: “Since the beginning of this school year, have you talked to a counselor at your school, a teacher at your school, or another adult relative or adult friend (other than your parents), for any of the following reasons?”  
AA. To get information about high schools or high school programs (Counselor)  
AB. To get information about high schools or high school programs (Teacher)  
BA. To get information about jobs or careers that you might be interested in after finishing school (Counselor)  
BB. To get information about jobs or careers that you might be interested in after finishing school (Teacher)  
CA. To help improve your academic work in school right now (Counselor)  
CB. To help improve your academic work in school right now (Teacher)  
DA. To select courses or programs at school (Counselor)  
DB. To select courses or programs at school (Teacher)  
EA. Things you’ve studied in class (Counselor)  
EB. Things you’ve studied in class (Teacher) | Recoded. “No” was set equal to 0. Variables created representing whether the student talked to either a teacher or a counselor about academic/career planning. The resulting composite took on values ranging from 0 to 7. |
<table>
<thead>
<tr>
<th>Variable/Cluster</th>
<th>NELS Questions</th>
<th>Operationalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA</td>
<td>For counseling on personal problems</td>
<td>Reverse coded so that more favorable responses had higher values. Scores based on exploratory factor analysis.</td>
</tr>
<tr>
<td>HB</td>
<td>For counseling on personal problems</td>
<td></td>
</tr>
<tr>
<td>BYS59A, BYS59F,</td>
<td>“How much do you agree with each of the following statements about your school and teachers?</td>
<td></td>
</tr>
<tr>
<td>BYS59G, BYS59H,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BYS59I, BYS59J</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.</td>
<td>Students get along well with teachers</td>
<td></td>
</tr>
<tr>
<td>F.</td>
<td>The teaching is good</td>
<td></td>
</tr>
<tr>
<td>G.</td>
<td>Teachers are interested in students</td>
<td></td>
</tr>
<tr>
<td>H.</td>
<td>When I work hard on schoolwork, my teachers praise my effort</td>
<td></td>
</tr>
<tr>
<td>I.</td>
<td>In class I often feel 'put down' by my teachers</td>
<td></td>
</tr>
<tr>
<td>J.</td>
<td>Most of my teachers really listen to what I have to say</td>
<td></td>
</tr>
<tr>
<td>(1) = Strongly</td>
<td>Agree</td>
<td></td>
</tr>
<tr>
<td>(2) = Agree</td>
<td>Disagree</td>
<td></td>
</tr>
<tr>
<td>(4) = Strongly</td>
<td>disagree</td>
<td></td>
</tr>
<tr>
<td>F1S70A-F1S70L</td>
<td>“Among the friends you hang out with, how important is it to....”</td>
<td>Negative statements were reverse coded. Scores based on exploratory factor analysis.</td>
</tr>
<tr>
<td>A.</td>
<td>Attend classes regularly?</td>
<td></td>
</tr>
<tr>
<td>B.</td>
<td>Study?</td>
<td></td>
</tr>
<tr>
<td>C.</td>
<td>Play sports?</td>
<td></td>
</tr>
<tr>
<td>D.</td>
<td>Get good grades?</td>
<td></td>
</tr>
<tr>
<td>E.</td>
<td>Be popular/well-liked by students?</td>
<td></td>
</tr>
<tr>
<td>F.</td>
<td>Finish high school?</td>
<td></td>
</tr>
<tr>
<td>G.</td>
<td>Have a steady boyfriend/girlfriend?</td>
<td></td>
</tr>
<tr>
<td>H.</td>
<td>Be willing to party, get wild?</td>
<td></td>
</tr>
<tr>
<td>I.</td>
<td>Continue their education past high school?</td>
<td></td>
</tr>
<tr>
<td>J.</td>
<td>Participate in religious activities?</td>
<td></td>
</tr>
<tr>
<td>K.</td>
<td>Do community work or volunteer?</td>
<td></td>
</tr>
<tr>
<td>L.</td>
<td>Have a steady job?</td>
<td></td>
</tr>
<tr>
<td>(1) = Not important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(2) = Somewhat important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) = Very important</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Variable/Cluster</td>
<td>NELS Questions</td>
<td>Operationalization</td>
</tr>
<tr>
<td>------------------</td>
<td>----------------</td>
<td>--------------------</td>
</tr>
<tr>
<td><strong>Provisions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Programs</td>
<td>BYS661-BYS66D: “Are you enrolled in advanced, enriched, or accelerated courses in any of the following areas? A. English (language arts) B. Social studies C. Science D. Mathematics (1) = Yes (2) = No</td>
<td>Recoded. “No” was set equal to 0. A new variable, ACCELERATED, represents whether the respondent participated in any advanced, enriched, or accelerated courses.</td>
</tr>
<tr>
<td></td>
<td>BYS68A: “Are you enrolled in ... classes for gifted or talented students?” (1) = Yes (2) = No</td>
<td>Recoded. “No” was set equal to 0.</td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td>F1S42: “In a typical week, how much total time do you spend on all SCHOOL-SPONSORED extracurricular activities?” (0) = None (1) = Less than 1 hour per week (2) = 1-4 hours per week (3) = 5-9 hours per week (4) = 10-19 hours per week (5) = 20 hours or more per week</td>
<td></td>
</tr>
</tbody>
</table>

### Appendix B

**Occupation Codes, Descriptors, and Corresponding Prestige Scores**

<table>
<thead>
<tr>
<th>Code</th>
<th>Occupation</th>
<th>Sample Inclusions</th>
<th>Prestige Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Secretaries, specialized secretaries, receptionists</td>
<td>Typist, timekeeper, stenographer</td>
<td>42.96</td>
</tr>
<tr>
<td>2</td>
<td>Cashiers, tellers, sales clerks</td>
<td>Bank teller, gas station attendant</td>
<td>31.95</td>
</tr>
<tr>
<td>3</td>
<td>Clerks – data entry</td>
<td>Date entry clerks, data clerks, data processing clerks, statistical clerks</td>
<td>39.34</td>
</tr>
<tr>
<td>4</td>
<td>Clerical other</td>
<td>Dispatchers, ticketing and travel agents, library assistants, hotel front desk, records administrators, mail carriers, shipping/stock/file clerks</td>
<td>34.55</td>
</tr>
<tr>
<td>5</td>
<td>Farmers, foresters, farm laborers</td>
<td>Fish farmer, fisherman, forester, horticulture, trapper</td>
<td>35.57</td>
</tr>
<tr>
<td>6</td>
<td>Personal services</td>
<td>Waiters, bartenders, hairdressers, flight attendants, child/day care worker, housekeepers, pet groomers, hostess</td>
<td>28.73</td>
</tr>
<tr>
<td>7</td>
<td>Cooks, chefs, bakers, cake decorators</td>
<td></td>
<td>31.23</td>
</tr>
<tr>
<td>8</td>
<td>Laborers (other than farm)</td>
<td>Grounds keeper, maintenance, loader, custodian, bus boy, gardener, garbage collector, messenger, meter reader</td>
<td>24.66</td>
</tr>
<tr>
<td>9</td>
<td>Mechanics, repairers, service technicians</td>
<td></td>
<td>39.20</td>
</tr>
<tr>
<td>10</td>
<td>Craftsmen</td>
<td>Plumbers, electricians, carpenters, foremen, inspectors, machinists, roofers, upholsterers, jeweler</td>
<td>38.35</td>
</tr>
<tr>
<td>11</td>
<td>Skilled operatives</td>
<td>Assemblers, drillers, meat cutters, polishers, seamstress, welders</td>
<td>33.36</td>
</tr>
<tr>
<td>12</td>
<td>Transport operatives (other than pilots)</td>
<td>Boatmen, conductors, chauffeurs, deliverymen, fork lift, parking attendants, truck and bus drivers, taxi drivers</td>
<td>35.94</td>
</tr>
<tr>
<td>13</td>
<td>Protective services, criminal justice administration</td>
<td>Police, firemen, corrections/parole, bailiffs/bondsmen</td>
<td>48.40</td>
</tr>
<tr>
<td>Code</td>
<td>Occupation</td>
<td>Sample Inclusions</td>
<td>Prestige Score</td>
</tr>
<tr>
<td>------</td>
<td>-----------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>14</td>
<td>Military⁵</td>
<td>Career officer, enlisted soldier, weapons specialist (This category is only for military occupations that do not appear elsewhere)</td>
<td>39.89</td>
</tr>
<tr>
<td>15</td>
<td>Business/financial support services</td>
<td>Bookkeepers, credit examiners, insurance adjustors, loan officers, payroll, broker's assistant, bond clerks</td>
<td>41.37</td>
</tr>
<tr>
<td>16</td>
<td>Financial services professionals</td>
<td>Accountants, bank officers, controller, insurance brokers/agents, investment bankers, stock brokers, underwriters</td>
<td>54.20</td>
</tr>
<tr>
<td>17</td>
<td>Sales/purchasing</td>
<td>Buyers, salesmen, sales managers, advertising, marketing, real estate</td>
<td>44.70</td>
</tr>
<tr>
<td>18</td>
<td>Customer service</td>
<td>Telephone operators, telegraphers, eligibility clerks, NOT CLERICAL, NOT SALES, NOT SERVICE OCCUPATIONS</td>
<td>43.59</td>
</tr>
<tr>
<td>19</td>
<td>Legal professionals</td>
<td>Lawyers, judges</td>
<td>73.13</td>
</tr>
<tr>
<td>20</td>
<td>Legal support</td>
<td>Paralegals, legal assistants</td>
<td>56.53</td>
</tr>
<tr>
<td>21</td>
<td>Medical practice professionals</td>
<td>Physicians, dentists, veterinarians</td>
<td>70.43</td>
</tr>
<tr>
<td>22</td>
<td>Medical licensed professionals</td>
<td>RNs, pharmacists, dental hygienists, XRAY/MRI/etc technologists, physical and other therapists, opticians</td>
<td>60.36</td>
</tr>
<tr>
<td>23</td>
<td>Medical services</td>
<td>LPNs, medical/dental assistants, home health aides, medical records, technologists, paramedics</td>
<td>49.32</td>
</tr>
<tr>
<td>24</td>
<td>Educators: K-12 teachers</td>
<td>K-12 school teachers</td>
<td>65.17</td>
</tr>
</tbody>
</table>

⁵ Military does not exist as a 1980 Census occupational category. The military prestige score was calculated by averaging the prestige scores for radio operators (42.83), peripheral equipment operators (40.09), mechanics and repairers (39.2), and precision production occupations (37.42).
<table>
<thead>
<tr>
<th>Code</th>
<th>Occupation</th>
<th>Sample Inclusions</th>
<th>Prestige Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>Educators: Trainers/instructors, teachers' aides, college professors, flight instructors, librarians, nursery school teachers</td>
<td>56.52</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>Instructors other than K-12: Social workers, clergy, counselors, occupational therapists/advisors</td>
<td>54.67</td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>Engineers, architects, software engineers: MINIMUM OF BACHELOR'S DEGREE</td>
<td>65.49</td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>Scientist, statistician professionals: Statisticians, chemists, medical scientists, economists, psychologists</td>
<td>65.34</td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>Research assistants/lab technicians: Draftsmen, surveyors (not medical)</td>
<td>45.82</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>Technical/professional workers, other: Archivists, air traffic controllers, city planners, curators, navigators, pilots</td>
<td>55.68</td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Computer systems/related professionals: Systems analysts, software support specialists, network administrators</td>
<td>63.37</td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Computer programmers</td>
<td>60.51</td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Computer and computer equipment operators</td>
<td>52.16</td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>Editors, writers, reporters</td>
<td>55.89</td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Performers/artists: Artists, commercial artists, athletes, entertainers, dancers, musicians, actors</td>
<td>50.24</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Managers: Executive: President, vice president, executive director, managing director</td>
<td>69.84</td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>Managers: Midlevel: Retail, service, manufacturing, store manager, restaurant manager</td>
<td>52.51</td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>Managers: Supervisory, office, administration: Office managers, department managers, coordinators</td>
<td>51.19</td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>Health/recreation services: Recreation assistants, sports/fitness instructors/trainers</td>
<td>41.90</td>
<td></td>
</tr>
</tbody>
</table>

Source: National Education Longitudinal Study of 1988: Base-Year to Fourth Follow-up Data File User’s Manual (Appendix G). Tabulations by Author based on Nakao and Treas (1994). Unemployed, (41) and (42), was set to missing.

6 Prestige scores vary greatly in this category, with college professors having prestige scores of 73.51 in comparison to nursery school teachers having prestige scores of 43.06.
### Appendix C

*Means and Standard Deviation of Variables Before and After Multiple Imputation*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before Imputation</th>
<th>After Imputation</th>
<th>N (%)</th>
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<td>Class without pencil/paper</td>
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<td>3.16</td>
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<td>Solve problems using new ideas</td>
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*Note:* All values are rounded to two decimal places.
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<td>Talk to teachers</td>
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<td>Get along with teachers</td>
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<td>Attend classes</td>
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<td>Study</td>
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<td>Play sports</td>
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<td>Get good grades</td>
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<td>Finish HS</td>
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<td>Continue school past HS</td>
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<td>Participate in religious activities</td>
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<td>Do community work/volunteer</td>
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<td>Have a steady job</td>
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<td>Any accelerated courses (base-year)</td>
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<td>Ever in AP</td>
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<td>Ever in gifted program</td>
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<td>Degree</td>
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<td>Occupational prestige</td>
<td>1860 (2.9)</td>
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Note: Percent missing in ( ).

¹N = 1906 after multiple imputation.
Appendix D

Stata Do-File

*Data Source: NELS:88/2000 public-use data (NCES 2002-322R)
*Predicting Success: Academic Potential and Talent Development Factors
*Among Black and White Students (Dissertation Study)
*by Valija C. Rose
*April 4, 2009

version 10
set mem 120m
set more off
cd "C:\Program Files\StatalO\Dissertation"
set logtype text
log using newdatamgt

use "C:\Program Files\StatalO\Dissertation\Dissertation My Data April 5, 2009.dta", clear

***********************************************************************
*set survey sampling weight, strata, and primary sampling unit
svyset psu [pweight=f4pnlwt] , strata(stratum)
***********************************************************************

**generate copies of variables, recode missing values
*make no=0 on dichotomous variables
recode bys34a bys34b (8 97 98 99=.), gen (daded momed)
recode bys35h bys35m (2=0) (6 8 9=.), gen (computer books)
recode bys36a bys36b bys36c (1=0) (2=1) (3=2) (6 8 9=.), gen (pdisprgms
pdisacts pdisclass)
recode bys38a bys38b bys38c bys38d (4=0) (3=1) (1=3) (6 8 9=.), gen
(pcheckhw pchores plimtv plimhang)
recode bys42a (96 98 99=.), gen (bytvtime)
recode bys50a bys50b bys50c bys50d (6 8 9=.), gen (dadplanhs momplanhs
cplanhs tplanhs)
recode bys51aa bys51ab bys51ba bys51bb bys51ca bys51cb bys51da bys51db
bys51ea bys51eb bys51ha bys51hb (2=0) (6/9=.), gen (chsprgm thsprgm
cjobs tjobs cschwork tschwork ccourses tcourses cstudies tstudies
cprobs tprobs)
recode bys59a bys59b bys59c bys59d bys59e bys59f bys59g bys59h bys59i bys59j bys59k bys59l bys59m (6 8 9=.), gen (getalong spirit rules fair disrupt oft en good teaching interested praise effort put down listen safe disrupt learning misbehave)

recode bys66a bys66b bys66c bys66d (2=0) (6 8 9=.), gen (honeng honss honsci honmath)

recode bys68a (2=0) (8 9=.), gen (bygifted)

recode bys78a bys78b bys78c (6 8 9=.), gen (bynopaper bynobooks bynohw)

recode g8ctrl (1=0) (2/4=1) (9=.), gen(private)
lable define private 1 "Private" 0 "Public"
lable values private private

recode g8urban (9=.), gen(urbanicity)
lable values urbanicity g8urban

recode g8minor g8lunch (998 999=.), gen (minority con poverty con)

recode bylocus2 bycncpt2 (99.98 99.99=.), gen (locus selfconcept)

recode bypared (7 98=.), gen (parented)
lable values parented bypared

recode byhomewk (1=0) (2=1) (3=2) (4=3) (5=4) (6=5) (7=6) (8=7) (98 99=.), gen (byhwtime)

recode by2xrirr by2xmrr by2xsirr by2xhr 99.98 99.99 -9.00=., gen (engtest mathtest scitest sstest)

recode f1s11a f1s11b f1s11c (2=0) (6 8 9=.), gen (workhard askquestions newideas)

recode f1s12d f1s12e (6 8 9=.), gen (cheat copy)

recode f1s36a2 (96 98 99=.), gen (flhwtime)

recode f1s38 (6 8 9=.), gen (goodgrades)

recode f1s42 (96 98 99=.), gen (flextracurric)

recode f1s40a f1s40b f1s40c (6/9=.), gen (f1nopaper f1nbooks f1nohw)

recode f1s45a (96 98 99=.), gen (fltvtime)

recode f1s70a f1s70b f1s70c f1s70d f1s70e f1s70f f1s70g f1s70h f1s70i f1s70j f1s70k f1s70l (6 8 9=.), gen (peersclasses peersstudy peerssports peersgrades peerspopular peersfinhs peersbgfriend peersparty peerscollege peersreligious peersvolunteer peershavejob)

recode f2s13e f2s13j (2=0) (6 8 9=.), gen (everap evergifted)

recode f2ses1 (99.998=.), gen (ses)
recode f2ses1q (8=.), gen (sesq)
label values sesq f2ses1q

recode f2ses1c (998=.), gen (sesc)

recode byp76 (96/99=.) (1/9=0) (10=1) (11/12=2), gen (peducexp)

recode f4bxoccd (-1 -2 -3 -6 41 42=.), gen (occupation)

recode f4race (-9=.), gen(race)
label values race f4race

*generate dummy race variables
tab race, gen(racedummy)
rename racedummy1 asian
rename racedummy2 hispanic
rename racedummy3 black
rename racedummy4 white
rename racedummy5 natamer

*label race dummies
label define asian 1 "Asian" 0 "Non Asian"
label values asian asian
label define hispanic 1 "Hispanic" 0 "Non Hispanic"
label values hispanic hispanic
label define black 1 "Black" 0 "Non Black"
label values black black
label define white 1 "White" 0 "Non White"
label values white white
label define natamer 1 "Native American" 0 "Non Native American"
label values natamer natamer

*recode and create dummies for gender
recode f4sex (2=0), gen (male)
recode f4sex (1=0) (2=1), gen (female)
label define male 1 "Male" 0 "Female"
label define female 1 "Female" 0 "Male"
label values male male
label values female female

*generate honors if student was in any advanced/enriched/accelerated classes
gen honors=.
replace honors=1 if honeng==1 | honss==1 | honsci==1 | honmath==1
replace honors=0 if honeng==0 & honss==0 & honsci==0 & honmath==0
label define honors 1 "Honors" 0 "Not Honors"
label values honors honors

*generate high poverty and high minority variables
recode minoritycon povertycon (0/3=0) (4/7=1), gen (highminority highpoverty)
label define highlow 1 "High" 0 "Low"
label values highminority highlow
label values highpoverty highlow
*generate dummy variables for urbanicity
  tab urbanicity, gen(urban)
  rename urban1 urban
  rename urban2 suburban
  rename urban3 rural
  label define urban 1 "Urban" 0 "Not Urban"
  label define suburban 1 "Suburban" 0 "Not Suburban"
  label define rural 1 "Rural" 0 "Not Rural"
  label values urban urban
  label values suburban suburban
  label values rural rural

*reverse code negative climate and teacher questions
  recode getalong spirit rules fair good teaching interested praise effort listen (1=4) (2=3) (3=2) (4=1)

*reverse code negative peers questions
  recode peers popular peers bgfriend peers party (1=3) (3=1)

******************************************************************************

*generate outcome variables

*generate high school completion variable
  recode f4hsdipl (2/3=0) (-9=.), gen (hsdiploma)

*generate degree attainment variable
  recode f4hhdg (1/3=0) (4=1) (5/6=2) (-3 -9=.), gen (degree)
  replace degree=0 if hsdiploma!=. & degree==.
  label define degree 0 "< Bachelors" 1 "Bachelors" 2 "Masters"
  label values degree degree
  label values peducexp degree

*generate dummy degree variables
  tab degree, gen(highestpse)
  rename highestpse1 nobachelors
  rename highestpse2 bachelors
  rename highestpse3 masters

*generate prestige codes
  recode occupation (1=42.96) (2=31.95) (3=39.34) (4=34.55) (5=35.57)
  (6=28.73) (7=31.23) (8=24.66) (9=39.2) (10=38.35) (11=33.36) (12=35.94)
  (13=48.4) (14=39.89) (15=41.37) (16=54.2) (17=44.7) (18=43.59)
  (19=73.13) (20=56.53) (21=70.43) (22=60.36) (23=49.32) (24=65.17)
  (25=56.52) (26=54.67) (27=65.49) (28=65.34) (29=45.82) (30=55.68)
  (31=63.37) (32=60.51) (33=52.16) (34=55.89) (35=50.24) (36=69.84)
  (37=52.51) (38=51.19) (39=41.9), gen (prestige)

******************************************************************************

*summarize test scores by race to determine 90th 95th and 99th percentiles
  summ engtest math test scitest sstest if asian==1, detail
  summ engtest math test scitest sstest if hispanic==1, detail
*sum prestige score by race to determine 90th 95th and 99th percentiles
sum prestige if asian==1, detail
sum prestige if hispanic==1, detail
sum prestige if black==1, detail
sum prestige if white==1, detail
sum prestige if natamer==1, detail

*generate within racial group top10, top5, and topl
*using within race percentiles
gen top10=0
replace top10=1 if race==1 & engtest>=40.86 & engtest <. | race==1 & mathtest>=59.25 & mathtest <. | race==1 & scitest>=27.09 & scitest <. | race==1 & sstest>=37.49 & sstest <.
replace top10=1 if race==2 & engtest>=35.14 & engtest <. | race==2 & mathtest>=45.57 & mathtest <. | race==2 & scitest>=22.28 & scitest <. | race==2 & sstest>=33.68 & sstest <.
replace top10=1 if race==3 & engtest>=34.8 & engtest <. | race==3 & mathtest>=44.19 & mathtest <. | race==3 & scitest>=21.74 & scitest <. | race==3 & sstest>=32.79 & sstest <.
replace top10=1 if race==4 & engtest>=40.17 & engtest <. | race==4 & mathtest>=54.93 & mathtest <. | race==4 & scitest>=26.27 & scitest <. | race==4 & sstest>=36.36 & sstest <.
replace top10=1 if race==5 & engtest>=33.98 & engtest <. | race==5 & mathtest>=43.04 & mathtest <. | race==5 & scitest>=21.78 & scitest <. | race==5 & sstest>=32.52 & sstest <.

label define top10 1 "Top 10" 0 "Not Top 10"
label values top10 top10

*generate within group top 5 percent
*using within race percentiles
gen top5=0
replace top5=1 if race==1 & engtest>=43.43 & engtest <. | race==1 & mathtest>=62.81 & mathtest <. | race==1 & scitest>=29.63 & scitest <. | race==1 & sstest>=39.13 & sstest <.
replace top5=1 if race==2 & engtest>=38.18 & engtest <. | race==2 & mathtest>=50.96 & mathtest <. | race==2 & scitest>=24.86 & scitest <. | race==2 & sstest>=35.5 & sstest <.
replace top5=1 if race==3 & engtest>=37.86 & engtest <. | race==3 & mathtest>=49.46 & mathtest <. | race==3 & scitest>=23.83 & scitest <. | race==3 & sstest>=34.85 & sstest <.
replace top5=1 if race==4 & engtest>=42.63 & engtest <. | race==4 & mathtest>=58.88 & mathtest <. | race==4 & scitest>=28.05 & scitest <. | race==4 & sstest>=38.25 & sstest <.
replace topS=1 if race==S & engtest>=37.36 & engtest <. | race==5 & mathtest>=48.89 & mathtest <. | race==5 & scitest>=23.81 & scitest <. | race==5 & sstest>=34.65 & sstest <.

label define topS 1 "Top S" 0 "Not Top S"
label values topS topS

*generate within group top 1 percent
*using within race percentiles
gen top1=0
replace top1=1 if race==1 & engtest>=43.83 & engtest <. | race==1 & mathtest>=66.81 & mathtest <. | race==1 & scitest>=31.67 & scitest <. | race==1 & sstest>=41.3 & sstest <.

replace top1=1 if race==2 & engtest>=43.83 & engtest <. | race==2 & mathtest>=59.33 & mathtest <. | race==2 & scitest>=29.13 & scitest <. | race==2 & sstest>=39.43 & sstest <.

replace top1=1 if race==3 & engtest>=42.63 & engtest <. | race==3 & mathtest>=58.53 & mathtest <. | race==3 & scitest>=27.94 & scitest <. | race==3 & sstest>=38.03 & sstest <.

replace top1=1 if race==4 & engtest>=43.83 & engtest <. | race==4 & mathtest>=64.20 & mathtest <. | race==4 & scitest>=30.91 & scitest <. | race==4 & sstest>=41.3 & sstest <.

replace top1=1 if race==5 & engtest>=43.83 & engtest <. | race==5 & mathtest>=60.49 & mathtest <. | race==5 & scitest>=28.77 & scitest <. | race==5 & sstest>=37.16 & sstest <.

label define top1 1 "Top 1" 0 "Not Top 1"
label values top1 top1

*generate trichotomous variable denoting top 10, top5, top1
*these are discrete/non-overlapping categories
gen tops=0
replace tops=3 if top1==1
replace tops=2 if top5==1 & top1==0
replace tops=1 if top10==1 & top5==0 & top1==0
label define tops 0 "Not Tops" 1 "Top 10" 2 "Top5" 3 "Top1"
label values tops tops

******************************************************************************

*generate overall top10 top5 top1 using all test scores
*generate true top 10 percent
gen truetop10=0
replace truetop10=1 if engtest>=39.65 & engtest <.
replace truetop10=1 if mathtest>=54.2 & mathtest <.
replace truetop10=1 if scitest>=25.73 & scitest <.
replace truetop10=1 if sstest>=35.985 & sstest <.
label values truetop10 top10
* generate true top 5 percent
  gen truetop5=0
  replace truetop5=1 if engtest>=42.63 & engtest <.
  replace truetop5=1 if mathtest>=58.28 & mathtest <.
  replace truetop5=1 if scitest>=27.65 & scitest <.
  replace truetop5=1 if sstest>=37.85 & sstest <.
  label values truetop5 top5

* generate true top 1 percent
  gen truetopl=0
  replace truetopl=1 if engtest>=43.83 & engtest <.
  replace truetopl=1 if mathtest>=63.88 & mathtest <.
  replace truetopl=1 if scitest>=30.86 & scitest <.
  replace truetopl=1 if sstest>=41.26 & sstest <.
  label values truetopl topl

***********************************************************************
* create composite variables for parents discussion
* create variable that represents talking about hs plans with mom or dad
  gen pplanhs=1
  replace pplanhs=. if momplanhs==. & dadplanhs==.
  replace pplanhs=2 if momplanhs==2 | dadplanhs==2
  replace pplanhs=0 if momplanhs==0 & dadplanhs==0
  replace pplanhs=0 if momplanhs==. & dadplanhs==0 | momplanhs==0 &
  dadplanhs==.

* gen parent discussion as an index
  gen pdiscuss = pdisprgms + pdisacts + pdisclass + pplanhs

* gen variables for discussions with teachers or counselors
* make value 1 if spoke with either counselor or teacher
  gen schplanhs=0
  replace schplanhs=. if cplanhs==. & tplanhs==.
  replace schplanhs=1 if cplanhs!=0 | tplanhs!=0

  gen schhsprgm=0
  replace schhsprgm=. if chsprgm==. & thsprgm==.
  replace schhsprgm=1 if chsprgm==1 | thsprgm==1

  gen schjobs=0
  replace schjobs=. if cjobs==. & tjobs==.
  replace schjobs=1 if cjobs==1 | tjobs==1

  gen schwork=0
  replace schwork=. if cschwork==. & tschwork==.
  replace schwork=1 if cschwork==1 | tschwork==1

  gen schcourses=0
  replace schcourses=. if ccourses==. & tcourses==.
  replace schcourses=1 if ccourses==1 | tcourses==1

  gen schstudies=0
  replace schstudies=. if cstudies==. & tstudies==.
  replace schstudies=1 if cstudies==1 | tstudies==1
gen schprobs=0
replace schprobs=. if cprobs==. & tprobs==.
replace schprobs=1 if cprobs==1 | tprobs==1

gen talkteachers = schplanhs + schhsprgm + schjobs + schwork +
schcourses + schstudies + schprobs

***********************************************************************
*generate my sample subpopulation
gen mysample=0
replace mysample=1 if top10==1 & black==1 & f4pnlfl==1
replace mysample=1 if top10==1 & white==1 & f4pnlfl==1

***********************************************************************
*create local macro for all my variables
local allvars "nobachelors bachelors masters degree prestige black
white male female ses sesq parented locus selfconcept goodgrades
bynopaper bynобooks bynohw workhard askquestions newideas cheat copy
fhwtime fltvtime computer books urban suburban rural private
highminority highpoverty spirit rules fair disruptoften safe
disruptlearning misbehave pdiscuss pcheckhw pchores plimtv plimhang
peducexp talkteachers getalong goodteaching interested praiseeffort
putdown listen peersclasses peersstudy peersports peersgrades
peerspopular peersbfriend peersparty peerscollege
peersreligious peersvolunteer peershavejob bygifted honors everap
evergifted fleextracurric engtest mathtest scitest sttest mysample"

*create local macro for all my categorical variables
*local allcatvars "urbanicity highminority highpoverty parented
bygifted honors everap evergifted sesq peducexp nobachelors bachelors
masters degree race male"

*summarize variables
summ 'allvars' if mysample==1
summ 'allvars' if mysample==1 & black==1
summ 'allvars' if mysample==1 & white==1

***********************************************************************
drop if race==.

***********************************************************************
*Begin missing data analysis
*conduct missing data analysis on all my variables for my analytic
sample
misschk `allvars' if mysample==1, gen(miss)
ttest misnum if mysample==1, by(black) unequal
ttest misnum if mysample==1, by(male) unequal
ttest misnum if mysample==1, by(private) unequal
oneway misnum urbanicity if mysample==1, tab
oneway misnum tops if mysample==1, tab
oneway missnum sesq if mysample==1, tab
oneway missnum degree if mysample==1, tab

*create local macro for all my multiple imputation variables
local allmivars "computer books pdiscuss o.pcheckhw o.pchores o.plimtv 
 o.plimhang bytvtme talkteachers o.getalong o.spirit o.rules o.fair 
 o.disruptoften o.goodteaching o.interested o.praiseeffort o.putdown 
 o.listen o.safe o.disruptlearning o.misbehave honors bygifted 
o.bynopaper o.bynobooks o.bynohw private urban rural highminority 
 highpoverty locus selfconcept parented byhwtime engtest mathtest 
 scitest sstest workhard askquestions newideas o.cheat o.copy flhwtime 
 o.goodgrades fleextracurric fitvtime o.peersclasses o.peersstudy 
o.peerssports o.peersgrades o.peerspopular o.peersbgfriend o.peersparty o.peerscollege o.peersreligious o.peersvolunteer
 o.peershavejob everap evergifted ses o.peducexp bachelors masters 
degree prestige asian hispanic black natamer male mysample"

*Multiple imputation
ice `allmivars', pass(bachelors:degree==1\masters:degree==2)
sub(degree: bachelors masters) cmd(degree:ologit) saving(imputed45)
m(S) seed (3312009)

***********************************************************************

*create local macro for all my variables
local allvars "nobachelors bachelors masters degree prestige black 
white male female ses sesq parented locus selfconcept goodgrades 
bynopaper bynolooks bynolow workhard askquestions newideas cheat copy 
flhwtime fitvtime computer books urban suburban rural private 
highminority highpoverty spirit rules fair disruptoften safe 
disruptlearning misbehave pdiscuss pcheckhw pchores plimtv plimhang 
peducexp talkteachers getalong goodteaching interested praiseeffort 
putdown listen peersclasses peersstudy peersSports peersgrades 
peerspopular peersfinhs peersbgfriend peersparty peerscollege 
peersreligious peersvolunteer peershavejob bygifted honors everap 
evergifted fleextracurric engtest mathtest scitest sstest mysample"

*create local macro for all my categorical variables
*local allcatvars "urbanicity highminority highpoverty parented 
bygifted honors everap evergifted sesq peducexp nobachelors 
bachelors masters degree prestige race male"

*obtain descriptive stats of variables after imputation
mim: mean `allvars' if mysample==1

*describe stratum
svy: mean if mysample==1

*clear svy to remove stratum b/c there are two strata with only 1 unit
svyset, clear

*reset svy excluding strata, but include sampling weight and primary 
sampling unit
svyset psu [pweight=f4pnlwt]

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*Run all EFAs using PCF w/ Kaiser's rule, check scree plot, load >= .4

*find correlations for peers variables & generate factor scores
corr peers*

factor peers* if _mj!=0 & mysample==1, pcf
scre
rotate, norm blank(.4)
alpha peersclasses peersstudy peersgrades peersfinhs peerscollege
alpha peerspopular peersbgfriend peersparty peerssports
alpha peersvolunteer peersreligious peershavejob
alpha peersvolunteer peersreligious

*rerun removing peershavejob
factor peersclass peersstudy peerssports peersgrades peerspopular
peersfinhs peersbgfriend peersparty peerscollege peersreligious
peersvolunteer if _mj!=0 & mysample==1, pcf
scre
rotate, norm blank(.4)
predict pacademic psocial pengagement

*find correlations for teachers variables & generate factor scores
corr getalong goodteaching interested praiseeffort putdown listen if
mysample==1 & _mj!=0

factor getalong goodteaching interested praiseeffort putdown listen if
mysample==1 & _mj!=0, pcf
rotate, norm blank(.4)
scre
alpha getalong goodteaching interested praiseeffort putdown listen if
mysample==1 & _mj!=0
predict strelations

*find correlations for volition variables & generate factor scores
corr bynopaper bynобooks bynohw cheat copy flhwtime fltvtime

factor bynopaper bynобooks bynohw cheat copy flhwtime fltvtime if
mysample==1 & _mj!=0, pcf
scre
rotate, norm blank(.4)
alpha bynopaper bynобooks bynohw if mysample==1 & _mj!=0
alpha cheat copy if mysample==1 & _mj!=0
alpha flhwtime fltvtime if mysample==1 & _mj!=0
*remove flhwtime fltvtime
factor bynopaper bynobook bynhw cheat copy flhwtime fltvtime if
mysample==1 & _mj!=0, pcf
rotate, norm blank(.4)
predict prepared honesty

gen academico=workhard+askquestions+newideas

******************************************************************************

*find correlations for school climate variables & generate factor
scores
corr spirit rules fair disruptoften safe disruptlearning misbehave if
mysample==1 & _mj!=0
factor spirit rules fair disruptoften safe disruptlearning misbehave if
mysample==1 & _mj!=0, pcf
rotate, norm blank(.4)

alpha disruptoften disruptlearning misbehave if mysample==1 & _mj!=0
alpha spirit fair safe if mysample==1 & _mj!=0

factor disruptoften disruptlearning misbehave if mysample==1 & _mj!=0,
pcf
rotate, norm blank(.4)
predict badbehavior

******************************************************************************

*find correlations for school climate variables & generate factor
scores
corr pcheckhw pchores plimtv plimhang if mysample==1 & _mj!=0
factor pcheckhw pchores plimtv plimhang if mysample==1 & _mj!=0, pcf
alpha pcheckhw pchores plimtv plimhang if mysample==1 & _mj!=0

gen pstructure=pcheckhw + pchores + plimtv + plimhang
gen pstructure2=pstructure^2

******************************************************************************

*generate a variable representing at least a bachelors degree
gen bachormore=bachelors
replace bachormore=1 if masters==1
label define bachormore 0 "< Bachelors" 1 "Bachelors or More"
label values bachormore bachormore

******************************************************************************

*generate and label dummy variables for levels of potential
tab tops, gen(levels)
rename levels1 notintop
rename levels2 top9094
rename levels3 top9598
rename levels4 top99
label define notintop 0 ">= 90th Percentile" 1 "Not Top Percentile"
label define top9094 0 "Other" 1 "90th-94th Percentile"
label define top9598 0 "Other" 1 "95th-98th Percentile"
label define top99 0 "Other" 1 "99th Percentile"
label values notintop notintop
label values top9094 top9094
label values top9598 top9598
label values top99 top99

***********************************************************************
*create local macros for independent variables by DMGT category
local background "male ses parented"
local dmgt "male ses parented top9094 top99 locus selfconcept
goodgrades prepared honesty academico f1hwtime f1tvtime computer books
urban rural private highminority highpoverty badbehavior pdiscuss
pstructure pstructure2 peducexp talkteachers strelations pacademic
psocial pengagement peershavejob honors everap evergifted
f1extracurric"
local potential "top9094 top99"
local intrapersonal "locus selfconcept goodgrades prepared honesty
academico f1hwtime f1tvtime"
local environmental "computer books urban rural private highminority
highpoverty badbehavior pdiscuss pstructure pstructure2 peducexp
talkteachers strelations pacademic psocial pengagement peershavejob
honors everap evergifted flextracurric"
local milieu "computer books urban rural private highminority
highpoverty badbehavior"
local parents "pdiscuss pstructure pstructure2 peducexp"
local teachers "talkteachers strelations"
local peers "pacademic psocial pengagement peershavejob"
local provisions "honors everap evergifted flextracurric"
local tests "engtest mathtest scitest sstest"

***********************************************************************
*generate variable to denote how students were identified as having
academic potential
*by reading/language arts test, math test, science test, or social
studies test
gen ideng=0  
replace ideng=1 if race==1 & engtest>=40.86 & engtest <. & mysample==1 | race==2 & engtest>=35.14 & engtest <. & mysample==1 | race==3 & engtest>=34.8 & engtest <. & mysample==1 | race==4 & engtest>=40.17 & engtest <. & mysample==1 | race==5 & engtest>=33.98 & engtest <. & mysample==1

gen idmath=0  
replace idmath=1 if race==1 & mathtest>=59.25 & mathtest <. & mysample==1 | race==2 & mathtest>=45.57 & mathtest <. & mysample==1 | race==3 & mathtest>=44.19 & mathtest <. & mysample==1 | race==4 & mathtest>=54.93 & mathtest <. & mysample==1 | race==5 & mathtest>=43.04 & mathtest <. & mysample==1

gen idsci=0  
replace idsci=1 if race==1 & scitest>=27.09 & scitest <. & mysample==1 | race==2 & scitest>=22.28 & scitest <. & mysample==1 | race==3 & scitest>=21.74 & scitest <. & mysample==1 | race==4 & scitest>=26.27 & scitest <. & mysample==1 | race==5 & scitest>=21.78 & scitest <. & mysample==1

gen idss=0  
replace idss=1 if race==1 & sstest>=37.49 & sstest <. & mysample==1 | race==2 & sstest>=33.68 & sstest <. & mysample==1 | race==3 & sstest>=32.79 & sstest <. & mysample==1 | race==4 & sstest>=36.36 & sstest <. & mysample==1 | race==5 & sstest>=32.52 & sstest <. & mysample==1

gen howmanyid=ideng+idmath+idsci+idss

*************************************************************
*generate descriptive stats
mim: svy, subpop(mysample if black==1): mean black 'dmgt' suburban female ideng idmath idsci idss howmanyid *test
mim: svy, subpop(mysample if white==1): mean black 'dmgt' suburban female ideng idmath idsci idss howmanyid *test
mim: svy, subpop(mysample): mean black 'dmgt' suburban female ideng idmath idsci idss howmanyid *test

*how is academic potential identified?  
*are students identified in 1, 2, 3, or 4 areas according to identification criteria
mim: svy, subpop(mysample): proportion howmany
mim: svy, subpop(mysample): proportion howmany, over(black)

*************************************************************
*Research Question One*

*Are there differences in urbanicity by race?*
svy, subpop(mysample if _mj==0): tab urbanicity black

*Are there differences in SES by race?*
svy, subpop(mysample if _mj==0): tab black sesq
mim: svy, subpop(mysample): mean ses, over(black)
mim: lincom [ses]_subpop_l-[ses]Black, 1(99)

*Are there differences in test scores by race?*
mim: svy, subpop(mysample): mean engtest, over(black)
mim: lincom [engtest]_subpop_l-[engtest]Black, 1(99)
mim: svy, subpop(mysample): mean mathtest, over(black)
mim: lincom [mathtest]_subpop_l-[mathtest]Black, 1(99)
mim: svy, subpop(mysample): mean scitest, over(black)
mim: lincom [scitest]_subpop_l-[scitest]Black, 1(99)
mim: svy, subpop(mysample): mean sstest, over(black)
mim: lincom [sstest]_subpop_l-[sstest]Black, 1(99)

*Are there differences in locus of control by race?*
mim: svy, subpop(mysample): mean locus, over(black)
mim: lincom [locus]_subpop_l-[locus]Black, 1(99)

*Are there differences in self concept by race?*
mim: svy, subpop(mysample): mean selfconcept, over(black)
mim: lincom [selfconcept]_subpop_l-[selfconcept]Black, 1(99)

*Are there differences in television time by race?*
mim: svy, subpop(mysample): mean fltvtime, over(black)
mim: lincom [fltvtime]_subpop_l-[fltvtime]Black, 1(99)

*Are there differences in high poverty & minority school attendance by race?*
mim: svy, subpop(mysample): mean highminority, over(black)
mim: lincom [highminority]_subpop_l-[highminority]Black, 1(99)
mim: svy, subpop(mysample): mean highpoverty, over(black)
mim: lincom [highpoverty]_subpop_l-[highpoverty]Black, 1(99)

*Are there differences in talking to teachers by race?*
mim: svy, subpop(mysample): mean talkteachers, over(black)
mim: lincom [talkteachers]_subpop_l-[talkteachers]Black, 1(99)

*Are there differences in participation in special programs by race?*
mim: svy, subpop(mysample): mean everap, over(black)
mim: lincom [everap]_subpop_l-[everap]Black, 1(99)
mim: svy, subpop(mysample): mean honors, over(black)
mim: lincom [honors]_subpop_l-[honors]Black, 1(99)
mim: svy, subpop(mysample): mean evergifted, over(black)
mim: lincom [evergifted]_subpop_l-[evergifted]Black, 1(99)
*are there differences in level of preparedness by race?
mim: svy, subpop(mysample): mean prepared, over(black)
mim: lincom [prepared]_subpop_l-[prepared]Black, 1(99)

***********************************************************************

*RESEARCH QUESTION TWO*

*examine prestige scores by level of academic potential?
mim: svy, subpop(mysample): mean prestige, over(tops)
mim: lincom [prestige]_subpop_l-[prestige]Top5
mim: lincom [prestige]_subpop_l-[prestige]Top1

mim: svy, subpop(mysample if top5==1): mean prestige
mim: svy, subpop(mysample): mean prestige

*examine prestige scores by race
mim: svy, subpop(mysample): mean prestige, over(black)
mim: lincom [prestige]_subpop_l-[prestige]Black

*are there differences between blacks and whites in the top5?
mim: svy, subpop(mysample if top5==1): mean prestige, over(black)
mim: lincom [prestige]_subpop_l-[prestige]Black

*are there differences between blacks and whites in the top1?
mim: svy, subpop(mysample if top1==1): mean prestige, over(black)
mim: lincom [prestige]_subpop_l-[prestige]Black

*are there within race differences by level of academic potential?
mim: svy, subpop(mysample if black==1): mean prestige, over(tops)
mim: lincom [prestige]_subpop_l-[prestige]Top1

mim: svy, subpop(mysample if white==1): mean prestige, over(tops)
mim: lincom [prestige]_subpop_l-[prestige]Top1

*examine degree attainment by race and level of academic potential
mim: svy, subpop(mysample): proportion bachormore, over(black)
mim: lincom [_prop_2]_subpop_l-[_prop_2]Black

mim: svy, subpop(mysample if black==1): proportion bachormore, over(tops)
mim: lincom [_prop_2]_subpop_l-[_prop_2]Top5
mim: lincom [_prop_2]Top5-[_prop_2]Top1

mim: svy, subpop(mysample if white==1): proportion bachormore, over(tops)
mim: lincom [_prop_2]_subpop_l-[_prop_2]Top5
mim: lincom [_prop_2]Top5-[_prop_2]Top1
mim: lincom [_prop_2]_subpop_l-[_prop_2]Top1

mim: svy, subpop(mysample if black==1): proportion bachormore, over(sesq)

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mim: svy, subpop(mysample if white==1): proportion bachormore, over(sesq)

***********************************************************************
*RESEARCH QUESTION THREE*
*white sample*
*BLOCK 1*
mim: svy, subpop(mysample if white==1): logistic bachormore 'background'
mim: testparm 'background'
mim: testparm parented

*BLOCK 2*
mim: svy, subpop(mysample if white==1): logistic bachormore 'background' 'potential'
mim: testparm 'background' 'potential'
mim: testparm parented top9094 top99

*BLOCK 3*
mim: svy, subpop(mysample if white==1): logistic bachormore 'background' 'potential' 'intrapersonal'
mim: testparm 'background' 'potential' 'intrapersonal'
mim: testparm parented 'potential' locus selfconcept honesty academico fltvtime

*BLOCK 4*
mim: svy, subpop(mysample if white==1): logistic bachormore 'dmgt'
mim: testparm 'dmgt'
mim: testparm parented top9094 top99 locus selfconcept honesty academico flhwtime fltvtime computer books urban rural highminority highpoverty badbehavior pdiscuss pstructure pstructure2 peducexp talkteachers strelations psocial pengagement honors evergifted

*FINAL MODEL*
mim: svy, subpop(mysample if white==1): logistic bachormore male ses goodgrades prepared private pacademic peershavejob everap flextracurric
mim: testparm male ses goodgrades prepared private pacademic peershavejob everap flextracurric
mim: testparm private
mim: svy, subpop(mysample if white==1): logistic bachormore male ses goodgrades prepared pacademic peershavejob everap flextracurric

*black sample*
*BLOCK 1*
mim: svy, subpop(mysample if black==1): logistic bachormore 'background'
mim: testparm 'background'
mim: testparm male parented
*BLOCK 2
mim: svy, subpop(mysample if black==1): logistic bachormore
  `background' `potential'
mim: testparm `background' `potential'
mim: testparm male parented `potential'

*BLOCK 3
mim: svy, subpop(mysample if black==1): logistic bachormore
  `background' `potential' `intrapersonal'
mim: testparm `background' `potential' `intrapersonal'
mim: testparm male parented `potential' selfconcept goodgrades prepared
  honesty academico fitvtime

*BLOCK 4
mim: svy, subpop(mysample if black==1): logistic bachormore `dmgt'
mim: testparm `dmgt'
mim: testparm male ses parented `potential' locus selfconcept prepared
  honesty academico books rural highminority highpoverty badbehavior
  pdiscuss pstructure pstructure2 strelations pacademic pstructure
  pengagement peershavejob honors everap flextracurric

*FINAL MODEL
mim: svy, subpop(mysample if black==1): logistic bachormore male ses
  goodgrades prepared private pacademic peershavejob everap flextracurric
mim: testparm male ses goodgrades prepared private pacademic
  peershavejob everap flextracurric
mim: testparm private
mim: svy, subpop(mysample if black==1): logistic bachormore male ses
  goodgrades prepared pacademic peershavejob everap flextracurric

*Advanced degree attainment white sample
*BLOCK 1
mim: svy, subpop(mysample if white==1): ologit bachormore `background'
mim: testparm `background'
mim: testparm parented

*BLOCK 2
mim: svy, subpop(mysample if white==1): logistic bachormore
  `background' `potential'
mim: testparm `background' `potential'
mim: testparm parented top9094 top99

*BLOCK 3
mim: svy, subpop(mysample if white==1): logistic bachormore
  `background' `potential' `intrapersonal'
mim: testparm `background' `potential' `intrapersonal'
mim: testparm parented `potential' locus selfconcept honesty academico
  fitvtime

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*BLOCK 4
mim: svy, subpop(mysample if white==1): logistic bachormore `dmgt'
mim: testparm `dmgt'
mim: testparm parented top9094 top99 locus selfconcept honesty academico flhwtime fltvtime computer books urban rural highminority highpoverty badbehavior pdiscuss pstructure pstructure2 peducexp talkteachers strelations psocial pengagement honors evergifted

*FINAL MODEL
mim: svy, subpop(mysample if white==1): logistic bachormore male ses goodgrades prepared private pacademic peershavejob everap flextracurric
mim: testparm male ses goodgrades prepared private pacademic peershavejob everap flextracurric
mim: testparm private
mim: svy, subpop(mysample if white==1): logistic bachormore male ses goodgrades prepared pacademic peershavejob everap flextracurric

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*RESEARCH QUESTION FOUR*

*white only sample

*BLOCK 1
mim: svy, subpop(mysample if white==1): regress prestige `background'
mim: testparm `background'
mim: testparm male parented

*BLOCK 2
mim: svy, subpop(mysample if white==1): regress prestige `background' `potential'
mim: testparm `background' `potential'
mim: testparm parented `potential'

*BLOCK 3
mim: svy, subpop(mysample if white==1): regress prestige `background' `potential' `intrapersonal'
mim: testparm `background' `potential' `intrapersonal'
mim: testparm male parented `potential' locus selfconcept honesty academico flhwtime fltvtime

*BLOCK 4
mim: svy, subpop(mysample if white==1): logistic bachormore `dmgt'
mim: testparm `dmgt'
mim: testparm parented top9094 top99 locus selfconcept honesty academico flhwtime fltvtime computer books urban rural highminority highpoverty badbehavior pdiscuss pstructure pstructure2 peducexp talkteachers strelations psocial pengagement honors evergifted

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*FINAL MODEL
mim: svy, subpop(mysample if white==1): logistic bachormore male ses
goodgrades prepared private pacademic peershavejob everap flextracurric
mim: testparm male ses goodgrades prepared private pacademic
peershavejob everap flextracurric
mim: testparm private
mim: svy, subpop(mysample if white==1): logistic bachormore male ses
goodgrades prepared pacademic peershavejob everap flextracurric

*black only sample

*BLOCK 1
mim: svy, subpop(mysample if black==1): regress prestige `background'
mim: testparm `background'
mim: testparm ses parented

*BLOCK 2
mim: svy, subpop(mysample if black==1): regress prestige `background'
`potential'
mim: testparm `background` `potential'
mim: testparm ses parented `potential'

*BLOCK 3
mim: svy, subpop(mysample if black==1): regress prestige `background'
`potential` `intrapersonal'
mim: testparm `background` `potential` `intrapersonal'
mim: testparm male parented `potential` locus selfconcept honesty
academico flhwtme fltvtime

*BLOCK 4
mim: svy, subpop(mysample if black==1): regress prestige `dmgt'
mim: testparm `dmgt'
mim: testparm parented top9094 top99 locus selfconcept honesty
academico flhwtme fltvtime computer books urban rural highminority
highpoverty badbehavior pdiscuss pstructure pstructure2 peducexp
talkteachers strelations psocial pengagement honors evergifted

*FINAL MODEL
mim: svy, subpop(mysample if black==1): logistic bachormore male ses
goodgrades prepared private pacademic peershavejob everap flextracurric
mim: testparm male ses goodgrades prepared private pacademic
peershavejob everap flextracurric
mim: testparm private
mim: svy, subpop(mysample if black==1): logistic bachormore male ses
goodgrades prepared pacademic peershavejob everap flextracurric

***********************************************************************
*CONCLUSIONS

*What percentage of my sample participated in any provision?

gen anyprgm=.
replace anyprgm=1 if honors==1 | everap==1 | evergifted==1
replace anyprgm=0 if honors==0 & everap==0 & evergifted==0
mim: svy, subpop(mysample): mean anyprgm, over(black)

*overall measures of success in my sample
mim: svy, subpop(mysample): proportion bachormore
mim: svy, subpop(mysample): proportion degree
mim: svy, subpop(mysample): mean prestige

***********************************************************************
*CORRECT FOR ERROR IN PARENTAL EDUCATION EXPECTATIONS CODING

recode peducexp (2=1), gen (peducexp2)

*are there differences in parents' educ expectations by race?
mim: svy, subpop(mysample): mean peducexp2, over(black)
mim: lincom [peducexp2]_subpop_l-[peducexp2]Black, 1(99)

*reset dmgt local macro to include new parental expectations
local dmgt "male ses parented top9094 top99 locus selfconcept
goodgrades prepared honesty academico flhertime fltvtime computer books
urban rural private highminority highpoverty badbehavior pdiscuss
pstructure pstructure2 peducexp2 talkteachers strelations pacademic
psocial pengagement peershavejob honors everap evergifted
flextracurric"

*rerun Model 4 of Research Question #3 for both black and white students

*white sample
mim: svy, subpop(mysample if white==1): logistic bachormore `dmgt'
mim: testparm `dmgt'
mim: testparm parented top9094 top99 locus selfconcept honesty
academico flhertime fltvtime computer books urban rural highminority
highpoverty badbehavior pdiscuss pstructure pstructure2 peducexp2
talkteachers strelations psocial pengagement honors evergifted

*black sample
mim: svy, subpop(mysample if black==1): logistic bachormore `dmgt'
mim: testparm `dmgt'
mim: testparm male ses parented 'potential' locus selfconcept prepared
honesty academico books rural highminority highpoverty badbehavior
pdiscuss pstructure pstructure2 peducexp2 strelations pacademic psocial
pengagement peershavejob honors everap flextracurric

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*rerun Model 4 of Research Question #4 for both black and white students

*white sample
  mim: svy, subpop(mysample if white==1): regress prestige `dmgt'
mim: testparm `dmgt'

*black sample
  mim: svy, subpop(mysample if black==1): regress prestige `dmgt'
mim: testparm `dmgt'

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*RUN ADDITIONAL ANALYSES ON OCCUPATIONAL PRESTIGE FROM RESEARCH QUESTION #2

  gen presgrps=.
  replace presgrps=1 if prestige>=-5 & prestige<40
  replace presgrps=2 if prestige>=40 & prestige<57
  replace presgrps=3 if prestige>=57 & prestige<90

  label define presgrps 1 "Low" 2 "Medium" 3 "High"
  label values presgrps presgrps

  *examine occupational prestige by race and level of academic potential
  mim: svy, subpop(mysample): proportion presgrps, over(black)
mim: lincom [Low]_subpop_l-[Low]Black
mim: lincom [Medium]_subpop_l-[Medium]Black
mim: lincom [High]_subpop_l-[High]Black

mim: svy, subpop(mysample): proportion presgrps, over(tops)
mim: lincom [Low]_subpop_l-[Low]Top5
mim: lincom [Medium]_subpop_l-[Medium]Top5
mim: lincom [High]_subpop_l-[High]Top5

mim: svy, subpop(mysample if white==1): proportion presgrps, over(tops)
mim: lincom [Low]_subpop_l-[Low]Top1
mim: lincom [Medium]Top5-[Medium]Top1
mim: lincom [High]_subpop_l-[High]Top5

  *Are there differences in prestige groupings between the general pop and my sample?
mim: svy: proportion presgrps, over (mysample)
mim: lincom [Low]0-[Low]1
mim: lincom [Medium]0-[Medium]1
mim: lincom [High]0-[High]1
VITA

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