ACADEMIC ADJUSTMENT OF GIFTED FIFTH, SIXTH, AND SEVENTH GRADE CHILDREN PLACED IN ACCELERATED MATH COURSES

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CHAPTER I

INTRODUCTION

"A society that wastes female brilliance has made it the norm for gifted women to lead an average life and gifted women have largely adapted to that norm."

---Barbara Kerr

In October of 2004, a meta-analysis of research on acceleration practices reported that gifted children who are exposed to accelerated academic opportunities are more likely to achieve academic success; yet, there exists general and pervasive hesitation to accelerate students who are gifted (Colangelo, Assouline, & Gross, 2004). District personnel and parents fear that rapid acceleration might have harmful effects on the social and emotional development of their students and children (Elkind, 2001; Gagné & Gagnier, 2004; Lynch, 1996; Reis, 2002; Swiatek, 2002). Contrary to this fear, studies of children with exceptional gifts and talents who have participated in accelerated programs suffer few negative psychological effects from their accelerated experience (Brody 2004; Colangelo, et al.; Rimm 2002; Roedell, 1984; Rogers, 2004). According to analysis of existing acceleration studies (Lohman & Marron, 2008), few studies include comparisons with non-accelerated gifted children identified according to the same criterion. In spite of positive achievement reports and little evidence of maladaptive psychological effects, any

psychological advantages of acceleration for gifted children is yet unclear (Gross, 2003; Neihart, 2007).

Studying the influence of participation in accelerated courses on academic adjustment and overall well-being with special interest in gifted females and their math placement is needed. Many in the field of gifted education believe gifted children whose academic needs are not met will be more likely to encounter academic problems in areas such as attitude toward school, attitude toward teachers and classes, motivation and self-regulation, self-perception, and goal values (Colangelo, et al., 2004; Cross, 2002; McCoach & Siegle, 2003). When the regular classroom curriculum provides too little challenge, gifted learners may face psychological problems (Neihart, Reis, Robinson, & Moon, 2002; Reis & McCoach, 2002; Reis & Renzulli, 2004; Rimm 2002; Swiatek, 1995). Possible problems related to autonomous behaviors, environmental mastery, relationships with others, self-acceptance, and sense of directedness may affect overall psychological well-being.

The purpose of this study was to examine the influence of participation in accelerated courses on academic adjustment and overall well-being with special interest in gifted females and their math placement.

Acceleration

From early studies in acceleration (Hollingworth, 1926; Terman, 1916) to current acceleration research synthesis (Colangelo, et al., 2004), the academic and psychological adjustment of gifted children has been a primary concern. Because of years of research, it is commonly accepted that intellectually gifted children are potentially capable of

working well above their age or grade level. Acceleration is the educational intervention that allows gifted children to fulfill their intellectual potential. Conceptually, acceleration is defined as an "educational intervention that moves students through an educational program at a faster than usual rate or younger than typical age" (Colangelo et al., p. 5), addresses best practices to accommodate gifted children's intellectual capabilities and achieve academic success (Robinson, Shore, & Enerson, 2007).

Over the last fifty years, studies in gifted education concluded that curricular interventions such as ability grouping and academic acceleration provide academically and emotionally rich modifications to traditional grade level curriculum necessary for academic adjustment. In many instances, acceleration and ability grouping have been viewed as separate academic interventions, but both strategies are actually interconnected. Grouping children together who are intellectually prepared for an advanced curriculum provides a means for accelerated learning to occur (Brody, 2004). Although grouping by ability is essential for gifted learners, it is not enough. Scholars in the field of gifted education argue that grouping according to readiness is essential; however, only small effects on achievement will occur if not accompanied by appropriate differentiated curricula (Kulik & Kulik, 1997; Rogers, 2002a, 2004; Slavin, 1987).

Grouping for accelerated learning is exemplified with mathematically gifted children. Early twentieth century psychologists (Terman, 1916; Hollingworth, 1926) cautioned educators to design accelerated interventions that grouped according to intellectual ability. Longitudinal studies with mathematically gifted children present a strong case for grouping by ability and enlarging the scope of accelerated opportunities (Benbow, Perkins, & Stanley, 1983; Brody & Benbow, 1987; Kolitch & Brody, 1992;

Swiatek & Benbow, 1991). Educators support the National Council of Teachers of Mathematics (NCTM, 1980, 1989) call over twenty years ago to identify and nurture outstanding math talent or giftedness. Further, educators recognize the inadequacy of current identification practices used to identify underrepresented potential in most school districts.

> The student most neglected, in terms of realizing full potential, is the gifted student of mathematics. Outstanding mathematical ability is a precious societal resource, sorely needed to maintain leadership in a technological world (p. 18).

According to NCTM, students with mathematical promise exhibit the following characteristics: *ability* or aptitude for mathematical reasoning, *motivation* necessary to succeed, *belief* in one's ability to succeed, *experience* with the subject content, and *opportunity* to participate in advanced level courses (Sheffield, 2003). However, in order to uncover outstanding mathematics talent characteristics, mathematical potential must be developed in all students to reveal those students with mathematical talent (Sheffield, Bennet, Berriozabal, DeArmond, & Wertheimer, 1995).

Academic Adjustment

As defined by Reis and McCoach (2002), gifted children who achieve academically are those whose ability and actual level of performance are consistent with their intellectual capacity. Gifted achievers exhibit characteristics of positive academic adjustment in areas such as attitude toward school, attitude toward teachers and classes, motivation and self-regulation, self-perception, and goal values. Current research has approached distinguishing academic achievers from underachievers by investigating five

academic adjustment factors including *student perceptions*, *attitudes*, *motivation* and *self-regulation* and *goal valuation* (Mathews & McBee, 2007; McCoach & Siegle, 2003) reasoning that underachievers exhibit characteristics on a negative continuum of those adjustment factors (Dowdall & Colangelo, 1982; Reis & McCoach, 2000).

Students thrive in settings where they have opportunities to communicate with students who are at the same intellectual level. Academic achievement is more likely to occur when gifted children are provided accelerated experiences which are challenging and rigorous, and when gifted children are given opportunities to interact with intellectual peers as well as their chronological age peers (Colangelo, et al., 2004; Rogers, 2007). Research in gifted education has long advocated for enriched and differentiated curriculum (Hollingworth, 1942; Kaplan, 1986; Passow, 1962; Rogers, 2002a; Tomlinson, 1999; VanTassel-Baska, 1986) needed to provide academic rigor and as a means for gifted children to interact with their intellectual peers. When gifted achievers are exposed to accelerated experiences such as subject-based and grade-based classroom opportunities that increase challenge, depth and complexity (Gross, 2006; Rogers, 2004; VanTassel-Baska, Quek, & Feng, 2007) and when they are allowed to interact with intellectual peers, gifted children are more likely to fulfill their intellectual and academic potential (Rogers, 2007; VanTassel-Baska, 2005). Conversely, highly gifted students who are not given acceleration opportunities may get discouraged with their current class placement and disengage with the regular curriculum (Gross, 2003) and may experience periods of depression (Reis & Renzulli, 2004). Thus, we need to study the effects of acceleration on indicators of academic adjustment for students who are participating in accelerated math experiences.

Psychological Adjustment

Aspects of psychological well-being may affect whether gifted children experience academic adjustment include autonomy, environmental mastery, personal growth, relationship with others, purpose in life, and self- acceptance. Decades of research records educational psychologists and educators interest in how factors such as dimensions of well-being affect giftedness (Brendt, Kaiser, & Van Aalst, 1982; Freeman, 1983; Hollingworth, 1942; Parker & Mills, 1996; Ramaseshan, 1957; Reynolds & Bradley, 1983; Strang, 1950; Watson, 1965). Neihart (1999) suggests that psychological well-being is dependent on the type of giftedness, appropriate educational fit, and personality characteristics of gifted children. From an early age, gifted children are bombarded with messages that influence their perceptions of achievement, intellectual ability, peer relationships, and self-concept. For some gifted children, their elementary and middle school experiences undermine their self- confidence and perception of their intellectual ability (Reis 2002). How best to circumvent psychological issues that might arise from academic acceleration strategies are frequently debated by both educational psychologists and gifted educators (Cross, 1997, 2001; Gentry, & Kettle, 1998; Lynch, 1996; Niehart, 1999; Reis 2002; Tomchin, Callahan, Sowa, & Play, 1996; Versteynen, 2004). The debate over the appropriateness of acceleration suggests that little is known about the relationship of psychological well-being and academic adjustment in gifted children who are accelerated.

As educators debate the appropriateness of accelerated curricula and adaptive interventions for high ability learners, our classrooms house a population of gifted students who lead academically invisible lives. Gifted girls are among the most vulnerable population in our educational system and are at risk of not realizing their academic potential and are further susceptible to a range social emotional problems if their intellectual needs are not addressed (Reis, 2002; Smutny, 1999). Evidence of intellectual vulnerability is evident in the level of mathematics courses gifted girls are willing to choose. In spite of tremendous gains in promoting and nurturing the development of mathematically gifted students, mathematically gifted girls are still at risk of not fulfilling their mathematical potential (Campbell, 1996; Kitano, 2007; Nokelainen, Tirri, & Campbell, 2004; Reis, 2002; Sheffield, 2003). At some point during their academic careers, gifted girls who potentially have a bright academic future lose confidence in their intellectual ability over time or choose to downplay their gifts to appear more acceptable according to peer norms (Cross, 1997; 2002; Reis, 2002; Rimm, 2002). Findings from previous research warrants further study into whether gifted girls who are currently enrolled in accelerated courses experience greater levels academic adjustment and psychological well-being.

This study was guided by substantial evidence that accelerated gifted children experience positive academic outcomes and are no more at risk for psychological difficulties than their non-accelerated gifted classmates. Some theorists ascribe academic adjustment and well-being to the absence of underachieving indicators or characteristics (McCoach & Siegle, 2003; Matthews & McBee, 2007). Although much is known about

acceleration's contribution to achievement and academic adjustment in gifted children, whether accelerated gifted children and gifted girls specifically experience higher levels of overall well-being or have a psychological advantage over their non-accelerated gifted peers is unclear (Gross, 2003; Lohman & Marron, 2008; Neihart, 2007).

Statement of the Problem

Current research on acceleration has examined interventions to eliminate factors related to underachievement among gifted students. Studies of factors attributed to underachievement provide valuable information for addressing maladaptive academic adjustment (McCoach & Siegle 2003; Matthews & McBee, 2007), but provide little information regarding positive indicators of academic adjustment and overall well-being. Positive indicators of academic adjustment for this study include 1) attitudes toward school, 2) attitudes towards teachers and classes, 3) motivation and self-regulation, 4) academic self-perception, and 5) goal valuation and positive indicators of overall well-being include 6) aspects of autonomy, 7) environmental mastery, 8) personal growth, 9) relationships with others, 10) self-acceptance, and 11) purpose in life. Although acceleration practices reveal that gifted children who are exposed to accelerated academic opportunities are more likely to achieve academic success and suffer few negative psychological effects from their accelerated experience, general and pervasive hesitation to accelerate gifted children exists (Colangelo, et al., 2004; Rimm 2002; Roedell, 1984; Rogers, 2004). The research does not include evidence of whether there are psychological advantages for gifted children who are in accelerated classes. Therefore, this study addressed the relationship of academic adjustment and psychological well-being among

gifted children in an accelerated academic program. An investigation of the effects of acceleration on academic adjustment is needed.

Conceptual Framework

Academic and psychological well-being associated with giftedness has intrigued educational psychologists for years (Brendt, et al., 1982; Freeman, 1983; Hollingworth, 1942; Neihart, et al., 2002; Ramaseshan, 1957; Reynolds & Bradley, 1983; Strang, 1950; Watson, 1965). Psychologists suggest that aspects of psychological well-being may affect whether gifted children experience Academic Adjustment (Cross, 2001; Neihart,1999; Versteynen, 2004). When gifted children's academic needs are not met, they are more likely to encounter social and emotional problems (Neihart, et al., 2002; Swiatek, 1995; Rimm, 2002). It is my contention that gifted children who are participating in accelerated math classes are more likely to experience greater social and emotional satisfaction from their accelerated placement, therefore certain psychological advantages or positive social emotional effects will be observed.

Academic adjustment and psychological well-being were the conceptual frameworks used to guide this study. Both frameworks contain constructs that are conceptualized as characteristics associated with positive attitudes toward school and positive psychological adjustment. McCoach and Siegle (2003) identified five factors associated with motivation and attitude towards school: 1) academic self- perception, 2) attitude towards school, 3) attitude towards teachers and classes, 4) motivation and self-regulation, and 5) goal valuation that differentiate gifted achievers from underachievers which are particularly relevant to academic adjustment. The model originally designed to

provide a new way of approaching academic interventions to change patterns of underachievement, also offers insight into positive academic functioning. These factors, conceptualized as the components of positive achievement attitudes can be thought of in terms of academic adjustment and will provide the framework for this study.

My study considered positive psychological well-being (Ryff, 1989) to address the affective needs of gifted children relevant to psychological adjustment. The six domains of psychological well-being include: 1) autonomy, 2) environmental mastery, 3) self-acceptance, 4) positive relations with others, 5) personal growth, and 6) purpose of life. Previously, research on affective needs of gifted approached psychological well-being from a deficit or negative psychological framework (Jin & Moon, 2006) for understanding overall psychological well-being.

McCoach and Siegle (2003) present an operational definition for gifted achievers and underachievers. Gifted children who achieve academically are those whose ability and actual level of performance are consistent with their intellectual capacity. It is commonly accepted that gifted children are potentially capable of working well above their age or grade level (Colangelo, et al., 2004). Conceptually, academic underachievement is identified as an inconsistency between a student's higher level of ability and their actual level of performance (Reis & McCoach, 2000).

Five Distinguishing Adjustment Factors

According to McCoach and Siegle (2003), academic adjustment consists of five distinct factors. *Academic self-perceptions* are students' beliefs about their academic skills and students' *academic self-perceptions* influence classes they choose and types of

activities they participate in. Self-perceptions effect how much students will challenge themselves in those classes or activities and their persistence once they are involved in them. Students *attitudes about teachers and classes* includes the level of interest and engagement a student has with a class, affect towards teachers, and an attitude positively related to achievement. Interest in coursework may be identified by the level of motivation and the self-regulatory strategies students employ. *Attitude towards school* factor describes a student's self-reported interest and affect towards school. The fourth factor, *motivation and self-regulation* which McCoach and Siegle suggest holds the key to achievement, is self-reported effort and use of self-regulatory strategies such as task commitment, persistence, work ethic, and self-control. The final factor, *goal valuation* states that goals and achievement values are instrumental to self-regulation and motivation. Goal values influence how students approach, value, and expend effort on a task. Student with decisive career goals may place a higher value on tasks that promote achievement. The influence of acceleration on academic adjustment was the primary focus of this study.

Model of Psychological Well-Being

Ryff (1989) proposed a multi-dimensional model of well-being, as a means to understand psychological adjustment. From its inception, the field of psychology has been extremely interested in levels of psychological well-being, but rarely studied the causes and consequences of positive functioning; rather focusing on human unhappiness and suffering (Diener, 1984, 2000; Myers, 2000). Three main areas of research that guide what is understood about psychological well-being originate from the perspectives of

developmental and clinical psychology, as well as the mental health literature (Ryff & Keyes, 1995). Ryff's Psychological Well-being model hypothesized that by integrating many of the same features of positive psychological functioning that are shared by the three perspectives; a new theoretical frame would optimize their shared characteristics and serve as the foundation for a multi-dimensional model of positive functioning (Jin & Moon, 2006). Integrating the similar features of the three perspectives, Ryff developed core dimensions for an alternate theory of psychological well-being. The dimensions of psychological well-being have previously been utilized in research conducted on the affective needs of gifted children from a deficit or negative psychological framework for understanding psychological well-being (Jin & Moon). Interest in the relationship of psychological well-being and academic adjustment in accelerated gifted children was investigated in the present study.

Statement of the Purpose

The purpose of this study was to explore the relationship of variables of academic adjustment (attitudes toward school, attitudes towards teachers and classes, motivation and self-regulation, academic self-perception, and goal motivation) and overall psychological well-being of gifted children in regular and accelerated math classes. Further, this study explored the influence of math placement and gender on academic adjustment. In an educational climate that acknowledges acceleration but implements acceleration cautiously, nurturing and balancing academic success with psychological well-being of gifted learners is of utmost importance.

Research Questions

The research questions driving this study include:

1 (a) What is the intra-relationship of the variables for Academic Adjustment (attitudes toward school, attitudes towards teachers and classes, motivation and self-regulation, academic self-perception, and goal valuation) and Psychological Adjustment (autonomous behaviors, managing their environment, relationships with others, self-acceptance, and purpose in life)?

1 (b) How are overall variables for Academic Adjustment related to Psychological Adjustment?

2 What is the influence of acceleration and gender on academic adjustment?

Significance of the Study

This study establishes Academic Adjustment as a social well-being construct that supports positive social effects for gifted children who are participating in accelerated math classes.

Definition of Terms

For the purpose of this study, key terms are defined as:

Ability grouping: A practice that places children of like abilities together for instruction in small groups or inclusive classrooms based on a pre-assessment of their levels of readiness or ability in a subject area (Kulik & Kulik, 1992).

Academic Adjustment: The presence of positive academic indicators relating to attitudes toward school, teachers and classes, motivation, self-perception, and goal motivation. The School Attitude Assessment Survey -Revised (McCoach & Siegle, 2003) was used to assess Academic Adjustment.

Acceleration: An educational intervention that moves students through an educational program at a faster than usual rate or younger than typical age (Colangelo, et al., 2004).

Accelerated math students: Includes fifth grade students enrolled in Pre-algebra or Algebra, sixth grade students enrolled in Pre-algebra or Algebra, and seventh grades students enrolled in Algebra, Geometry, or Algebra 2.

Gifted achievers: Gifted children who achieve academically are those whose ability and actual level of performance are consistent with their intellectual capacity (Reis & McCoach, 2000).

Gifted underachievers: Underachievers who exhibit superior scores on measures of expected achievement (i.e. standardized achievement test scores or cognitive or intellectual ability assessments) but whose level of performance is not consistent with their intellectual abilities (Reis & McCoach, 2000).

Intellectually gifted, gifted learner, high ability learner: Children identified at the preschool, elementary, and secondary level as having demonstrated potential abilities of high performance capability and needing differentiated or accelerated education or services. For the purpose of this study the definition, "demonstrated abilities of high performance capability" means those identified students who score in the top three

percent (3%) on any national standardized test of intellectual ability (Oklahoma State Department of Education, 2009).

Mathematically talented or promising: Those who have the potential to become the leaders and problem solvers of the future described as a function of ability, motivation, belief, and experience or opportunity (Sheffield, 2003).

Psychological Adjustment: Presence of positive aspects of psychological well-being (Ryff, 1989), including autonomy, environmental mastery, self-acceptance, positive relations with others, personal growth, and purpose of life. The Scales of Psychological Well-Being (Ryff) was used to assess Psychological Adjustment.

Psychological well-being: Relates to the type of giftedness, the educational fit and the child's personal characteristics such as self-perceptions, temperament and life circumstances (Neihart, 1999) and the balance of positive and negative affect and life satisfaction (Ryff, 1989).

Regular math students: Fifth and sixth grade gifted students enrolled in an on grade level math class (EDM - Everday Math), and gifted seventh grade student enrolled in pre-algebra.

Chapter Organization

The remainder of the dissertation is organized according to the following outline:

Chapter II – The second chapter provides an overview of relevant literature on acceleration issues. A review of literature addresses the rationale for providing accelerated services, prevalent views of adjustment that influence how educators view

gifted children and their willingness to provide accelerated gifted service, and describes the issues related to gifted girls academic and psychological development.

Chapter III – The third chapter presents the methodology and design utilized to conduct this study, providing a description of the participants and a detailed explanation of the instruments utilized. The final section included a summary of data collection procedures and the statistical methods used to analyze the data.

Chapter IV – The fourth chapter consists of results of statistical analyses to answer the research questions. Instrument reliability is addressed and descriptive statistics are presented. The final section of the chapter is organized to answer the research questions.

Chapter V –The final chapter provides preliminary conclusions and a summary of the study. Contributions to the field and implications for theory and practice as well as future recommendations are addressed.

CHAPTER II

REVIEW OF RELEVANT LITERATURE

The purpose of this study was to examine the relationship between variables of academic adjustment (academic self-perceptions, attitudes towards teachers and classes, attitudes toward school, goal values, and motivation/self-regulation) and aspects of psychological well-being (autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance) and the effects of gender and acceleration on academic adjustment. Because of the historical context and emerging views of acceleration in gifted programming, this chapter begins with a review of relevant acceleration issues, the unique academic needs of gifted children that provide a rationale for acceleration, and a review of the importance of acceleration strategies as an academic intervention. Relevant to this study is a review of acceleration in mathematics. This section is followed by a description of psychological issues influencing gifted children's perceptions of academic adjustment and psychological well-being. The final section addresses educational issues of gifted girls.

A Review of Relevant Acceleration Issues

The history of acceleration provides a context to understand the theoretical questions and conceptual framework of current acceleration research. Accelerating intellectually advanced students is rooted in the American education system (Daurio, 1979). Although perceptions and stereotypical beliefs promoted in the 1890's by early writings of Lombroso (1895), Nisbet (1895), Witty and Lehman (1929) portrayed gifted individuals as studious spectacled, pasty skinned, introverted geniuses, who were emotionally maladjusted (Brody & Benbow, 1986), pioneering educational psychologists and educators presented a different picture.

Before pioneers in gifted education began to study how intellectually gifted children's academic needs differed from other populations of children, evidence of acceleration was documented in the St. Louis school system in 1868 when academically advanced children were allowed to skip grades and grouped according to their intellectual ability (Rogers, 2004). However, it was not until the turn of the century that psychologist began to look at intelligence and giftedness with intensity. Early intelligence studies of the 1900's (Hollingworth, 1926, 1942; Terman, 1916) enlightened our understanding of the gifted child and their educational needs. Contrary to the early writings on intellectually gifted, early intelligence pioneers presented a picture of gifted children who were active, engaging, and socially and emotionally healthier than previous perceptions portrayed (Robinson, et al., 2007). Hollingworth and Terman reported that children with Intelligence Quotients [IQ's] above 130 would need differentiated educational accommodations that would allow children to progress academically at a pace that would develop gifted children's intellectual potential. While identifying intellectually bright

children for his early work, Terman (1925) discovered that children in his study were the youngest of their classmates having been grade accelerated one or more years. Both researchers foresaw the importance of implementing appropriate educational interventions to meet the intellectual and emotional needs of gifted children and possible challenges arising from a mismatch of educational services.

By 1933, a minimum of 26 reviews of acceleration research had been conducted. According to experts in the field of gifted education, developmental and socio-affective myths associated to gifted learners and acceleration's influence on psychological developmental were concerns then and remain key issues among gifted educations (Colangelo, et al., 2004; Gentry, & Kettle, 1998). In the 1940's, Hollingworth's (1942) longitudinal study with highly gifted children found the most successful academic interventions occurred when high ability learners were identified in early elementary school and were accelerated or placed with their intellectual peers. Additionally, they advocated for educational accommodations, recognizing that a rigorous curriculum should be substantively different from-the regular classroom curriculum. Hollingworth, an early advocate for gifted children in general and gifted girls specifically, anticipated potential social and emotional issues might occur if high ability learners' needs were not met. Gifted females continue to be a topic for discussion into the 21st century (Reis, 2002; & Smutny, 1999) and the theme of unfulfilled potential resonates with mathematics educators (Reis, 2002; Sheffield, 2003). A majority of gifted programs across the nation serve more girls than boys, however, gifted boys still out perform girls on standardize math tests (Kitano, 2007).

Following World War II, Pressey (1949) an educational psychologist originally interested in children with below normal IQ's switched his attention and research with children of superior abilities. Pressey's work with gifted children advanced research in acceleration and establishing language to define acceleration, "progress through an educational program at rates faster or ages younger than conventional" (p. 2). During the next decade, the advent of Sputnik and the race for space in the 1950's placed the spotlight on acceleration. The United States centered its attention on increasing the rigor in mathematics and science to identify and develop our brightest students to increase globally competitiveness. However, it was not until the early 1970's that accommodations for gifted children were formalized. The Marland Report (1972), a landmark federal report on gifted education created the road map to identify and provide gifted programs and established language to define gifted students as students who have outstanding abilities and who demonstrate high performance. The report addressed appropriate programs and services to differentiate educational programs and services beyond the regular classroom programs and curriculum.

Whereas earlier generations of educators believed accelerating children to the next grade was the appropriate solution for challenging intellectually bright children who needed more rigor, the Marland report highlighted terms to define giftedness. As a result, pedagogical differences for serving gifted children emerged. The logical academic accommodations of previous decades were set aside in the 70's and 80's to debate the advantages of acceleration versus enrichment opportunities while ability grouping versus cooperative learning were the key issues of the late 20th century (Brody, 2004). While professionals in the field of gifted education develop appropriate interventions for gifted

students, their efforts are at odds with the current educational trend promoting mixed ability classrooms. Regular classroom advocates suggest that all students can learn with similar learning strategies through group instruction with identical practice assignments; an educational approach that prescribes paced curriculum which ignores ability levels and limits the field of gifted education (Fiedler, Lange, & Winebrenner, 2002; Stanley & Baines, 2002; VanTassel-Baska, et al., 2002). For some professionals in gifted education controversial topics, such as the age to provide accelerated gifted services and the level of rigor for educational services offered to our high ability learners, are highly debatable issues (Rogers, 2004, 2002; Vialle, Ashton, Carlon, & Rankin, 2001).

Thirty-two years following the Marland Report, *A Nation Deceived: How Schools Hold Back America's Brightest Students* (Colangelo, et al., 2004), a national report on academic acceleration, presented a synthesis of convincing research confirming that acceleration provides the rigor needed to meet the needs of gifted students; yet, skepticism fueled by persistent acceleration myths still persists (Gentry & Kettle, 1998). Currently educators and educational psychologists echo the admonitions of early gifted pioneers for appropriate educational interventions to meet the needs of intellectually gifted children. Strong voices advocate for a continuum of differentiated instruction in addition to the regular classroom curriculum to ensure that gifted children's intellectual needs are met (Roger, 1992, Van-Tassel-Baska, 1986). Years of research on acceleration has concluded that intellectually talented students benefit academically from an accelerated curriculum (Colangelo, et al., 2004; Gagné & Garnier, 2004; Kolitch & Brody, 1992; Kulik & Kulik, 1992; Lubinski, 2004; Rogers, 2004; Southern & Jones 1991; Swiatek, 2002). Although accelerated students suffer few ill psychological effects

from their accelerated experience, advocates stress that educators cannot address acceleration's positive influence on academic achievement without considering issues related to psychological well-being such as self-perceptions, the affective context of school and family and relationships, and personal well-being in the process of educating (Gross, 2004; Neihart, et al., 2002).

Rationale for Acceleration

Gifted children's unique academic needs provide the rational for acceleration. Current synthesis of the research in gifted education consolidates what is known about gifted services and prescribes areas to emphasize when developing programs for intellectually gifted learners (Rogers, 2007). Suggestions for service includes opportunities for increased challenge, accelerated experiences, and interaction with intellectual peers. First, gifted learners need to be challenged daily in their area of talent or interest. Developing innate ability occurs through consistent practice and mastering increasingly difficult levels of skill. If gifted children are not given an opportunity to progress, researchers have noticed an increase in depression, boredom, and stress (Csikszentmihalyi, Rathunde, & Whalen, 1993). The research also reports that in order for children to develop their talent, independent and persistent effort is required, but the influence of home and school must not be discounted (Rogers). Some form of ability grouping is the most effective way to provide challenge and to work with intellectual peers. An effective instructional strategy, ability grouping and consistent if not daily challenge produce significant academic gains (Kulik, & Kulik, 1992; Slavin, 1987). The child who is equally gifted but not challenged, gains the year of academic growth just by

attending school, while the gifted child who is grouped with intellectual peers and given sufficient challenge, will gain six months the first year and will be a full year head after two years (Rogers).

According to Brody (2004), experts agree that whether offering acceleration or grouping opportunities, curricula designed for average students is not appropriate to meet the intellectual needs of academically advanced students. In addition to providing challenge and grouping by ability, professionals in the field of gifted education have determined that when subject-based and grade-based acceleration options are appropriately utilized to meet the needs of gifted children, subject-based accelerants particularly show significant positive academic gains (Colangelo, et al., 2004).

Studies show that children who are admitted to kindergarten or first grade ahead of their age peers consistently are well adjusted, high achievers, and were competitive with their intellectual peers (Proctor, Black, & Feldusen, 1986). A retrospective study (McCluskey, Baker, and Massey, 1996) reported that 80% of the early entrants were level with or ahead of their intellectual peers. Subject-based acceleration and cross-grade grouping has been particularly successful with gifted elementary math students (Gavin & Adleson, 2008). Seventeen studies on mathematics acceleration with students in grades two to twelve report positive affects for math acceleration (Rogers, 2004). More recently a study with extremely gifted first graders agreed with the positive benefits in grade or subject-based acceleration for these precocious children (Lupkowski-Shoplik & Assouline, 1994).

Further, gifted children need regular opportunities to socialize with their intellectual as well as chronological age peers. Several meta-analyses of ability grouping

in the last twenty years (Kulik & Kulik, 1984, 1992; Gentry & Owens, 1999; Rogers, 1998) report evidence of dramatic positive academic effects and somewhat significant affective effects when gifted children are placed in a learning environment with their intellectual or like-ability peers. Powerful results occur when gifted children are grouped according to ability and exposed to differentiated learning assignments and opportunities (Rogers, 2007). Conversely, gifted children experience social and emotional trauma when they feel intellectually isolated (Brown & Steinberg, 1990) and experience a greater degree of problems with social adjustment (Gross, 2002). Hollingworth (1926) found that before the age of 10, gifted children are more likely to experience greater degrees of isolation and loneliness, suggesting that there is greater difference between gifted children and their age peers in elementary school and their conception of friendship (Gross, 2002). In Hollingworth's research on peer relations, she identified the IQ range of 125-155 as socially optimal intelligence. Children in this intellectual range were accepted by their age peers and thought to be well adjusted and self-confident. Beyond an IQ of 160 gifted children encountered difficulty with their chronological age peers. Proper class placement and opportunities to play and work with intellectual peers improves feelings of isolation and loneliness (Adams-Byers, Whitsell, & Moon, 2004). According to Plucker, et al., (2004) "being in the company of like-minded peers with whom one can relate, converse, and argue is a critical component of intellectual and social development" (p. 269).

Academic Interventions

Gifted programming interventions that provide challenge, accelerated experiences, and interaction with intellectual peers are at odds with the current educational trend that promotes mixed ability classrooms education labor to develop appropriate interventions for gifted students. Regular classroom advocates suggest that all students can learn with similar learning strategies through group instruction with identical practice assignments; an educational approach that prescribes paced curriculum which ignores ability levels and limits the field of gifted education (Fiedler, et al., 2002; Stanley & Baines, 2002; VanTassel-Baska, et al., 2002). Ironically, this is the antithesis of appropriate programming for gifted children. Educational psychologists and gifted practitioners advocate grouping students according to their levels of academic readiness or abilities (Kulik & Kulik, 1992; Tieso, 2002; Rogers, 2007) but conclude that though grouping students according to readiness is essential, small effects on achievement will occur if not accompanied by appropriate differentiated curricula (Kulik & Kulik; Rogers, 2004, 1993; Slavin, 1987).

Acceleration and ability grouping traditionally were implemented as if they were separate academic interventions, but both strategies are very much interconnected. Grouping by ability is essential for gifted learners but not enough; although grouping according to readiness is essential, small effects on achievement will occur if not accompanied by appropriate differentiated curricula (Kulik & Kulik, 1992; Rogers, 2004, 1993; Slavin, 1987). Accelerated learning occurs and achievement is documented when children who are intellectually prepared for advanced courses are grouped together (Brody, 2004).

Ability Grouping

Ability grouping is a practice that places children of like abilities together for instruction in small groups or inclusive classrooms based on a pre-assessment of their levels of readiness or ability in a subject area (Kulik & Kulik, 1992). Flexible grouping practices are designed to enrich and differentiate regular classroom curriculum to increase the breadth (interest, choices, and learning style variation) and depth (lessons for different ability levels) of the curriculum for diverse learners (Tieso, 2002). Operationally ability grouping is a practice that places children of like abilities together for instruction in small groups or inclusive classrooms based on a pre-assessment of their levels of readiness or ability in a subject area (Kulik & Kulik, 1992). Kulik and Kulik discovered that the types of grouping practices and rigor of the curriculum would result in different effects on student achievement for the different groups. Through their work three different kinds of grouping practices were identified: programs that use the same curriculum for all groups in the classroom (whole-class instruction), programs in which curriculum is tailored to each group according to the groups needs (between-class), and programs that make curricular adjustments for groups of students within their regular classroom (within-class, flexible).

Programs that utilize whole-class instruction are the traditional instructional method in most regular classrooms characterized by established textbook-driven curriculum (Bagley, 1931; Goodlad, 1984; Reis et. al., 1993). In this type of grouping all students' progress through the curriculum with similar learning strategies and identical practice assignments at the same pace (Cuban, 1984; Goodlad) and the entire class receives instruction at the same time. The Joplin Plan (Floyd, 1954) continues to be the

most frequently used form of between-class grouping. Originally, the plan implemented grouping according to reading ability. Elementary fourth, fifth, and sixth grade students were placed in cross-grade grouping during their reading time. Students would switch classrooms to participate in instruction at their readiness level. This type of grouping is prevalent today as an intervention to differentiate the content or provide subject-based acceleration options for intellectually gifted in math and reading (Gavin & Adelson, 2008; Lupkowski-Shoplik &Assouline, 1994; Rogers, 2004). For example, between-class grouping would be appropriate for a fifth grade student who demonstrates algebraic math competency. During the fifth grade math period, the child would go to the sixth grade algebra class for instruction. Lewis (2002) suggested that teachers who are strong in math content are essential when accelerating high ability preschoolers in addition to assessment, flexible grouping, and counseling.

The third type of grouping is within-class or flexible grouping. Students are placed in small groups within the same class to work on assignments or special projects (Kulik & Kulik, 1992). Prior to presenting a lesson, teachers determine which students have demonstrated mastery, their passions and interests, and prior knowledge of the topic (Renzulli, 1994). Typically, this type of grouping provides opportunities for differentiation where greater breadth and depth can be integrated into the curriculum (Benbow, 1998; Davis & Rimm, 1994; Feldhusen & Moon, 1992; Kulik, 1992; Slavin, 1987; Tieso, 2002; Tomlinson, 1995, 1999; Westberg, Archambault, Dobyns, & Salvin, 1993).

Acceleration Strategies

The three levels of ability grouping are only the starting point for integrating more challenge and depth. A continuum of acceleration strategies is available to gifted students to meet district objectives while providing the challenge and rigor gifted children may need without burdening the district. Classroom instruction students receive may range from no differentiated service in the regular curriculum to radical acceleration, resulting in early graduation. The decision should not be a matter of whether or not to accelerate gifted students; but what is the appropriate level of acceleration to meet the needs of each gifted student and further, how the decision to deny or provide accelerated options will positively or negatively influence psychological well-being.

The first documented evidence of ability grouping and acceleration was recorded in the St. Louis school system in 1862 (Rogers, 2004). The admonition to place children according to intellectual ability or academic readiness continues to receive much attention. Appropriate acceleration interventions continue to be one of the most widely researched and debated topics in gifted education (Colangelo, et al., 2004). Experts in the field of gifted education operationally define *acceleration* as an "educational intervention that moves students through an educational program at a faster than usual rate or younger than typical age" (Colangelo, et al., p. 5). The Marland Report on gifted education (1972) established the road map to identify and provide gifted programs. Though research has long recognized that intellectually gifted children have the capacity to learn material rapidly and comprehend concepts in a deeper way (Sousa, 2003), the age to provide accelerated gifted services, and the rigor of educational services offered to our high ability learners is still a controversial issue (Rogers, 2004, 2002; Vialle, et al., 2001).

Thirty-two years following the Marland Report; *A Nation Deceived: How Schools Hold Back America's Brightest Students* (Colangelo, et al., 2004), a national report on academic acceleration, presented convincing research confirming acceleration provides the rigor needed to meet the needs of gifted students; yet skepticism fueled by persistent acceleration myths still persists (Gentry & Kettle, 1998).

In their comprehensive report, Colangelo, et al. (2004) analyzed the validity of 18 levels of acceleration based on three categories of rigor. Acceleration interventions are possible when a teacher differentiates curriculum addressing the academic needs of students whether individually or in small groups providing different ways of understanding the content (Tomlinson, 1995). Through pre-testing, the educator assesses the mastery level of the subject content to determine which acceleration option should be employed allowing gifted students to progress quickly through the curriculum; possibly bypassing subjects, or grades when appropriate. Often, communicating what is meant by acceleration may mean implementing very different strategies with very different levels of depth or rigor (Gagné & Garnier, 2004). A teacher who uses compacting which is a *subject-based* form of acceleration in the regular classroom is providing a different level of rigor than when *radical acceleration* has been prescribed for a highly gifted student, yet both are forms of acceleration.

Of the 18 levels of acceleration (Rogers, 2004) that were analyzed in the report, the first category of acceleration rigor includes: (1) thirteen *subject-based acceleration option*s: early entrance, compacting, single -subject, concurrent/dual enrollment, talent search programs, correspondence/distance learning, independent study, AP/BP, college-in-schools, mentorship, credit for prior learning/testing out, post secondary options. This

category of acceleration options requires cognitive ability to work at an accelerated paced, but does not require social/emotional maturity beyond a child's chronological age as some might believe. Subject based acceleration allows students who master a curriculum beyond their age or grade level to continue to stay with age and grade peers (Southern & Jones, 2004), (2) Five *grade-based acceleration options* include grade skipping, non-graded/multi-graded classrooms, multi-grade/combination classes, grade telescoping, and early admission to college. This category of acceleration gives the gifted learner the opportunity to progress more quickly from kindergarten through 12th grade, graduating from high school earlier than age and grade peers as prescribed by the age/grade educational system. As the student rapidly progresses through each grade, he/she must adjust to a more mature peer group and is most appropriate for highly gifted students (Rogers, 2004). The third category of acceleration service, (3) *radical acceleration* is defined as a combination of interventions that allow the gifted student to graduate from high school three or more years earlier than age peers. Of all possible acceleration options, only Advanced Placement (AP) courses have gained acceptance as an appropriate acceleration option without risk to the child's emotional well-being (Gagné & Garnier, 2004). AP courses allow students to enroll in college courses while remaining with their age peers and families for a few more years (Colangelo, et al., 2004).

Math Acceleration

The positive influence of acceleration practices with mathematically talented students is considerable. Studies with precocious children and youth discovered that

participation in a flexibly paced and accelerated mathematics courses resulted in considerable achievement gains with no ill effects (Assouline, & Lupkowski-Shoplik, 2005; Brody, Lupkowski, & Stanley, 1988; Kolitch & Brody, 1992; Mills, Ablard, & Gustin, 1994; Preckel, Goetz, Pekrun, & Kleine, 2008). A synthesis of years of research with math acceleration and ability grouping confirms these early findings (Colangelo, et al., 2004).

Sheffield (2003) reports that math educators believe that mathematical abilities can be developed utilizing academic interventions that provide prolonged experiences with challenging problems. In order to uncover outstanding mathematics talent, characteristics for mathematical potential must be developed in all children to reveal those with mathematical talent (Sheffield, et al., 1995). According to NCTM, children with mathematical promise exhibit the following characteristics: *ability*, *motivation*, *belief*, *experience*, *or opportunity* (Sheffield, 2003).

Elementary math educators provide experience and diverse opportunities to increase ability, but children's motivation and belief their potential for success present challenges to develop mathematical potential. Children are not always motivated to reach their full mathematical potential. Popular culture and opinions encourage intellectually gifted children to stay within the norms, to avoid negative labels such as nerd or brain (Sheffield, 2003). Gifted children's belief in their ability to succeed in rigorous math courses and the value they place on mathematics is influenced by parents, teachers, and peers (Sheffield; Reis, 2002) and lack of confidence in mathematical ability is a significant barrier to learning for gifted girls (Reis; Rimm, 2002). Finally, experience and

opportunity to learn are particularly lacking in middle schools and high schools in the US with regards to the disparity in mathematics course offerings (Sheffield).

In recent years, research has made great gains in promoting and nurturing mathematically promising children, although mathematically gifted girls are still at risk of not fulfilling their mathematical potential (Reis, 2002; Sheffield, 2003). According to results from a cross-national study with Mathematics Olympians, Campbell (1996) and Nokelainen, et al. (2004) determined international data on mathematical self-perceptions confirmed the findings that Mathematics Olympians academic self-perceptions change from elementary school to high school. These findings give substance to what is already known about mathematically promising gifted girls. Ironically, the majority of gifted programs across the nation serve more girls than boys, but gifted boys still out perform girls on standardize math tests (Kitano, 2007). Results may be due to external and internal factors that influence gifted girls' perception of their mathematical ability as they transition from elementary school to high school (Kerr, 1994; Reis, 2002). Girls with extremely bright futures progressively underestimate their intellectual ability, lose confidence in their ability to succeed in advanced math courses, or choose to disguise their mathematical ability to appear more acceptable to their peers and avoid negative labels (Sheffield, 2003; Siegle & Reis, 1998). Conflicting views of adjustment contribute to academic and psychological well-being:

Prevalent Views of Adjustment

Academic and psychological well-being associated with giftedness has intrigued educational psychologists for years (Brendt, et al., 1982; Freeman, 1983; Hollingworth, 1942; Ramaseshan, 1957; Reynolds & Bradley, 1983; Strang, 1950; Watson, 1965). Some common topics include the type of giftedness, educational fit, and personal characteristics (Neihart, 1999). Gifted children are bombarded with messages that influence their perceptions of achievement, intellectual ability, peer relationships, and self concept (Neihart, et al., 2002). For some of our brightest children, what they believe about their giftedness interferes with their elementary and middle school experience, undermining their self-confidence and perception of their intellectual ability (Reis 2002). Beliefs about their intellectual abilities and their school experiences affect academic and psychological adjustment. Educators' views of gifted developmental issues and parents' understanding of giftedness is also influential component to adjustment. Perceptions of gifted learners are viewed through the lens of two prevalent conflicting philosophies of psychological adjustment that influence how gifted children's needs are met and to some degree may account for educators' reluctance to choose acceleration (Colangelo, et al., 2004; Neihart, 1999).

Academically and Psychologically Capable

Two prevalent yet conflicting views of adjustment influence among American educators, influence the way teachers, parents, and society interact with gifted learners and their perceptions of social emotional vulnerability influence how gifted children's needs are met (Neihart, 1999). The first perception of adjustment views students

academically and psychologically capable, while the second view of adjustment perceives gifted children as vulnerable and in need of protection. When comparing gifted children and their non-gifted peers, the first view proposes that by virtue of their giftedness, gifted children are generally better adjusted (Neihart, 1999). Due to their intellectual abilities, gifted children are capable of deeper understanding of themselves and others therefore they are better equipped than their age peers to cope with issues such as developmental gaps, the stress of academic rigor, and conflict (Colangelo, et al., 2004; Cross, 1997, 2002; Gentry, & Kettle, 1998; Lynch, 1996). From this perspective, educators would likely recommend acceleration options for gifted learners who have demonstrated readiness. Also likely, parents who hold this view might be a source of encouragement and strength in developing talent, or a source of criticism, applying pressure to perform leading to adjustment issues.

Academically and Psychologically Vulnerable

The second view suggests that gifted children are more prone to social and emotional problems than their non-gifted peers. Intellectual giftedness magnifies affective issues and high ability learners tend to be less well adjusted. This view contends that intellectually gifted children are more sensitive, internalize personal conflicts, and experience situations and their surroundings more deeply than do their non-gifted peers (Neihart, 1999). Educators and parents who hold this view might be more reticent to suggest acceleration interventions to protect gifted children from too much too fast, allowing children to be children (Elkind, 2001) as well as citing developmental concerns

that may be detrimental to social and emotion health (Colangelo, et al., 2004). Both views of psychological adjustment ultimately affect how gifted children perceive their abilities.

Developmentally Ready for Acceleration

The two conflicting views of adjustment are evident in the school related to developmental readiness. Many in the field of gifted education believe gifted children whose academic needs are not met are more likely to encounter social and emotional problems (Neihart, et al., 2002; Swiatek, 1995; Rimm, 2002). The regular classroom curriculum rarely provides enough challenge for gifted children (Reis & McCoach, 2002; Reis & Renzulli, 2004). Gifted children in a regular classroom are infrequently taught at their instructional level. Though intellectually gifted children may have mastered over half the curriculum before it is taught they are required to spend more time than necessary on any topic, consequently they may be at risk for academic problems (Colangelo, et al., 2004; Kulik & Kulik, 1997; Swiatek, 2002). Problems related to academic achievement may result in underachievement (Reis & McCoach, 2002; Reis & Renzulli, 2004), susceptibility to boredom, perfectionism, peer pressure (Neihart, et al., 2002; Swiatek, 1995; Rimm, 2002) and possibly isolation if they are unwilling to conform to peer norms (Plucker & Levy, 2001; Robinson, 2002). Moreover, highly gifted students tend to get discouraged and disengage when they are only exposed to a regular curriculum with no acceleration opportunities (Gross, 2003). In some cases the lack of accelerated opportunities results in periods of depression (Reis & Renzulli).

Several studies illustrate developmental readiness for a more rigorous curriculum. A study with extremely gifted Australian youths reported that only 17 of the 60 youths in

the study had been radically accelerated. Of this group several stated that acceleration should have been offered much earlier. Most of the students in this study "ceilinged out on age appropriate tests of academic ability and achievement in most elementary school subjects" (Gross, 2006, p. 423). Similar results were found in Lubinski, Webb, Morelock, and Benbow (2001), an investigation of gifted youth participating in CTY talent search. Their study found that less than half had ever been grouped by ability during elementary or middle school. Within this group of high ability students reported that 80% of the time they preferred taking classes with their intellectual peers rather than classes with age peers (Ablard, Hoffhines, & Mills, 1998). Another study of 12-16 year old students' participation in CTY advanced science and math courses determined that though all choose to receive advanced placement from their regular schools, a majority also choose to receive credit for the classes taken during the summer program (Lynch, 1996). For many of these students the course work was more than two years beyond course work of their chronological peer group.

Developmentally Vulnerable

Though the research suggests otherwise, educators and developmental psychologists believe acceleration is fraught with potential negative consequences (Lynch, 1996; Swiatek, 2002). By 1933, a minimum of 26 reviews of acceleration research had been conducted and according to experts in the field of gifted education, developmental and socio-affective myths associated to gifted learners and acceleration's influence on social emotional developmental remain a key issue (Colangelo, et al., 2004; Gentry & Kettle, 1998). Educators hold fast to developmental beliefs with regard to

gifted children. Teachers might determine a child's reading is above grade level but does not write well. Delay in fine motor skills and potentially other developmental skills is evidence for not accelerating that child according to reading readiness. Yet Silverman (2002) reminds educators that giftedness is not always evident in all areas of development. For example, children who might be extremely gifted in their conceptual understanding of math, developmentally may not be able to tie their shoes or write legibly. Because development may be asynchronous, intellectually gifted children may not demonstrate early and rapid progression through developmental milestones at the same time (Gross, 1993; Kearney, 2001). Additionally levels of intellectual giftedness are rarely recognized among educators (Gross, 1993). The differences between mildly, moderately, highly, and profoundly gifted are as dramatically different as children with a range of intellectual disabilities.

Developmental psychologist and educators also perceive that acceleration potentially results in gaps or weak areas in student learning. Longitudinal studies analyzed by Colangelo, et al. (2004) reported that students who are accelerated have already mastered the previous subject matter and while small gaps may exist, the repetitive nature of curriculum addresses the gaps through implementation of short lessons covering the material (Lynch, 1996; Swiatek & Benbow, 1991). Educators question whether skipping grades or placing students in advanced courses is appropriate developmentally and express concern for possible negative social emotional implications of moving children through a curriculum to quickly or allowing them to skip grades (Cross, 1997, 2002; Lynch, 1996). The age to provide accelerated gifted services, and the rigor of educational services offered to gifted students is a controversial issue (Rogers,

2002, 2004; Vialle, et al., 2001). Research cited in Colangelo, et al. (2004) provides evidence to extinguish the debate of chronological age versus intellectual readiness. Although some educators believe that gifted children are not as emotionally mature as their age peers, studies have found that psychosocial age is more closely related to mental than chronological age (Robinson & Noble, 1991) and when grouped by intellectual ability rather than by chronological age gifted children experience positive academic gains (Kulik & Kulik, 1997; Swiatek, 2002). Due to their unique characteristics, gifted children are able to learn quickly (Sousa, 2003) and grasp abstract concepts at an earlier than expected age, consequently, when gifted children are grouped with their intellectual peers they learn more in one year than if grouped with classmates with a broad range of abilities (Swiatek, 2002).

Gifted Girls

While educators discuss appropriate curriculum interventions for high ability learners, and support social emotional development and well-being, our classrooms house a population of gifted students who lead invisible academic lives. Though great strides have been achieved towards gender equity, gifted girls are one of the most at risk, gifted populations in our educational system (Reis, 2002; Robinson & Noble, 1991; Smutny, 1999). Although most gifted programs across the nation serve more girls than boys, boys still out perform girls on standardize math tests (Kitano, 2007). At some period during their academic careers, gifted girls who have extremely bright academic futures lose confidence in their intellectual ability or downplay their gifts to appear more acceptable.

Stereotypes

According to Rimm (2000), gifted girls and women face several stereotypes, social issues, and obstacles influence their success. Several issues are highlighted. Rimm suggests that gifted girls perceive *self-esteem* through the lens of others assessment of whether they are pretty and popular. To maintain popularity and not appear to be boring, gifted girls accept the *air-head mystique* which project the "airhead" image of girls who tend to though as pretty and popular, whereas being considered "brainy" or too smart could be perceived as boring. The *math stereotype* promotes the belief that girls cannot do math and that boys are much better problem solvers. *Parent stereotype* reinforce the notion that dads are smart naturally and moms must work hard to achieve. Rimm says *competitiveness and leadership is unfeminine*: girls who enjoy competition and take on the challenge of leadership are perceived as *bossy* or *aggressive* whereas the same characteristics in males are applauded. As gifted adults, women face *pressure* to not invest their efforts on extensive education and advanced degrees. Gifted women face the *mothering metamorphosis*, the dilemma of the ideal nurturing mother and the perceived "fire eater" career woman. Finally, *glass ceilings* and *sticky floors* exist for those who choose careers outside the home; women find that they can only rise so far.

External and Internal Influences

It is not surprising that gifted girls' perceptions of their potential for academic success and their views of self worth are filtered through the lens of the world and pervasive stereotypic beliefs. Gifted children's beliefs about their intellectual abilities are influenced by external and internal cues, shaping their perceptions of academic

achievement, intellectual ability, peer relationships, and academic self-perception (McCoach & Siegle, 2003). Several external and internal factors exert influence on academic achievement and further influence gifted girls' ability to realize their full academic potential and to experience social emotional well-being (Reis, 2002). External factors such as parental influence, school environment, and teachers' beliefs, stereotyping contribute to gifted development and well-being. Additionally internal factors such as self-perception, social issues, choices, and decision unique to females also affect whether gifted girls' talents will be recognized and developed and whether social emotional needs are met. As Kerr (1994) notes: "A society that waste female brilliance has made it the norm for gifted women to lead an average life, and gifted women have largely adapted to that norm" (p. 171).

External Factors' Influence on Academic Adjustment

Gifted girls are bombarded from an early age with messages that influence their perceptions of achievement and intellectual ability. External factors such as parental influence and beliefs about intellectual ability (Reis, 2000), peer influence, teachers' beliefs (Neihart, 1999; Reis) and school environment and/or curricular options that do not match educational needs (Neihart, et al., 2002; Tomlinson, 1995) effect the way children are going to respond to academic challenge. During the impressionable elementary and middle school years, gifted girls' perceptions of ability and self-confidence tend to be undermined or diminish by the time they reach puberty (Reis 2002). By the age 11, many girls with high potential are either unaware of their gifts or those who have been

identified often try to mask their abilities (Eby & Smutny, 1990). The accumulation of subtle messages may have detrimental effects on their academic success.

Parents' Beliefs About Intellectual Ability

For some gifted girls and women, external and environmental barriers hinder development of gifts and talents. Gifted females are faced with stereotypes and barriers to achievement from birth. From an early age gifted girls' perceptions of their abilities are influenced by their parent's beliefs about their abilities. Parents' attitudes about academic self-concept and achievements are well-documented (Hess, Holloway, Dickson, & Price, 1984; McGillicuddy-De Lisi, 1985; Parsons, Adler, & Kaczala, 1982; Stevenson & Newman, 1986). In several studies, students' prior performance had less influence on self-perception as parents' belief about their children's' ability (Parsons, et al., 1982; Phillips, 1987). For instance, a study on gifted girls' math self-concept demonstrated how student self-concept was highly correlated with parent's attitude towards math and parent's expectation for success (Dickens, 1990). Parents' attitudes and beliefs about their gifted daughters have long-term effects in positive and negative directions. According to Reis (2002), gifted girls may be plagued by memories of negative comments, even years after they reached adulthood, with distressing implications for social emotional well-being. Additionally, even when parents provide an environment at home that encourages exploration and the freedom to pursue individual passions, school and social pressures may interfere or stifle their ability or desire to reach their full potential (Smutny, 1999).

Teachers' Beliefs About Intellectual Ability

Our schools and society in general reinforce perceptions of gender and preconceived notions about intelligence among girls and boys. In several studies it was determined that teachers underestimate girls' intelligence. Teachers had no trouble identifying gifted boys, but were quite surprised when girls were identified (Kramer, 1985). Sadker and Sadker (1994) echo these findings, "study after study has shown that adults, both teacher and parents, underestimate the intelligence of girls" (p. 95). Another study found that teachers were unsuccessful in predicting how well girls would score on the quantitative subtest of the SAT, though teachers were more likely to accurately predict high scores for their male students (Kissane, 1986). Similarly, a study of male and female teachers determined beliefs about gifted students' competence showed gender bias. Cooley, Chauvin, and Karnes (1984) found that both male and female teachers consistently regarded gifted boys as more competent in critical and logical thinking skills, whereas they identified gifted girls as more competent in creative writing. Interestingly female teachers were less likely to adhere to traditional views of highly intelligent girls while male teachers viewed gifted girls in typical stereotypic ways; as highly emotional, less spontaneous than boys, less imaginative and inventive or curious, and believed that gifted girls tend to follow the crowd rather than thinking independently. Fennema (1990) reported teachers' stereotypical beliefs about aptitude favor boys; having innate ability, while girls must work hard to make good grades. Sociologically, Cross (2002) suggests that students' receive mixed messages from their school experience and develop coping strategies to make sense or blend into the school environment based on others perceptions. Conversely, Kanevsky and Keighley (2003) found that when teachers

provide a supportive caring academic environment previously stereotypic perceptions can be overcome.

Internal Factors and Psychological Well-Being

Internal psychological factors relating to self-perceptions, social issues, and choices (Reis, 2002) low self-esteem or perfectionism (Neihart, et al., 2002) also influence to what extent a student may fulfill their intellectual potential and experience psychological well-being. Fundamental gender differences among gifted children exist; gifted boys are more confident in their abilities, have higher self-esteem, while gifted girls are extroverted, anxious, and trusting (Feingold, 1994), and have increasingly lower self-confidence **(**Reis). Gifted girls beliefs about their abilities and talents, coping strategies they employ to respond to their giftedness, and potential social issues identified as possible stressors in gifted girls. A twenty-year-old study determined that gifted boys and gifted girls have more in common than with their non-identified peers with the exception that gifted boys more readily not only to recognize, but, accept their innate ability level (Buescher, Olszewski, & Higham, 1987).

Perception of Ability

A study by Kline and Short (1991) found that by age 11 gifted girls talents are not made aware of their abilities or those who are already identified choose to hide their gifts and talents. It is not surprising that they may lose faith in their intellectual capabilities early in their academic career continues beyond high school. For instance, work with girls who show mathematical promise in elementary school have found that gradually

they lose confidence in their mathematical ability, exert less and less effort and overtime lower their expectations of success (Bell, 1989; Cross, 2002; Kline & Short, 1991) and tend to choose less rigorous courses during secondary years (Piirto, 2007; Reis, 2002). A study almost a decade earlier found that the further along in their academic career the more likely intellectually gifted males and females were, "equally likely to continue in or become disengaged from the domain of the area of their talent by the end of high school" (Csikszentmihalyi, et al., 1993, p. 207). Logically gifted girls continue to attribute their academic success to hard work and luck rather attributing success to intellectual ability long after high school graduation (Bell, 1989; Cramer, 1989; Hany, 1994; Kramer, 1991; Leroux, 1988; Perleth & Heller, 1994; Reis & Callahan, 1989; Subotnik, 1988).

Perfectionism

Conversely, while some gifted girls attribute success to hard work and luck, undue attendance to intellectual ability and pressure to perform presents problems for gifted girls. Perfectionism once thought to be one-dimensional currently is considered a continuum of thinking about behavior from normal/healthy to neurotic/dysfunctional (Hamachek, 1978). Some possible antecedents to the development of perfectionism may include perceptions and pressure from teachers and peers, unattainable high personal standards, parental influence, birth order, and goal orientation (Schuler, 2002; Speirs Neumeister, 2004). Whatever the trigger, when children no longer feel satisfaction in their level of accomplishment believing their effort will never be good enough, these children have crossed over to neurotic perfectionism (Neihart, et al., 2002, Robinson, et al., 2007). These children experience a discrepancy between a healthy expectation for

success and the reality of what can be achieved, “The belief that perfection is attainable and expected becomes the point at which self-esteem suffers when the child cannot be satisfied with lesser achievements” (Robinson, et al., p. 18).

Responses to Expectations

To make sense of mixed messages about their giftedness and to create an emotionally safe environment, gifted girls unconsciously respond to conflicting expectations from home, school, and peers in several ways. They may develop mechanisms to explain away their success and attribute success to luck or they retreat from intellectual challenge to please others (Smutny, 1999). Clance and Imes (1978) characterize this attribution as *Impostor Phenomenon* in which gifted girls feel they must justify or make excuses for their success since it goes against peer expectations and also how they view themselves. In a study with high achievers they discovered that this group of highly intelligent individuals saw themselves as intellectual frauds. They attributed their success not to ability or skill, but to luck, fearing that given enough time their fraud would be discovered and they would be viewed as inadequate.

On the other hand, intellectually gifted girls may experience the *Horner Effect* (Kerr, 1994); fearing success, gifted girls choose to refrain from competition in an effort to please others which is particularly intense need for gifted females. She conducted a study of her gifted peers from late 60’s to uncover why few of these intellectually gifted women attained any level of eminence. Four main causes contributing to underachievement emerged; denial of giftedness; parents down played the importance of their intelligence, lowered aspirations in high school and college; and fourth adjusting

expectations to the reality of family and the possibility of following their own careers and passions. It would seem that gifted girls silently and invisibly retreat. This highlights possible reasons why intellectually gifted females are not identified as underachievers as often as gifted boys though as many academically talented girls may underachieve as do boys (Reis & McCoach, 2000).

Surprisingly gifted girls may not necessarily view their giftedness as an asset. To avoid disapproval from their peers' gifted girls choose to become intellectually invisible and deny their abilities (Gross, 2004; Rimm, 2002; Swiatek, 1995, 2002). In a study on social emotional development of high ability middle school girls, Callahan, Cunningham, and Plucker (1994) determined that girls seek out opportunities to conform to their age peers and avoid situations where they stand out academically. A current review of research on the implications of academic acceleration determined that it is more likely that gifted students who are not accelerated will succumb to peer pressure by denying their giftedness in order to not feel different (Colangelo, et al., 2004). According to Sheffield (2003), placing mathematically gifted students with their intellectual ability peers, students will learn from each other, reinforce each other, and help each other as they encounter mathematical challenge, thus acceleration seems to alleviate the desire for age peer approval.

Self-Concept and Adjustment

Gifted girls' are inundated with cues from home, school, peers, the media, etc. about ideals for behavior, achievement, friendships, and personal appearance, therefore it is not surprisingly that gifted females are more prone to perfectionism (Kramer, 1988;

Schular, 2002). The conflict between self and surroundings progressively increases as girls move from elementary through high school (Coleman & Cross, 2005; Kline & Short, 1991). There is a definite relationship between academic achievement and self-concept (Robinson, et al., 2007) and it is not common for gifted children to relate their personal worth to academic success and teacher's perceptions of their ability (Delisle, 1992). Parents' beliefs about achievement are instrumental in developing self-perceptions of intellectual ability. Children of parents who are performance oriented tend to exhibit unhealthy/ dysfunctional perfectionism. They focus on potential mistakes, doubt their actions, worry about parental expectations, and parental criticism (Ablard & Parker, 1997). An unhealthy attitude towards achievement places gifted children at risk for adjustment problems and future underachievement.

Summary

This chapter included a review of relevant literature concerning acceleration issues. The first section described the rationale for providing accelerated services and the need for ability grouping to address the needs of high ability learners. Commonly accepted acceleration strategies are included in the first section, as well as discussion on the necessity to promote and nurture mathematically promising children. Gifted students in this study exemplify the need for accelerated and non-accelerated math classes. The second section included the prevalent views of adjustment that influence how educators view gifted children and educators' willingness to provide accelerated gifted services. Students' attitudes towards school and teachers, as well as students' motivation and self-regulatory behaviors in accelerated and non-accelerated math may offer insight to guide

teacher practice and perceptions of adjustment. The final section described the issues related to gifted girls academic and psychological development. This study attempted to identify the influence of both gender and acceleration on academic and psychological adjustment with particular attention to gifted girls in accelerated math classes.

CHAPTER III

METHOD

This study investigated the influence of participation in accelerated courses on academic adjustment and overall well-being for gifted fifth, sixth, and seventh grade children placed in accelerated and non-accelerated math classes, with special interest in gifted females and their math placement. Specifically this study examined the influence of gender and acceleration on academic adjustment based on the five factors of the School Attitude Assessment Survey-R (perceptions of academic self-perception, attitude towards school, attitude towards teachers and classes, motivation and self-regulation, and goal valuation). Additionally, evidence of psychological adjustment was examined, utilizing the six dimensions on the Psychological Well-Being Scale (autonomy, environmental mastery, personal growth, positive relationships with others, purpose in life, and self-acceptance). Further this study utilized the Cognitive Abilities Test - CogAT® (Lohman, & Hagen, n. d.) to investigate Intelligence Quotient (IQ) scores in order to eliminate the possibilities of IQ's influence in any relationship determined to be significant. This study was conducted with permission and the cooperation of a suburban K-12 school system in the mid-western United States. This chapter describes the participants, research instruments, procedures, and design utilized to answer the research questions.

Participants

Participants for this study included 370 fifth, sixth, and seventh grade students, identified as gifted from a Midwestern (pseudonym) school district. There were 185 girls and 185 boys. Because current researchers note that few acceleration studies have used comparisons with non-accelerated gifted children identified according to the same criterion (Lohman & Marron, 2008), fifth, sixth, and seventh grade gifted students from were chosen for this study because of the pool of potential participants are identified for gifted enrichment services and accelerated math placement according to the same criteria. Therefore, the two groups of students consisted of one group of 257 accelerated gifted and talented students who were participating in accelerated math courses, including Pre-Algebra, Algebra I, Geometry, or Algebra II. The second group of 113 gifted fifth, sixth, and seventh grade students were enrolled in on-grade level math classes within a gifted cluster that included non-gifted students. Students in this study may have qualified for one of the accelerated math courses but chose to stay in on-grade level math courses with enrichment opportunities. The rationale for establishing a Pre-Algebra/Algebra program at the fifth and sixth grade level was to bring mathematically talented students together to benefit academically from an accelerated curriculum (Colangelo, et al., 2004). Table 1 presents the student math population by regular and accelerated math placement.

Table 1

Demographic information by grade and gender

Grade	Gender	Regular Math	Accelerated Math	Total
5th	Male	29	4	33
	Female	32	7	39
6th	Male	16	57	73
	Female	18	55	73
7th	Male	10	69	79
	Female	8	65	73
	Total	113	257	370

All gifted students in the district are identified for the gifted services in one of two ways. Students qualify for gifted services by scoring in the top 3% on the Cognitive Abilities Test (CogAT®) (Lohman and Hagen, n. d.), a full-scale intelligence (aptitude test). Students may also qualify for gifted services through a multi-criteria category. Students, who do not qualify for services by scoring in the 97th percentile but are within four points of the qualifying score on the CogAT® are placed on an identification matrix. The matrix includes CogAT® scores along with other academic criterion such as CRT (Criterion Reference Tests) math and CRT reading scores, teacher and parent evaluations which are assigned a point value. At the fifth, sixth, or seventh grade, students who accumulate 15 total points on the identification matrix qualify for gifted services under the state multi-criteria category.

Math Placement Process

Students were identified to participate in accelerated math courses through talent development on a math matrix. A pool of students was identified for out-of-grade level assessment by earning three or more points on a math matrix. The math matrix consists six possible indicators of mathematical potential with weighted scores including scores from teacher recommendations (one point), the CogAT®, full scale aptitude test both comprehensive and quantitative scores (two points each), Oklahoma Math League competition (two points), CRT math and CRT reading scores (one-half point each); a similar concept to a portfolio for talent development. The objective was to establish a group of students suspected of having high ability in mathematics and to make every attempt to avoid missing potentially talented student. Students accumulating three points on the matrix were further evaluated by administering the Orleans-Hanna-OH (Hanna, n. d.) and the Iowa Algebra Aptitude-IAAT™ (Schoen, & Ansley, n. d.); out of grade assessments for algebraic reasoning. Students scoring a minimum of 180 (90%) total points on these tests are eligible to take Algebra 1. Students scoring a minimum of 140 (70%) on the combined OH and IAAT™ are given the opportunity to take Pre-Algebra. Parents were informed of their child's assessment results and placement. Parents of students scoring below 140, but in the 130-139 range, who were interested in pursuing Pre-Algebra were allowed to fill out a mathematically promising characteristics checklist so that students might be assessed in more depth for possible placement.

Instrumentation

Academic adjustment was assessed by scores on the School Attitude Assessment Survey-Revised (SAAS-R; McCoach & Siegle, 2003) which measures five aspects of motivation in and attitude towards school such as attitude towards school, attitude towards teachers and classes, motivation and self-regulation, academic self-perception, and goal motivation. Psychological adjustment was determined by scores on the dimensions of the Psychological Well-Being Scale (PWB; Ryff, 1989) which consists of six aspects of psychological well-being including autonomous behaviors, environmental mastery, personal relationships with others, purpose in life, and self- acceptance. Students completed both assessments in one sitting taking approximately 30 minutes. The Cognitive Abilities Test (CogAT®; Lohman & Hagen, 2001) was utilized to investigate Intelligence Quotient (IQ) scores in order to eliminate the possibilities of IQ's influence in any relationship determined to be significant.

The School Attitude Assessment Survey-Revised (SAAS-R)

The School Attitude Assessment Survey-Revised (*SAAS-R*) contains 35 items that are indicators of one of five factors designed to measure perceptions and attitudes toward and motivation in school. Statements are rated on a 7-point Likert-like agreement scale ranging from strongly disagree to strongly agree.

Administration and Scoring

The SAAS-R was administered in groups. The teachers or counselors monitored students closely to ensure that the survey was completed appropriately. To complete the

survey, students marked the degree of disagreement or agreement with each of the 35 statements on a 7-point Likert-like scale ranging from strongly disagree to strongly agree. Each of the 35 statements receives a score of 1, 2, 3, 4, 5, 6, or 7 which corresponds to the student's mark on the Likert-like scale. *Academic Self-Perceptions* consists of 7 statements such as "I can learn new ideas quickly in school." *Attitudes toward Teachers (and Classes)* consist of 7 statements such as "My teacher makes learning interesting." *Attitude toward School* consists of 5 statements such as "I am glad that I go to this school." *Goal Valuation* consists of 6 statements including: "Doing well in school is one of my goals." The last factor *Motivation/Self-regulation* consists of 10 statements and includes statements such as "I am organized about my school work." Item-level scores were recorded and subscale scores were then computed (McCoach, 2002).

Reliability

In their 2003 study, McCoach and Siegle found good internal consistency reliability for the individual factors for students in 9th grade through 12th grades as the Cronbach's alpha coefficients were above .85. Internal consistency reliability for the individual factors included (Attitude towards School, $\alpha = .87$; Attitude towards Teachers, $\alpha = .89$; Motivation/Self-regulation, $\alpha = .91$; Academic Self-perception, $\alpha = .86$; and Goals, $\alpha = .89$).

Validity

The SAAS-R instrument, according to McCoach and Siegle, demonstrates evidence of adequate construct validity, criterion-related validity, and internal consistency

reliability. Table 2 reports their results for criterion-related validity as demonstrated by a series of a *t* tests on the mean scale scores of the five factors. The authors believe that four of the five factors of the SAAS-R appear to distinguish gifted achievers from gifted underachievers.

Table 2

t Tests and effect size measures for gifted achievers and non-achievers on the five sub-scales of the SAAS-R

	Achievers (*n* = 120)		Underachievers (*n* = 56)			
Subscales	Mean	SD	Mean	SD	*p*	*d*
ASP	6.17	0.590	5.84	0.973	.019	0.46
ATT	5.33	0.915	4.58	1.015	< .001	0.78
ATS	5.33	1.19	4.41	1.54	.001	0.67
Goal valuation	6.56	0.592	5.32	1.42	< .001	1.23
MOT/S-R	5.39	0.975	3.88	1.37	< .001	1.29

Note. ASP = academic self-perceptions; ATT = attitudes toward teachers; ATS = attitudes toward school; MOT/S-R = motivation/self-regulation (McCoach & Siegle, 2003).

The Psychological Well-Being Scale (PWB)

The Psychological Well-Being Scale (PWB) consists of six 14-item scales based on a multidimensional model of psychological well-being constructed from the theoretical perspective of positive human functioning and normal human development (Ryff, 1989, 1992, Ryff & Keyes, 1995). Students complete the PWB self-report inventory that assesses students' appraisal of themselves and their lives across six unique

domains of psychological well-being. Statements in each scale are rated on a 6-point Likert-like agreement scale ranging from strongly disagree to strongly agree (Ryff, 1989).

Administration and Scoring

The PWB was administered in conjunction with the SAAS-R. Each of the 84 statements on the PWB receives a score of 1, 2, 3, 4, 5, or 6 which corresponds to the student's mark on the 6-point Likert-like scale ranging from strongly disagree to strongly agree. Items are divided between positively and negatively phrased statements. The math teacher or counselor monitored students closely to ensure that the survey was completed correctly.

Each of the six dimensions of the PWB consists of 14 statements. A sample statement for each dimension is included. A*utonomy* consists of statements such as "I tend to worry about what other people think of me." *Environmental mastery includes* "I am good at juggling my time so that I can fit everything in that needs to get done," Statements for *Personal growth* consist of "I am the kind of person who likes to give new things a try." *Positive relations with others* include statements such as "I know that I can trust my friends and they know they can trust me." *Purpose in life* includes "I have a sense of direction and purpose in my life," and *Self-acceptance* "In general, I feel confident and positive about myself." The author suggested that statements from the six individual dimensions should be mixed by incorporating one statement from each dimension sequentially into one continuous self-report instrument including all 84 statements (C. Ryff, personal communication, June-12-2008).

Reliability

Internal consistency (alpha) coefficients range from .83 to .91(see Table 3) and are reported for each domain of the PWB scale along with correlations for each domain with the original PBW 20-item scale which range from .97 to .99 (Ryff, 1989) as reported in table 3. When the PBW was translated and administered to high achieving Korean high school students, internal consistency for all alpha coefficients were above .75, excluding .63 reliability for *autonomy*. Though reliability was lower than reported when used with US adults (Ryff, 1989, 1992, Ryff & Keyes, 1995) the instrument was considered a reliable measure for high ability high school students (Jin & Moon, 2006).

Table 3

Internal consistency coefficients for Psychological Well-being

	No. of Items	* High School Students n = 111 α	**Original PWB instrument α
Autonomy	14	.63	.83
Environmental mastery	14	.75	.86
Personal growth	14	.76	.85
Positive relations with others	14	.85	.88
Purpose in life	14	.81	.88
Self-acceptance	14	.84	.91

Note: *Korean high ability high school students (Jin & Moon, 2006), ** Reliability study (Ryff, 1995)

Validity

Convergent and discriminant validity for the PBW was shown through modest and positive correlation with previously established measures of positive functioning for life-satisfaction, self-esteem, internal control, and positive affect; and negative correlation with measures of negative functioning such as depression, external control. It was determined that each of the six dimensions of PBW are distinct constructs (Ryff, 1989, 1992, Ryff & Keyes, 1995).

Cognitive Abilities Test (CogAT®)

Intelligence quotients (IQ) scores of subjects in this study were considered to eliminate IQ's influence on Academic and Psychological Adjustment. The district administers the *Cognitive Abilities Test* (CogAT®) (Lohman & Hagen, 2001), a nationally recognized standardized aptitude test used to assess for gifted services. Students with scores in the 97th % ile or above are recommended for gifted placement.

Procedure

Over the last two years, a team of educators was established to determine the effects of the math acceleration program for gifted students in fifth and sixth grade. Because of the districts interest in advanced math with elementary students, which began when the current seventh grade students were identified for accelerated math classes at the end of fifth grade, the assistant superintendent determined the necessity of administering the study instruments to all gifted students in grades five through seven. In

addition to obtaining approval from the Institutional Review Board at Oklahoma State University (APPENDIX A), when permission to conduct the study was obtained from the school district, I made arrangements with both intermediate (fifth and sixth grade) sites and the middle school (seventh and eighth graded) site to administer the instruments. District policy dictates that a letter of explanation of the research be sent to the site principals and a letter sent to all parents of gifted students informing them of the district's intent to administer the instruments since the research was initiated and sponsored by the District. The letter to parents replaced the need for an informed consent letter. The language of the letter provided an opportunity for parents to choose to deny permission to participate. The letter was sent home in a sealed envelope with children through their homeroom teacher in *Thursday Folders* informing parents of the study and assessments. Seventh grade students received the same letter in their math classes. The letter instructed students to return the letter to their math teach at the intermediate schools and to their math teachers at the middle school with a parent signature if parents choose to deny permission to participate. Of the potential 417 participants, 89% participated, 11% were absent or parents' opted out. Table 4 presents a summary of non-participation due to absence or parent request.

Table 4

Non-participation by grade

Grade	Absent	Parent Request	Total
5th	1	5	6
6th	5		5
7th	35	1	36
Total	41	6	47

Because the district is interested in retaining the data collected for further analysis, personnel conducted a records review which included only student ID numbers, gender, grade, CogAT® composite and CogAT® quantitative scores and math placement with no identifying names attached. Students' names were included on a math class roster only to identify students who might have been absent during the assessment for rescheduling purposes and were detached before any data were provided to me. Both instruments, the SAAS-R and PBW, teacher and identical student instruction sheets were included in the packets. I was notified when all classes had completed the surveys. After scoring each survey, I provided scored protocols by individual student IDs to the Assistant Superintendent of Secondary Education.

Teachers and/or school staff coordinated data collection. The math teachers at the intermediate (fifth and sixth grade) school sites administered the SAAS-R and PBW surveys to gifted children in one thirty-minute session. Every effort was made to provide a makeup session for students who were absent on the day the surveys were administered. At the middle school, the math teachers and one counselor administered the SAAS-R and the PWB surveys to the seventh grade students in the same manner as the intermediate sites, but only one day was allotted to give the surveys.

On the day the survey was administrated, a school official gave each math teacher the packet. Teacher instructions for administering the surveys were included in the class roster packet with the student surveys. The class roster packet included a form on the outside of the packet that included student name to identify students who might be absent on the day the surveys were administered, student school ID number, gender, and grade level. The student surveys included both the SAAS-R and PWB surveys and an

instruction page written in student-appropriate language. Instructions explained that there were no incorrect answers, student opinions were valuable to the research, and that their responses to the items would be kept confidential. Prior to completing the surveys, students were informed that participation was voluntary. Questions concerning completing the surveys were encouraged. Teachers were instructed to read aloud all instructions to the students to ensure consistency; however, students completed the surveys on their own.

Once the surveys were completed, the class roster packets were stored in a secure place, and I was informed that the completed packets were ready to be picked up. Prior to receiving the class roster packets, student names were removed to insure confidentiality. Upon receiving the completed the survey packets, they were stored in a locked file cabinet.

Data Analysis

Data were analyzed using SPSS 16.0. Scores associated with academic adjustment and psychological well-being were used for the analysis. Descriptive statistics were calculated prior to the analysis of split plot analysis of variance to insure the required statistical assumptions were met. The first research question examined the global relationship of academic adjustment to psychological adjustment. Bivariate correlations were run between variables of academic adjustment (attitudes toward school, attitudes towards teachers and classes, motivation and self-regulation, academic self-perception, and goal motivation) and aspects of psychological adjustment (autonomous behaviors, managing their environment, relationships with others, self-acceptance, and purpose in

life) to address the first research question. Split-Plot ANOVA analysis was utilized to examine the second research question, which concerned the relationship between math placement and gender and academic adjustment.

Summary

This chapter described the methodology and design utilized to conduct this study. The first section described the participants, how the participants were selected for the study, demographic information concerning the participants, and information about the district's identification process for math placement. The second section described the research instruments used in the study. Procedures for the study were detailed in the third section. The final section included a summary of the statistical analysis.

CHAPTER IV

RESULTS

The purpose of this study was to examine the influence of participation in accelerated math courses on academic adjustment and overall well-being with special interest in gifted females and their math placement. The results of this study are presented herein. After an overview of the descriptive statistics for all relevant variables, statistical subscale reliabilities of both instruments are presented. Findings related to research questions are presented to conclude the chapter. Research questions addressed are as follows:

Question One (a): What is the intra-relationship of the variables for Academic Adjustment (attitudes toward school, attitudes towards teachers and classes, motivation and self-regulation, academic self-perception, and goal valuation) and Psychological Adjustment (autonomous behaviors, managing their environment, relationships with others, self-acceptance, and purpose in life)?

Question One (b): Are the variables for Academic Adjustment significantly related to the variables for Psychological Adjustment?

Question Two: What is the influence of acceleration and gender on academic adjustment?

Descriptive Statistics

The two instruments used in this study yielded scores from 11 subscales for the gifted fifth, sixth, and seventh grade students. These scores represented two variable sets or two distinct constructs, Academic Adjustment and Psychological Adjustment. The scales or variables associated with Academic Adjustment included attitude towards school, attitudes towards teachers and classes, motivation and self-regulation, academic self- perceptions, and goal valuation. Similarly, scales or variables used to measure the construct of Psychological Adjustment were scores associated with autonomy, environmental mastery, personal growth, positive relationships with others, purpose in life, and self-acceptance scales.

According to Stevens (2002), when the sample size is large, z-scores that fall beyond +/- 3.50 should be considered outliers. Means and standard deviations for each of the eleven variables were used to address outliers for Academic Adjustment and Psychological Adjustment by examining z-scores.

Examination of the participants' z-scores revealed that six participants had z-scores outside the + / - 3.50 range on one or more variable. The minimum and maximum statistics explain how well the variables fall within the designated z-scores range of +/- 3.5. With a reasonably large sample (N > 100), outliers do not greatly affect the outcome (Shavelson, 1996). After accounting for the fundamental reasons for outliers such as data entry errors, and subjects that might have been markedly different from the rest (Stevens,

2002), it was determined that outliers generally do not influence analysis when the sample is large or when outlier may be important to the study (Osborne & Overbay, 2004). Because math placement and gender are of great interest to this study, the decision was made to retain the outliers for analysis in this study since the participants considered to be outliers were in accelerated math classes (algebra) and half the outliers were girls.

This study utilized parametric statistical procedures to analyze the data and to assess how well the data met the design requirements (Keppel & Wickens, 2004). Univariate descriptive statistics were generated for all variables on academic adjustment and psychological adjustment to determine how well the data met the required assumptions according to the parametric statistical procedures (see Table 5).

Table 5

Descriptive statistics on the variables of academic and psychological adjustment

Variable	n	*M*	SD	Min	Max	Skew	Kurtosis	Variance
School	362	30.61	5.24	7	35	-1.78	3.67	27.491
Teacher	359	40.01	7.56	14	49	-1.22	1.05	57.173
Motivate	354	57.79	9.45	23	70	-1.12	1.04	89.225
Perception	353	42.50	4.76	23	49	-.95	.93	22.665
Goals	359	40.29	3.56	24	67	-.79	12.82	12.690
Autonomy	339	55.48	6.66	27	74	-.48	2.06	44.297
Mastery	342	55.23	6.54	25	76	-.69	3.61	42.791
Growth	327	59.92	7.24	24	83	-.96	4.46	52.414
Relations	340	51.48	7.76	19	75	-.17	3.11	60.168
Purpose	333	50.31	6.59	16	77	-1.14	7.39	43.402
Acceptance	338	51.96	6.20	24	74	-.37	3.74	38.274

Skewness and kurtosis statistics were used to address the assumption of normal data distribution. Statistically, if skewness for each variable is within +/- 1.00 range it indicates symmetric distribution (De Vaus, 2002). All variables were negatively skewed to varying degrees. Three variables for Academic Adjustment and one variable for Psychological Adjustment were negatively skewed beyond +/- 1.00 including Attitude towards school -1.78, Attitude toward teachers -1.22, Motivation and self-regulation -1.12, and Purpose in life -1.14, thus the overall distribution was negatively skewed for Academic Adjustment and minimally negatively skewed for Psychological Adjustment.

Kurtosis statistics assesses the spread of the distribution assuming the means scores for each variable have a normal distribution (Keppel & Wickens, 2004). In the absence of a broad or platykurtic distribution, kurtosis has little effect of the level of significance. Analysis of the kurtosis statistics for the variables in this study implies that there are no platykurtic distributions, thus normal distribution of data for this population was assumed.

Interest in the relationship of IQ scores, as assessed by CogAT ® composite and quantitative scores, was considered in order to eliminate the possibilities of IQ's influence in any relationship determined to be significant. To assess any IQ differences between groups, an examination of the IQ composite and quantitative scores for participants in the accelerated and regular classrooms and boys and girls is presented in

Table 6

Descriptive analysis of IQ composite and quantitative scores for group and gender

	Math Group				Gender			
	Accelerated n=252		Non-Accelerated n=112		Male n=181		Female n=183	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
IQ Comp	128.01	8.35	131.07	5.50	129.16	7.39	128.74	8.03
	Accelerated n=202		Non-Accelerated n=94		Male n=146		Female n=150	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
IQ Quant	124.99	9.22	125.24	9.90	126.40	9.97	123.77	8.70

Univariate ANOVA analysis of the IQ composite scores by math group revealed that there was a significant difference in the composite IQ scores between gifted students in regular math and accelerated math for F (1, 362) = 12.629, $p < .001$. Students in the non-accelerated math group were determined to have a higher mean IQ composite score (M= 131.07) than their accelerated peers (M = 128.01). Separate ANOVA analysis of IQ quantitative scores for both accelerated and regular participants revealed no significant differences with F (1, 294) = .048, p = .826.

Additionally, univariate ANOVA analysis was used to measure the influence of gender on IQ composite and quantitative subscales scores. Analysis determined no

significant difference exist between male and female scores on the overall IQ composite scale F (1, 362) = .266, p = 607. However, analysis of the IQ quantitative subscale revealed a significant difference for gender F (1, 294) = 5.90, p = .016. Gifted boys quantitative IQ mean score was (M =126.40) compared to the gifted girls overall average (M = 123.77).

Subscale Reliability

According to Stevens (2002), internal consistency reliability measures subjects' responses to statements on a measure at a single point in time to determine how well they correlate. SAAS-R subscale reliability for the individual factors of Academic Adjustment included *attitude towards school, attitude towards teacher*s, *motivation/self-regulation, academic self-perception,* and *goal valuation.* PWB subscale reliabilities for the factors related to Psychological Adjustment included *autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance* for the current application with 5th, 6th, and 7th grade gifted children are presented in Table 7.

Table 7

Internal consistency coefficients for the SAAS-R and PWB

	No. of Items	5th, 6th and 7th grade gifted N = 370 α
Attitude _ school	5	.92
Attitude _ teachers	7	.92
Motivation _ self-reg	10	.91
Academic self-percep	7	.81
Goal valuation	6	.88
Autonomy	14	.79
Environmental mastery	14	.79
Personal growth	14	.80
Positive relations – others	14	.86
Purpose in life	14	.86
Self-acceptance	14	.88

The Cronbach's alpha coefficients for the 35 statements on each subscale of the SAAS-R revealed that the *attitude toward school* and *attitude toward teachers and classes* at .92 demonstrated high internal consistency reliability. The *motivation/self-regulation* scale also demonstrated high internal consistency reliability at .91. Internal consistency reliability was considered good for both *goal valuation* (α = .88) and *academic self-perception* scales in the present study (α =.81). Overall scores fell within a range from good to high reliability. The items associated with a given subscale appear to measure internal consistency reliability, thus all subscales were retained for analysis.

Though reliability for PWB was lower than reported in the original study (Ryff, 1989, 1992, Ryff & Keyes, 1995) overall reliability for the 14 statements of the PBW

subscales for the current study was found to be sound. In the current study *autonomy*, α = .79; *environmental mastery*, α = .79; and *personal growth,* α = .80; showed lower but acceptable internal consistency reliability. *Positive relationships*, α = .86; *purpose in life*, α = .86 and *self-acceptance* α = .88 were considered good levels of internal consistency reliability, thus the measure was considered acceptable and all subscales were retained for the current study.

Summary of Descriptive Statistical Analysis

It was determined that the parametric assumptions related to this study consisted of sound measurement and acceptable normality. Means and standard deviations were as expected and minimum and maximum statistics revealed variable scores outside the expected range and were addressed. Assessment of the skewness and kurtosis statistics indicated that data distribution for the variables of Academic Adjustment was negatively skewed and slightly negatively skewed for Psychological Adjustment. Because of the sample population, the results were not unexpected. Gifted children by nature of their unique needs and IQ scores in the 97%ile or above could be expected to reveal a negatively skewed data distribution. Analysis of the kurtosis statistics for the variables in this study implies that there are no platykurtic distributions; consequently kurtosis has little effect of the level of significance.

Univariate ANOVA analysis was used to examine composite and quantitative mean IQ scores. Results suggest that significant differences exist for math group on mean composite IQ scores. Students in regular math classes had higher mean IQ's than their accelerated peers. Additionally analysis found statistical significant differences for gender

on the quantitative mean IQ subscales scores, favoring gifted boys.

Summary of Internal Consistency Reliability

Testing for internal consistency reliability established that SAAS-R and PWB subscales appear to measure how well the subscales correlate with one another. Cronbach's alpha coefficients for the SAAS-R demonstrated overall good internal consistency reliability. Reliability overall fell within a range from good to high ($\alpha = .81$ to $\alpha = .92$). he items associated with given subscales appear to measure similar constructs, thus all subscales were retained for analysis. Similarly, Cronbach's alpha coefficients for the PWB generated good internal consistency reliability, ranging from .79 to .88. Internal consistency reliability was considered acceptable when compared to the original instrument, thus the items associated with a subscale appear to measure similar constructs and therefore all subscales were retained for analysis in the current study.

Response to the Research Questions

Analysis of the research questions proceeded once it was determined that parametric statistical assumptions were met. Bivariate correlations were generated to answer both parts of the first research question. Repeated measures ANOVA was utilized to answer the second research question.

Question One (a) What is the intra-relationship of the variables for Academic Adjustment (attitudes toward school, attitudes towards teachers and classes, motivation

and self-regulation, academic self-perception, and goal valuation) and Psychological Adjustment (autonomous behaviors, managing their environment, relationships with others, self-acceptance, and purpose in life)?

To address the first part of question one, Pearson correlation coefficients *(r)* were used to examine the intra-relationship of Academic Adjustment and Psychological Adjustment variables (see Table 8).

Table 8

Bivariate correlations among variables of academic and psychological adjustment

	School	Teacher	Motive	Percep	Goal	Auton	Master	Grow	Relate	Purpose	Accept
School N=334	1.00	.56**	.51**	.34**	.42**	.11*	.18**	.32**	.00	.11	.05
Teacher N=332		1.00	.61**	.37**	.35**	.13*	.13*	.24**	.10	.10	.06
Motive N=328			1.00	.56**	.57**	.11*	.22**	.22**	.05	.12*	.01
Percep N=328				1.00	.33**	.04	.08	.18**	-.15**	.03	-.04
Goal N=332					1.00	.12*	.19**	.13*	-.02	.14*	.08
Auton N=326						1.00	.60**	.53**	.44**	.57**	.57**
Master N=342							1.00	.67**	.53**	.63**	.55**
Grow N=313								1.00	.44**	.62**	.56**
Relate N=326									1.00	.46**	.50**
Purpose N=327										1.00	.62**
Accept N=331											1.00

Note. Academic Adjustment: School = Attitude towards School, Teacher= Attitude towards Teachers, Motive = Motivation and Self-Regulation, Percep = Academic Self-perception, Goal = Goal Valuation. Psychological Adjustment: Auton = Autonomy, M aster= Environmental Mastery, Grow = Personal Growth, Relate = Positive relationships, Purpose = Purpose in Life, Accept = Self Acceptance. ** $p < 0.01$ * $p < 0.05$

Construct validity is observed when statistically significant correlations between variables occur. According to Nunnally and Bernstein (1994), variables have construct validity when variables constructed by theory have statistically significant positive correlations. Academic Adjustment and Psychological Adjustment are composed of variables based on theory, thus this study investigated the correlation coefficients of the individual variables of the two constructs. Correlation coefficients provide a measure of the direction and strength of the relationship. The closer the correlation coefficient is to +/-1.00, the stronger the relationship. A correlation coefficient with a value of 0.00 implies no relationship exists. Correlations with an absolute value less than .30 are considered low, correlations between .30 and .39 are considered moderately low, absolute values between .40 and .60 are regarded as moderate, correlations below .80 are considered moderately high and correlations with an absolute value above .80 are considered high (Shavelson, 1996).

Examining the correlation coefficients in Table 8 for the variables within Academic Adjustment revealed statistically significant positive correlations. Attitude towards school, and attitude towards teachers/ classes, motivation/ self-regulation, goal valuation were moderately and positively correlated *r*-value ranged from attitude towards school, and attitude towards teachers / classes had the strongest relationship $r = .56$ or 31% of the variance share. Attitude towards teachers/ classes was positive and moderately correlation with motivation/ self-regulation, academic self-perception, and goal valuation, with students' attitude towards teachers/classes and motivation/self-regulation having a moderately strong relationship $r = .61$ with 37% shared variance. Further, motivation/self-regulations, academic self-perception, and goal valuation were

positively correlated to a moderate degree (r = .56 and r = .57, respectively, representing 31% shared variance). An absolute value of .34 suggested a moderately low correlation (Shavelson, 1996) between attitude towards school and academic self-perception, although they shared only 12% of the variance. There was a modest but moderately low positive correlation for academic self-perception and goal valuation is recorded, r = .33 with 11% shared variance. These scores suggest that students who had moderate scores on one variable scale tended to score in the moderate range on the others, similarly students who scored low on one of the variables tended to score low on the others. Statistical significance was set at $p < .01$ for the correlation between the five Academic Adjustment variables.

Analyzing the correlation coefficients in Table 8 for the variables of Psychological Adjustment revealed significant positive correlations among the variables ranging from r = .44 to r = .67. Autonomy and environmental mastery, personal growth, positive relationships with others, purpose in life, and self-acceptance were positively and moderately correlated, although autonomy and environmental master shared the strongest relationship, r = .60 or 36% of the variance shared. There was also a positive and moderate correlation between environmental master and personal growth, positive relationships with others, purpose in life, and self-acceptance. Environmental master and personal growth were determined to share a moderately strong relationship, r = .67 or 45% of the variance shared. A positive and moderately strong relationship also was reported between personal growth and positive relationships with others, purpose in life, and self-acceptance, with 38% of the variance shared with purpose in life moderately high at r = .62. Additionally, positive relationships with others was moderately correlated

with purpose in life, and self-acceptance, sharing 25% of the variance with self-acceptance, and purpose in life was determined to be positive and moderately highly correlated with self-acceptance, $r = .62$, or 38% of the variance shared.

Question One (b): How are overall variables for Academic Adjustment related to Psychological Adjustment?

Convergent construct validity was established because significant positive correlations were reported within variable sets for Academic Adjustment and Psychological Adjustment. To determine the interrelationship between the variable sets used to measure the constructs, Academic adjustment and Psychological adjustment, Pearson correlation coefficients (*r)* were computed. The correlation coefficients between the subscales of the two overall measures (Academic Adjustment and Psychological Adjustment) are also presented in Table 8.

Analysis of the bivariate correlations determined that about half of these values reached statistical significance. There was a significant relationship between students' social and emotional adjustment at school assessed by the variables for Academic Adjustment and psychological well-being assessed by the variables for Psychological Adjustment. The correlation between the two constructs was statistically significant $r = .19$, $p < .05$. Because the squared correlation coefficient r^2 represents the shared variance between variables, it was determined that the estimated amount of variance shared between overall Academic Adjustment and Psychological Adjustment was low at 3%. It is understood that correlation research only describes the relationship and does not

predict the relationship; therefore, correlations are only an estimate of the amount of variance two variables share or have in common (Pedhazur, 1997). From the results of the second part of question one, divergent construct validity can be assumed for the relationship between Academic and Psychological Adjustment. Both constructs shared some variance, but are distinct constructs.

Question Two: What is the influence of acceleration and gender on academic adjustment?

The influence of gender and math group on Academic Adjustment (across the subscales) was determined with a split-plot ANOVA. In split-plot ANOVA analysis gender and math group served as the between–subject variables and the five Academic Adjustment subscales (attitudes toward school, attitudes towards teachers and classes, motivation and self-regulation, academic self-perception, and goal valuation) served as repeated measures in Table 9.

Table 9

Analysis of variances for academic adjustment

	df	*F*	Sig.	η_p^2
		Between Subjects		
Gender	1	23.894	.000	.07
Mathgrp	1	1.850	.175	.01
Gender*Mathgrp	1	5.630	.018	.02
Error (110.601)	322			
		Within Subjects		
Aca-Adj	4	1110.517	.000	.78
Aca-Adj *Gender	4	18.452	.000	.05
Aca-Adj *Mathgrp	4	4.033	.003	.01
Aca-Adj *Gender *Mathgrp	4	3.622	.006	.01
Error (Aca-Adj) (22.834)	1288			

Note. Values enclosed in parentheses represent mean square errors.

The ANOVA results provided evidence in support of homogeneity of covariance through Box's M (209.011) and sphericity through the Greenhouse-Geiser value (.816). The analysis determined that a statistically significant 3-way interaction existed between Academic Adjustment, gender, and math group [$F_{4, 1288} = 3.622$, $p < .01$, $\eta_p^2 = .01$]. Given the 4 degrees of freedom association with this effect, a post-hoc test was conducted using OSU-pak (Miller, 1990). Descriptive statistics for the cell means for gender and math group for the five subscales of Academic Adjustment are presented in table 10. Presentation of Figures 1 and 2 in APPENDIX B present graphs of these cell

means for group and gender and Figures 3 through 7 in APPENDIX C presents marginal means for the five subscales.

Table 10

Descriptive Statistics for Accelerated and Non-accelerated Math Groups

	Accelerated N = 229				Non-Accelerated N = 97			
	Male n =113		Female n = 116		Male n = 48		Female n = 49	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
School	29.40	5.87	30.94	5.26	30.44	5.10	32.59	3.36
Teacher	38.67	7.20	39.83	7.74	39.25	8.45	44.04	5.55
Motivate	55.85	9.34	59.86	9.38	52.33	10.38	62.31	6.48
Aca-Percept	42.51	4.48	42.60	4.87	41.19	5.94	43.76	3.85
Goals	39.81	3.46	40.18	3.70	40.15	5.26	41.35	1.72

Note. Academic Adjustment: School = Attitude towards School, Teacher = Attitude towards Teachers, Motivate = Motivation and Self-Regulation, Aca-Percept = Academic Self-perception, Goal = Goal Valuation.

Significant simple main effects were found in three of the five subscales (see Table 10). The simple main effects analysis utilizing OSU-pak (Miller, 1990) revealed a significant simple main effect of gender across math groups. Analyzing the data shown in Figure 3, results revealed no significant attitude towards school for males regardless of group, whereas there were differences for females [$F_{1, 1288} = 4.86$; $p < .01$]. Non-accelerated girls ($M = 32.59$) scored higher than accelerated girls ($M = 30.94$).

Additionally, simple main effect analysis revealed there was significant difference for gifted girls' attitude towards teachers and classes [$F_{1, 1288} = 31.63$, $p = .000$]. Girls in regular math classes ($M = 44.04$) reported experiencing higher levels of satisfaction towards their teachers and classroom experience than accelerated girls' ($M = 39.83$) as shown in Figure 4. No significant attitude towards teachers and classes differences were reported for boys in either math group.

Regarding motivation, the simple main effect analysis showed that both girls and boys in the two groups significantly differed at $p < .01$ [$F_{1, 1288} = 10.62$ and 22.11, respectively]. Figure 5 shows that girls in the non-accelerated group ($M = 62.31$) scored higher that girls in the accelerated group ($M = 59.86$) and boys in the non-accelerated group had lower motivation ($M = 52.33$) than boys in the accelerated group (M=55.85). For student academic perceptions and goal valuation, there were non-significant results from the simple main effect analyses (see Figure 6 and 7).

Summary of Research Question One

Academic Adjustment and Psychological Adjustment were analyzed to determine the intra-relationship among the variables defining both constructs and interrelationship between the variable sets. Variables within Academic Adjustment ranged from moderately correlated to moderately highly correlated sharing from 11% to 37% of the variance. Correlation coefficients for Psychological Adjustment produced moderate and moderately high correlations accounting for 19% to 45% of the variance. Construct validity was established for both Academic Adjustment and Psychological Adjustment. The interrelationship between the two constructs was statistically significant. It was

determined that the estimated amount of variance shared between Academic Adjustment and Psychological Adjustment was low at 3%. Divergent construct validity can be assumed for the relationship between Academic and Psychological Adjustment. Both constructs shared some variance, but are distinct constructs.

Summary of Research Question Two

Mixed model ANOVA determined that for the between-subject variables, a significant, though small main effect was obtained for gender. Academic Adjustment was slightly dependent on whether participants were girls and boys. There was no overall difference in Academic adjustment for students in regular math classes compared to students in accelerated math classes. The between-subjects interaction effect for gender and math group was statistically significant but weak. To a small degree, Academic Adjustment was dependent on the gender of the participants and their math placement.

Of focal interest was the statistically significant three-way interaction that existed between gender, math group, and Academic Adjustment. Significant simple main effects were found in three of the five subscales. Taken together, these simple main effect analyses of the three-way interaction presents an interesting pattern of results. For attitude towards school and attitude for teachers and classes, while non-accelerated girls scored significantly higher than accelerated girls, there were no real differences in the scores of boys in these two areas. Interestingly, for motivation there was a pattern change in that, for girls, the non-accelerated scored higher than the accelerated group, but the opposite was true for boys. For boys, the accelerated groups scored significantly higher in

motivation than did the non-accelerated group. Finally, there were no gender differs by group for student academic or goal valuation perceptions.

CHAPTER V

SUMMARY, CONCLUSIONS, AND IMPLICATIONS

The purpose of this study was to investigate the influence of participation in accelerated courses on academic adjustment and overall well-being for gifted fifth, sixth, and seventh grade children placed in accelerated and non-accelerated math classes, with special interest in gifted females and their math placement. This study is particularly relevant since few acceleration studies include comparisons with non-accelerated gifted children identified according to the same criterion (Lohman & Marron, 2008). For purposes of this investigation, acceleration was defined as an educational intervention that moves students through an educational program at a faster than usual rate or younger than typical age (Colangelo, et al., 2004).

Gifted students in this study were assessed according to their math placement. Accelerated math students included fifth and sixth grade students enrolled in Pre-algebra or Algebra I, and seventh grades students enrolled in Algebra I, Geometry, or Algebra II. Gifted students placed in regular, on grade level math classes consisted of fifth and sixth grade students enrolled in Everyday Math (EDM) and seventh grade students enrolled in Pre-algebra.

The constructs used to identify psychological advantages were conceptualized as social variables related to school and emotional variables related to overall psychological

well-being. Social variables to identify Academic Adjustment utilized positive academic indicators consisting of attitudes toward school, attitudes towards teachers and classes, motivation and self-regulation, academic self-perception, and goal motivation (McCoach & Siegle, 2003) to determine social emotional well-being. Psychological Adjustment was conceptualized through variables that measured psychological well-being (Ryff, 1989) such as autonomous behaviors, environmental mastery, positive relationships with others, purpose in life, personal growth, and self-acceptance.

In order to explore the relationship of Academic Adjustment and Psychological Adjustment, bivariate correlations were generated to examine the intra-relationship among the variables defining both construct. Similarly, bivariate correlations were utilized to analyze the interrelationship between the variable sets. The influence of acceleration and gender on Academic adjustment was examined through repeated measure ANOVA analysis. This chapter presents a summary of findings, followed by conclusions based upon the findings. Implications for theory, practice, and future research are presented, followed by closing remarks.

Summary of Findings

Interest in the relationship of scores of Intelligence Quotient (IQ) composite and quantitative scores was considered in order to eliminate the possibilities that IQ contributed to any relationship determined to be significant prior to addressing the research questions. As part of the initial analysis, examination of composite and quantitative mean intelligence quotient (IQ) scores revealed significant differences. Univariate ANOVA determined that statistical significant differences existed between

composite IQ scores for participants in accelerated and regular math classes. Mean composite IQ scores for children in regular math classes were higher compared to children in accelerated classes. Further, significant differences for quantitative subscale mean IQ scores favored boys over girls. Gifted children in non-accelerated math classes had slightly higher mean scores than the generally accepted IQ score of 130+ used to identify intellectually gifted (Oklahoma State Department of Education, 2009). Boys overall mean quantitative subscale scores though higher than girls in the study were below the generally accepted IQ score by the state of Oklahoma for academically gifted. The results from the research questions suggest that IQ did not contribute to any significant relationships with Academic Adjustment.

Academic Adjustment and Psychological Adjustment were analyzed to determine the intra-relationship among the variables defining both constructs and the interrelationship between the variable sets. The first part of question one investigated the intra-relationship of the Academic Adjustment construct and Psychological Adjustment construct. The five Academic Adjustment variables; attitude towards school, attitude towards teachers and classes, motivation and self-regulation, academic self-perception, and goal valuation and the six Psychological Adjustment variables which included autonomy, environmental mastery, personal growth, positive relationships with others, purpose in life, and self-acceptance were analyzed to determine the intra-relationship among the variables defining both constructs. The results of the bivariate correlations for the Academic Adjustment were variables positively and moderately inter-correlated. The five scales demonstrated convergent validity. Furthermore, bivariate correlations were generated for the variables that composed Psychological Adjustment. Moderate to

moderately high correlations were found for the relationship between the six Psychological Adjustment variables. Since the correlations between all six variables were at least moderate and positively correlated, Psychological Adjustment construct exhibited convergent (construct) validity.

To answer the second part of question one, which addressed the interrelationship across constructs, analysis of the bivariate correlation determined that there is a significant relationship between students' social and emotional adjustment at school assessed by the variables for Academic Adjustment and psychological well-being assessed by the variables for Psychological Adjustment. The relationship between the two constructs was statistically significant, though extremely small. Divergent construct validity was assumed for the relationship between Academic and Psychological Adjustment. Both constructs shared some variance, but are considered to be distinct constructs.

The second question investigated whether acceleration and gender combine to influence Academic Adjustment. Mixed model ANOVA determined that a statistically significant three-way interaction existed between gender, math group, and Academic Adjustment. Significant simple main effects were found in three of the five subscales. Taken together, these simple main effect analyses of the three-way interaction presented an interesting pattern of results. For attitude towards school and attitude for teachers and classes, while non-accelerated girls scored significantly higher than accelerated girls, there were no real differences in the scores of boys in these two areas. Interestingly, for motivation there was a pattern change in that, for girls, the non-accelerated scored higher than the accelerated group, but the opposite was true for boys. For boys, the accelerated

groups scored significantly higher in motivation than did the non-accelerated group. Finally, there were no gender differs by group for student academic or goal valuation perceptions.

Conclusions

Analysis of previous acceleration research found that in spite of positive achievement reports and little evidence of maladaptive psychological effects, whether any psychological advantages of acceleration for gifted children is yet unclear (Colangelo, et al., 2004; Gross, 2003; Neihart, 2007). The purpose of this study was to determine whether psychological advantages existed for gifted children who participated in accelerated math classes compared to their non-accelerated gifted peers. Findings from the examination of the five variables used to define an Academic Adjustment construct utilized repeated measures analysis of variance, offer several conclusions. Conclusions from initial analysis determined that IQ scores did not contribute to any significant relationships to Academic Adjustment. A significant, but minimal relationship existed between the variable of Academic and Psychological Adjustment suggesting that together they do not uncover any psychological advantages and though they share a slight relation, they are distinct constructs. Psychological advantages were reported on three subscales of Academic Adjustment for girls and on one subscale for accelerated males. Finally, no significant differences or advantages were found on four of the five subscales of Academic Adjustment for boys in both math groups. Implications drawn from the conclusions will be addressed at the end of this chapter.

Relationship between Academic Adjustment and Psychological Adjustment

The interrelationship between Academic Adjustment and Psychological Adjustment was statistically significant. However, analysis determined that the estimated amount of variance shared between Academic Adjustment and Psychological Adjustment was low which suggests they are distinct constructs. Moderate to moderately strong internal consistency reliability was found for the Psychological Adjustment instrument (PWB), suggesting construct validity. Though student responses were consistent across the statements of the PWB; it was concluded that the instrument was not suitable for this age. The small relationship of the overall variables of Academic Adjustment and psychological well-being suggest that they are distinct constructs and the PWB may not have been an appropriate instrument to measure emotional adjustment. Several other factors may contribute to these findings. The length of the PWB instrument, over twice as long as the Academic Adjustment instrument may have been daunting for the students to complete in the time allotted by district personnel. Perhaps students' perceptions of the questions did not elicit an overall response, but were bound in time by what was immediately happening in their lives. As part of the process of testing for readability, among student who previewed the instruments, several students included comments to the side of the statements. Several written comments included a gifted fourth grade girl's observation of statement 80, *"I have been able to build a lifestyle for myself that I like,"* stating that she didn't like being rushed in the morning while getting ready for school. A gifted seventh grade boy commented to statement 29 *"My daily activities often seem trivial and unimportant to me,"* brushing teeth, combing hair, school is trivial. Although statements were tested for readability and were determined acceptable, the wording of

statements did not seem to conceptually reflect gifted literature or gifted social emotional characteristics in areas such as autonomy, environmental control, peer relationships, and self-concept.

The National Council for Teachers of Mathematics (1999) views "mathematical promise as a function of ability, motivation, belief, and experience or opportunity" (p. 3) which are addressed in the Academic Adjustment subscales. Interestingly, three of the six variables for Psychological Adjustment represent important characteristics for social and emotional development of gifted children, where differences in psychological well-being might exist for accelerated and non-accelerated math students within the subscales. Gifted traits found on the PBW scale that mathematically gifted students might exhibit include higher levels of autonomy. According to Ryff (1989), autonomy represents independence; the ability to resist social pressures, to go against popular thought to act and think in certain ways; and to regulate behavior from within. Gifted children develop a sense of autonomy when they are able to work and think independently and to work at their own pace (Rogers, 2002b), yet gifted children may need opportunities to work with their intellectual peers to share knowledge and for support (Diezmann & Waters, 2000). Autonomous learners demonstrate responsibility for self- learning, develop decision-making and problem solving skills (Betts, 1986; Betts & Kercher, 1999), and are eager to share and build upon others ideas (Diezmann & Waters). Consequently, autonomy is one of several important characteristics children who are mathematically gifted should exhibit as a function of Psychological Adjustment.

Additionally, the PBW scale reports environmental mastery. Gifted children assess their environmental perceptions of home and school in terms of their belief that

they will be supported and will be successful (Siegle & McCoach, 2005), in this case in their math placement. Ryff (1989) suggests that a person who believes they are in control of their environment has a sense of mastery and competence in managing the environment; has control of external activities; uses opportunities successfully; and is able to choose or create contexts that are in line with personal needs and values. According to Siegle and McCoach, perceptions of the "friendliness" of an environment influence academic attitudes and behavior (p. 26). This may suggest when children perceive their school environment is not emotionally safe, they are not able to manage their surroundings in a way that develops autonomous skills or meets their intellectual needs. Students' perceptions of teachers' attitudes about giftedness may affect whether students thrive intellectually or adapt to a less than optimal intellectual environment (Cross, 2002). Thus, if gifted students perceive their environment is safe and believe they have some intellectual control; the ability to succeed, they should report higher levels of environmental mastery.

Additionally, experts in the field of gifted education suggest that positive relationship with others is important to social and emotional development in. Intellectually and mathematically gifted children thrive in an environment that includes opportunities to be with their intellectual peers (Gentry & Owens, 1999; Kulik & Kulik, 1984, 1992; Lupkowski-Shoplik & Assouline, 1994; Rogers, 1998, 2007; Sheffield, 2003). This subscale of the PBW reports how individuals perceive their relationships as satisfying, expressing empathy, affection, and intimacy. Gifted research has determined that intellectual peer associations are instrumental for social emotional well-being (Rimm, 2002; Rogers, 2007; VanTassel-Baska, 2005). Often, gifted children who spend

little time with intellectual peers have difficulty with peer relationships (Piirto, 2007). Frequently they feel odd or different; gifted children report a strong sense of relief when they find someone who understands and thinks like they do (Cross, 2002), who is a kindred spirit. Opportunities to play and work with intellectual peers improve feelings of isolation and loneliness (Adams-Byers, et al., 2004) and according to Plucker, et al., (2004) "being in the company of like-minded peers with whom one can relate, converse, and argue is a critical component of intellectual and social development" (p. 269). Intellectually gifted children tend to make friends according to mental age, rather than chronological age (Gross, 2002). At a time when age peers of average ability are looking for playmates, gifted children belief's about friendship at the same age more complex (Gross); they seek close, trusting relationships. Thus, positive relationships with others should be perceived as an important aspect of well-being for these high ability learners. Therefore, when children are appropriately challenged and in an intellectually safe environment should exhibit higher levels of autonomy; achieve environmental mastery, and develop positive relationships with their peers.

Girls' Subscale Advantages

Three of the five subscales composing the Academic Adjustment construct are measures of positive social adjustment. Higher levels of adjustment were found for *attitudes towards school*, *attitude toward teachers and classes,* and *motivation and self-regulation* depending on gender and math placement. Unexpectedly, this analysis determined that psychological advantages were most pronounced for gifted girls enrolled in regular on-grade level math classes. Guided by the acceleration literature (Colangelo,

et al., 2004) that supports achievement gains and no evidence of social emotional effects from accelerated experiences, my assumption would have favored psychological advantages for students in accelerated math classes, evidenced by curriculum that appropriately challenges students' intellectual needs. Many of the accelerated students, perhaps for the first time in their school career, were actually learning new material, working at their instructional versus mastery level. Also according to the literature, accelerated gifted children should respond positively when they are given an opportunity to associate with their intellectual peers. Students in this study had an advantage in that their intellectual peers were also their age peers. Thus several assumptions related to higher levels of adjustment for accelerated students were unexpected.

Surprisingly, non-accelerated girls reported high levels of Academic Adjustment in their satisfaction with their overall *school experience*, *positive affect towards teachers and interest in classes*, and reported *higher motivational and self-regulating behaviors* which represent behaviors such as task commitment, persistence, work ethic, and self-control. Social comparison, big-fish-little-pond (BFLPE) theories (Marsh, 1994; Plucker, et al., 2004) may explain the influence of this phenomenon on students' self-conceptions. Whereas social comparisons generally report that gifted children in non-accelerated math classes perceived their level of ability to perform by assessing their innate abilities compared to the non-gifted peers in their math classes, comparisons in the current study included an additional comparison. Gifted girls in the regular math classes compared their intellectual ability against not only the gifted males in their math class, but also the non-gifted children in their mixed ability math class.

Findings from this study suggest that psychological advantages that were found for non-accelerated girls were not as significant for girls in accelerated classes. Social comparison theory may provide an explanation. While non-accelerated gifted girls viewed their ability positively compared against their heterogeneous classmates; non-accelerated gifted male peers and the non-gifted students in their classes, accelerated girls perceived their *school experience* and *attitude towards teachers and classes* through a different lens. Girls in the accelerated math classes must now assess their ability against peers of equal ability (Plucker &Callahan, 2008; Robinson, et al., 2007). No longer part of the big-fish-little-pond (BFLPE) environment, accelerated girls had to assess their ability against peers of equal ability and of the same age, thus a safe intellectual environment; with likeminded peers did not reveal advantages. These results are consistent with previous work that suggests that academic self-perceptions may temporarily decrease when students are placed in an intellectually challenging environment (Plucker & Taylor, 1998), thus it is possible that initially, *levels of satisfaction with their school experience* and *attitude towards teachers and classes* might not be as high. Overtime a safe intellectual environment may promote an atmosphere in which accelerants are willing to work harder than their male peers (Hong & Aqui, 2004). Further, willingness to work hard may be a catalyst to adopt positive *motivational and self-regulating* behaviors to be academically competitive (Rimm, 2002) and to perceive their school experiences positively.

Boys' Levels of Academic Adjustment

A majority of gifted programs across the nation serve more girls than boys, however, gifted boys still out perform girls on standardize math tests (Kitano, 2007). In this study where equal numbers of boys and girls were served and accelerated male and female students are academically successful, boys in both math group did not report higher levels of adjustment. Overall, regardless of their math group, gifted boys reported the lowest mean scores on all but one of the five subscales of Academic Adjustment compared to gifted girls in both math groups.

Regarding significant findings for boys, the accelerated group reported significantly higher levels of *motivational and self-regulating behaviors*; task commitment or level of persistence, work ethic, and self-control, compared to their non-accelerated gifted male peers, which is consistent with several recent studies that favored gifted males in areas of motivation, but contradicts findings that favor boys in areas of academic self-perception and goal valuation (Matthews & McBee, 2007; Preckel, et al., 2008). The current findings suggest that as boys in accelerated classes assess their ability against girls of equal ability and of the same age, but may feel more confident with their mathematical ability and motivated to succeed compared to their gifted female peers (Feingold, 1994; Reis, 2002).

The non-accelerated gifted males reported the lowest mean scores for motivational and self-regulating behaviors, and academic self-perception. Several reasons for their level of Academic Adjustment may explain their lower mean scores. In a recent study, Hong and Aqui (2004) concluded that academically gifted male math students believed that they could excel in math without exerting much effort. In this study, gifted

boys in regular math intellectually compared their abilities against themselves and their heterogeneous ability group. Their comparison of their ability would determine the level of effort needed to maintain their intellectual standing. The pattern of getting good grades without exerting much effort might lead to an unrealistic perception of their ability. Thus exerting less effort and being inappropriately challenged may determine their *attitude towards school* and *teachers and classes*. Lower mean scores for boys in both groups may suggest that their laissez-faire *attitude towards school,* and *teachers and classes* could be the result of being under challenged and/or underachieving (Siegle & McCoach, 2005).

Absence of Subscale Psychological Advantages

Two variables used to define Academic Adjustment revealed no psychological advantages. No perceivable differences by gender or math placement were found for *academic self-perception or goal valuation*. Findings in a recent study support significant differences comparing gifted achievers and gifted underachievers for not only *motivation,* but also found significant differences for *academic self-perception* and *goal valuation* for gifted achievers (Matthews & McBee, 2007). Another study of mathematically talented youth determined that there were significant differences favoring only gifted boys in *motivation,* and lower mean scores for only girls on *perceptions of their mathematical competence* (Preckel, et al., 2008).

Olszweski-Kubilius and Turner (2002) found that elementary age gifted boys and girls accurately perceived their academic abilities. For the current study, no difference in students' *academic self-perception* might be explained by social comparison theory,

which also proposes that a decrease in self-perception might be expected when accelerated students are "exposed to higher ability comparison groups" (Plucker & Taylor, 1998, p. 125). Additionally, accelerated math students' *self-perception* might be a result of a more realistic appraisal of how well they performed in the past and the likelihood of success in the future (Siegle & McCoach, 2005) compared to how non-accelerated students view their ability relationally with their non-accelerated and non-gifted math peers. Prior to accelerated math placement, current accelerated math students may have developed an elevated perception of their mathematical ability and their potential for success (Marsh, 1988, 1994), consequently when placed with intellectual peers who are the same age, their perception of their past performance and current likelihood for success is still positive but tempered. Further, because of how the district structured accelerated classes to allow students to take advanced math classes at their regular school site with accelerated students of the same age, students' perceptions of themselves as intellectual equals in this setting might explain a neutral or non-significant difference between groups.

Interestingly, accelerated and non-accelerated children viewed *goal valuation* in much the same way. The subjective value, the enjoyment of the activity or perceived value of the outcome, determines the effort students are willing to expend (Siegle & McCoach, 2005). Accelerated math students placed no more value in learning math than their non-accelerated peers, though a recent study with slightly older adolescents reported that academically gifted math students valued and were willing to expend more time learning math than their non-accelerated peers (Hong & Aqui, 2004). Despite administrators, teachers, and parent's understanding of the implications of acceleration,

students in accelerated classes in this study may not understand fully the value of participating in advance math classes other than the intrinsic value (Wigfield, 1994); they enjoy mathematical concepts and operations (Sheffield, 2003) and excel in math. How students report goal valuation may be due to their limited understanding of the attainment or utility value (Wigfield) associated with their accelerated math experiences. Attainment values are associated with core beliefs about how students identify themselves; valuing and setting goals because one is a good musician, or an excellent athlete, or a high achieving math student who draws affirmation from good grades and achievement scores. According to Rimm (2001), attainment values may be the most difficult to influence because during adolescence students core beliefs about themselves are developed. Concurrently, students may not understand the utility of their accelerated experience. Although students may experience the immediate reward of good grades, they may not fully appreciate how their current math placement may relate to future outcomes (Wigfield). Thus, if relevant utility values such as hard work, persistence, and task commitment are not addressed, students may not perceive or respond positively to goal valuation. Conversely, viewing accelerated math placement as fundamental to achieving their future goals will reap long-term benefits.

Limitations to the Study

There are several possible limitations to this study. The participants for this study were considered an intact group, in that children's math placement determined their group membership. Once the district notified parents about the research and parents who opted to not have their children participate were identified, each school site arranged to

administer the instruments. This study relied on district staff to administer the self-reported instruments to assess Academic Adjustment. Thus, control over the testing environment was sacrificed to obtain district data. The testing environment may have differed by school site. Seventh grade math students from mixed grade accelerated classes were pulled from their home-base period prior to their first hour class to complete the instrument in the auditorium under the supervision of school personnel, where as the rest of the participants completed the assessments in their math classes. Additionally, if children were absent on the day the instruments were administered and were eligible to participate, a second opportunity was not offered to participate in the research. However, math teachers at both fifth and sixth grade school sites offered a makeup session to allow children who were absent to participate. Finally, though a guideline for completing the instruments was suggested in the instructions, different amounts of time allowed to complete the surveys may have varied by site.

Self-reporting instruments may only provide a snapshot of children's views on specific attitudes, rather than capturing an overall perspective of their level of Academic Adjustment. Additionally, self-report measures may generate responses according to what the respondent might think is expected. The use of self-report questionnaires have innate weakness: responses may be subjective, and may reveal social desirability responses to the assessment rather than revealing students' true attitudes (Hamilton, et al., 2003).

Socio-economic status was not included in the demographic data collected for this study. The suburban demographic makeup of the district may attribute to small amount of

variance generated. Diverse ethnic groups and minority groups were not overly represented in the study population.

Implications of the Study

Conclusions drawn from the results of this study suggest several implications. Results from the analysis of this study provided a basis to further investigate Academic Adjustment as a construct for positive psychological advantages. Understanding the influence of Academic Adjustment as social and emotional well-being construct may improve perceptions of acceleration interventions and the implementation of programs that address the intellectual and social emotional issues of mathematically gifted students. Further, the conclusions drawn from the analysis of a Psychological Adjustment construct need further investigation. Specific implications for theory, practice, and research are addressed.

Implications for Theory

Central to the study of whether possible psychological advantages exist for accelerated children is the notion that children with exceptional gifts and talents who have participated in accelerated programs suffer few negative psychological effects from their accelerated experience (Colangelo, et al.; 2004; Rimm, 2002; Roedell, 1984; Rogers, 2004). Though widely accepted as an appropriate instructional intervention, there exists general and pervasive hesitation to accelerate students who are gifted (Colangelo, et al.). District personnel and parents fear that acceleration might have harmful effects on the social and emotional development of their students and children (Elkind, 2001; Gagné

& Garnier, 2004; Lynch, 1996; Swiatek, 2002; Reis, 2002). Skepticism may exist because few acceleration studies currently include comparisons with non-accelerated gifted children identified according to the same criterion (Lohman & Marron, 2008). Social emotional well-being conceptualized as Academic Adjustment differs from previous acceleration studies that report the absence of negative psychological effects. In the current study comparison of non-accelerated and accelerated gifted children found evidence of psychological advantages by gender and math group.

Research on social and emotional outcomes for students in accelerated programs is considerably more limited that what is currently known about achievement outcomes (Robinson, 2004). Academic adjustment is conceptualized as a framework to understand whether psychological advantages (Gross, 2003; Neihart, 2007) of acceleration exist for gifted children. The framework contains constructs indentified as characteristics associated with positive attitudes toward school. Examining the influence of participation in accelerated courses on Academic Adjustment and overall well-being with special interest in gifted females and their math placement, the result of this study suggested that there were positive gender differences in adjustment. Positive psychological advantages were reported for non-accelerated girls on three subscales of Academic Adjustment and on one subscale for accelerated boys.

Of the total number of gifted children that participated in this study, 70% were accelerated in math one to three years ahead of their grade peers. Children in this study were considered intellectually equipped for the rigor of an accelerated math program. Thus, the Academic Adjustment construct served to not only identify whether higher levels of social emotional adjustment existed for students in accelerated programs, but to

also provide a comparison of accelerated and non-accelerated levels of adjustment. Therefore, this study adds to acceleration research in that it demonstrates that not only are there few negative psychological effects from participation in accelerated programs but there appears to be psychological advantages for gifted boys who are participating in accelerated math programs and for gifted girls in regular math programs .

Implications for Practice

The results of this research suggest that non-accelerated girls and respond positively to school, enjoy a positive relationship with their teachers and are interested in their coursework, exhibit positive motivation and self-regulating strategies which suggests that to date have not lost confidence in their mathematical ability nor have succumb to peer influence. Likewise boys in accelerated classes reported positive motivation and self-regulating behaviors. Research cautions that mathematics self-perception fluctuates between grade school and high school (Nokelainen, et al., 2004). Previous research suggests that gifted girls with mathematical promise in elementary school gradually lose confidence in their mathematical ability, exert less and less effort and overtime lower their expectations of success (Bell, 1989; Cross, 2002; Kline & Short, 1991) and tend to choose less rigorous courses during secondary years (Piirto, 2007; Reis, 2002).

Though previous research is cautionary, the findings of this study suggest that gifted girls in regular math classes are socially adjusted; slightly lower mean scores for accelerated girls indicate that positive mathematical attitudes should be further encouraged. Findings of significance for *attitude towards school, teachers and classes,* and *motivation/self-regulation* are important factors in social adjustment, thus vigilance is

need to nurture positive attitudes towards math for girls in accelerated programs and boys regardless of their math placement. District administrative decisions, teachers' instructional practice, and parents' perceptions of mathematical ability influence students' motivation and perception of their ability to be successful in math (Sheffield, 2003; Reis, 2002), therefore those who work with gifted children should foster positive mathematical attitudes.

Prior to analyzing the results of the research questions, IQ scores were looked at to eliminate IQ's contribution to adjustment. Though not a primary focus of this study, IQ differences for accelerated and non-accelerated gifted math students may provide insight for future math talent identification procedures. Analysis determined that gifted students in accelerated math classes had lower mean IQ composite scores than their non-accelerated peers and gifted boys had higher quantitative mean IQ scores than their female peers. Characteristically, Oklahoma school districts use 130+ IQ, the top 3% (Oklahoma State Department of Education, 2009) as the standard to identify children intellectually gifted for gifted services. Lower mean composite IQ scores recorded for accelerated math students compared to their non-accelerated peers in this study may suggest that potential or aptitude for math talent is not dependent on scoring in the top 3%. Seeking only the top 3% limits the pool of talented math students (Gallagher, 2008). The differences found favoring boys on the quantitative (math reasoning) subscale score for IQ differ from another study with elementary children that found no significant differences are measurable in mathematical reasoning ability for elementary boys and girls (Springler & Alsup, 2003). Contradictions might suggest that IQ alone is not a good predictor of finding math talent (Sheffield, 2003). As educators continue to identify math

talent at younger ages, multi-criterion methods are needed to preclude any one indicator as a gatekeeper that excludes math talent.

Implications for Research

The limited research for social and emotional outcomes for students in accelerated programs (Robinson, 2004) suggests that to fully understand Academic Adjustment as a framework to measures psychological advantages (Gross, 2003; Neihart, 2007), further research is needed. Since small but positive variance found between math groups and gender on Academic Adjustment, repeating the study with a different demographic such as an urban school district, larger variance between the subscales might be observed. The current research was conducted in a suburban district, with overall moderate to high SES, and minimal diversity in the gifted program, however there is a recognizable population of Asian, and middle eastern students. Repeating the study with an urban school district might eliminate an unbalanced ratio that reported 70% accelerated participants.

Additional research with the same data might look more closely at possible differences by grade, math group, and gender. Differences were observed in favor of gifted girls on three subscales of Academic Adjustment, however it is not known at what grade level specific psychological advantages exist or whether differences existed by grade for girls in accelerated classes. Likewise, data generated concerning gifted boys needs additional study. Finally, administering pre and post-tests to differentiate levels of adjustment resulting from initial perceptions of participation in accelerated or regular math classes and levels of adjustment at the end of the first semester may add to our understanding of Academic Adjustment.

Conclusions from the results of this study suggest that the Psychological Adjustment instrument (PWB) may not suitable for this age group. Though construct validity was established for the instrument, a weak relationship exists between students' social and emotional adjustment at school assessed by the variables for Academic Adjustment and the variables for Psychological Adjustment. Divergent construct validity was assumed for the relationship between Academic and Psychological Adjustment. Both constructs shared some variance, but are distinct constructs.

Though evidence for positive social adjustment was discovered, results of this study suggest that a new instrument should be developed to measure gifted children's level of psychological well-being as proposed as a construct for psychological or emotional adjustment. Further, adaptations to the current instrument might be considered. Adaptations might include revising the number of statements and reviewing the wording statements for readability for student friendly language. Written comments on the answer sheets may indicate that students did not relate sufficiently to the statements. Several variables on the PWB instrument are considered important aspects of emotional well-being for gifted and mathematically gifted children and may indicate that there are still potential differences between the emotional well-being of accelerated and non-accelerated students. A final modification would reduce the instrument to three subscales; autonomy, environmental perception and mastery, and peer relationships to more appropriately measure aspects of gifted characteristics for emotional well-being.

Closing Remarks

Gifted females' academic and psychological well-being will continue to be a topic for 21st century discussion. The theme of unfulfilled mathematical potential is gradually gaining parity, but vigilant educators will monitor the progress. Given opportunity and support, mathematically gifted girls will discover the beauty of mathematics and potential for the future.

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APPENDIX A

Oklahoma State University Institutional Review Board

Date:	Monday, November 10, 2008
IRB Application No	ED08168
Proposal Title:	Academic Adjustment of Gifted Fifth, Sixth, and Seventh Grade Children Placed in Accelerated Math Courses
Reviewed and Processed as:	Exempt

Status Recommended by Reviewer(s): Approved **Protocol Expires: 11/9/2009**

Principal Investigator(s):

Linnea Van Eman
P.O. Box 702766
Tulsa, OK 74170

Diane Montgomery
424 Willard
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Sheila Kennison, Chair
Institutional Review Board

APPENDIX B

INTERACTION MEANS FOR MATH GROUPS

Figure 1

Interaction Means for Regular Math

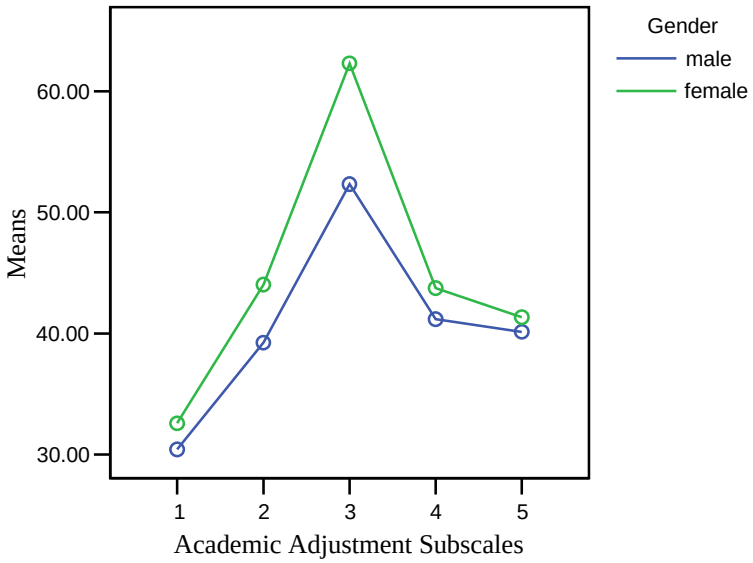
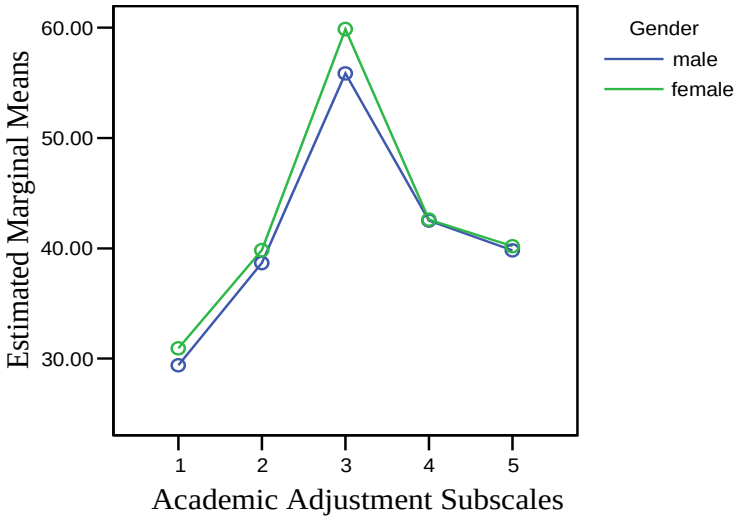


Figure 2

Interaction Means for Accelerated Math



APPENDIX C

INTERACTION MEANS FOR ACADEMIC ADJUSTMENT SUBSCALES

Figure 3

Interaction Means for Attitude toward School

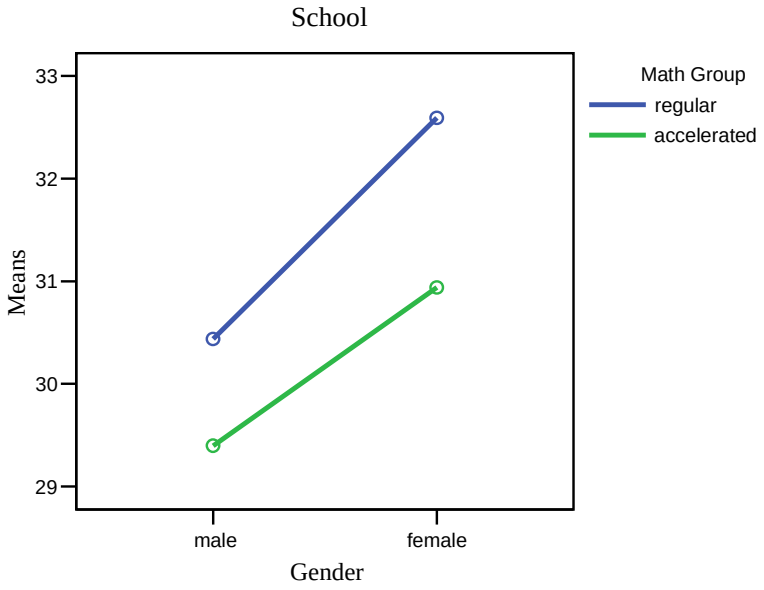


Figure 4

Interaction Means for Attitude towards Teachers

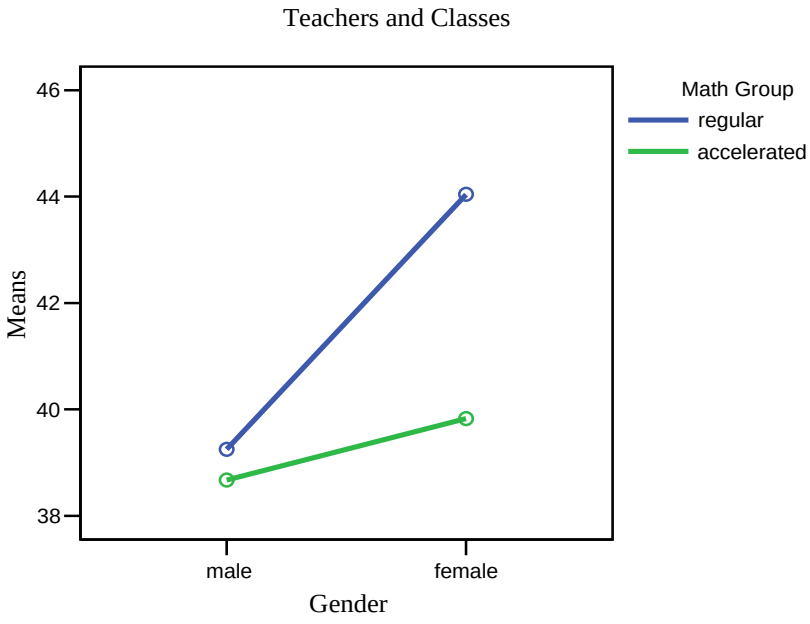


Figure 5

Interaction Means for Motivation-Self-regulation

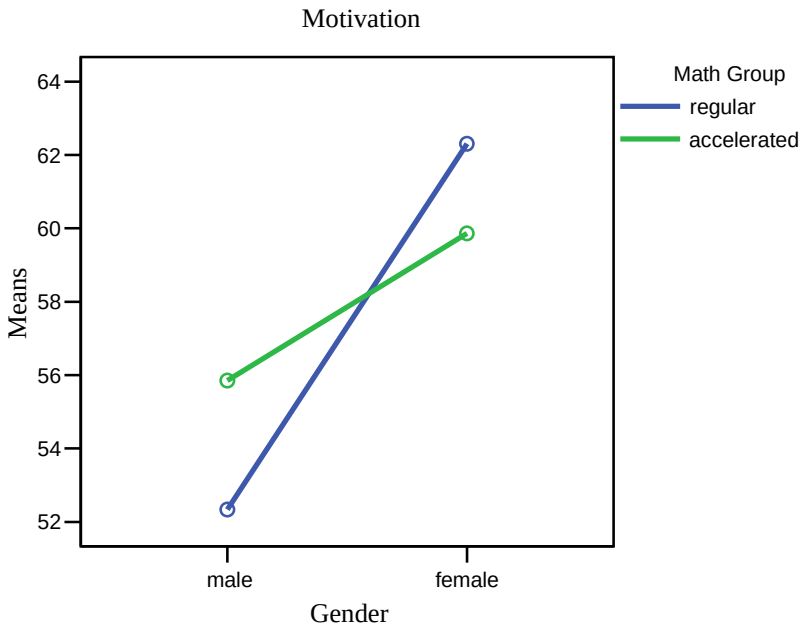
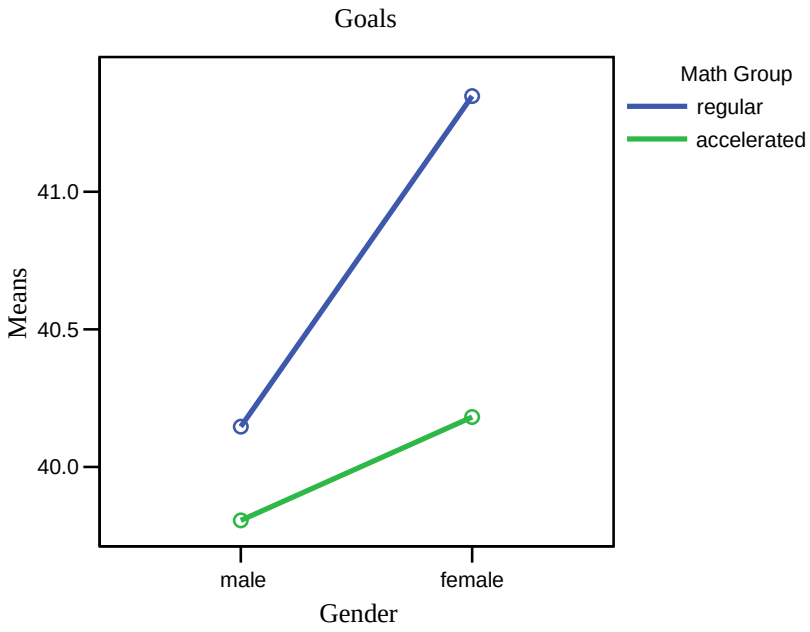


Figure 6

Interaction Means for Academic Self-perception

Figure 7

Interaction Means for Goal Valuation



VITA

Linnea Marie Van Eman

Candidate for the Degree of

Doctor of Philosophy

Thesis: ACADEMIC ADJUSTMENT OF GIFTED FIFTH, SIXTH, AND SEVENTH GRADE CHILDREN PLACED IN ACCELERATED MATH COURSES

Major Field: Educational Psychology

Biographical:

Education: Graduated from Nathan Hale High School, Tulsa, Oklahoma in May, 1970. Received a Bachelor of Science in Psychology from Oklahoma State University, Stillwater, Oklahoma in May 1973. Completed the requirements for a Masters of Educational Psychology, Gifted and Talented Education from Oklahoma State University, Stillwater, Oklahoma in May, 2005. Completed the requirements for the Doctor of Philosophy in Educational Psychology at Oklahoma State University, Stillwater, Oklahoma in May, 2009.

Experience: I received k-12 teaching accreditation in 1997. I was an art educator, humanities and church history in a private school k-12 from 1989 until 2000. From 2000-2002, I held the position of District Coordinator for Gifted Programs, in a rural public school k-12 working with administration, faculty, students, and parents. I returned to graduate school in January 2003. As a graduate research associate I participated in an arts infusion research project designed to transform teaching and learning in at risk elementary schools. Additionally, as a teaching assistant I taught several teacher education courses. I am currently a gifted coordinator for a suburban intermediate public school.

Professional Memberships: American Educational Research Association, Council for Exceptional Children-Talented and Gifted, National Association for Gifted Children, Oklahoma Association for the Gifted-Creative-Talented, Phi Kappa Phi

Name: Linnea Marie Van Eman Date of Degree: May, 2009

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: ACADEMIC ADJUSTMENT OF GIFTED FIFTH, SIXTH, AND SEVENTH GRADE CHILDREN PLACED IN ACCELERATED MATH COURSES

Pages in Study: 133 Candidate for the Degree of Doctor of Philosophy

Major Field: Educational Psychology

Scope and Method of Study: The purpose of this study was to investigate the influence of participation in accelerated math courses on Academic Adjustment for gifted fifth, sixth, and seventh grade children, with special interest in gifted females and their math placement. The constructs, *Academic and Psychological Adjustmen*t were conceptualized to determine whether psychological advantages existed for students in accelerated math classes and were conceptualized as *social variables* related to school and *emotional variables* related to overall psychological well-being. Academic Adjustment included positive academic indicators consisting of *attitudes toward school, attitudes towards teachers and classes, motivation and self-regulation, academic self-perception, and goal motivation* to determine social emotional well-being. Psychological Adjustment was conceptualized through variables that measured psychological well-being such as *autonomy, environmental mastery, positive relationships with others, personal growth, self- acceptance, and purpose in life*. Bivariate correlations were generated to examine the intra-relationship among the variables defining both construct. Bivariate correlations were also utilized to analyze the interrelationship between the variable sets. The influence of acceleration and gender on Academic adjustment was examined through repeated measures ANOVA analysis.

Findings and Conclusions: Significant positive correlations were reported within variable sets for Academic Adjustment and Psychological Adjustment and a relationship between the two constructs was statistically significant, though small. A statistically significant three-way interaction existed for gender, math group, and Academic Adjustment. Significant simple main effects were found in three of the five subscales of Academic Adjustment suggested psychological advantages were evident for non-accelerated girls in their *attitude towards school* and *attitude for teachers and classes*. For *motivation,* there was a pattern change in that for girls, the non-accelerated scored higher than the accelerated group, but the opposite was true for boys. Boys in the accelerated group scored significantly higher in *motivation* than did the non-accelerated group. Finally, there were no gender differs by group for student *academic perception* or *goal valuation.*

ADVISER'S APPROVAL: Diane Montgomery