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AN EXPLORATION OF THE RELATIONSHIPS BETWEEN ACADEMIC ENABLERS AND MIDDLE SCHOOL ACHIEVEMENT

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ABSTRACT

The purpose of the present study was to explore the relationships between middle school students' academic enablers and their later academic achievement. Based on previous research, five student academic enablers (academic self-efficacy, academic motivation, interpersonal skills, academic engagement, and study skills) were used to predict students' year-end standardized achievement scores after controlling for cognitive ability, prior achievement, gender, and free/reduced lunch status. The final data set included 733 students in Grades 6-8 at one suburban middle school in the Northeast U.S. It was hypothesized that all enablers would demonstrate small to moderate relationships with language arts and math achievement across all grade levels. After controlling for cognitive ability and student background characteristics, none of the academic enablers substantially added to the prediction of achievement test scores. Although math self-efficacy demonstrated a statistically significant relationship with later math achievement in all grades, this relationship was negligible in magnitude. These results were similar to several previous studies that included cognitive ability or previous achievement in the models. Results indicated that cognitive ability and previous achievement continue to have the greatest impact on academic achievement gains at the middle school level as they do in younger and older populations. Limitations of the study, implications of the findings, and directions for future research are addressed.

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Dedication

This dissertation is dedicated to my mother and my daughter. Mom, you have been my best teacher my whole life. As a divorced mother of six children, you instilled in all of us the importance of endurance and perseverance in the face of adversity. I have learned that life is what you make of it and you can never give up. You have given me a love of learning by example (having earned your B.A. later in life while employed full-time) and you have taught me always to believe in myself. Most of all, you have been my main supporter in life, my rock, and my life coach! Without your encouragement through the years and the tenacity you have taught me, this goal would not have been accomplished.

To my daughter, Olivia Marie, you have taught me more than any course I have ever completed. If I could teach you one thing it would be to never, ever give up on your goals no matter what life throws in your way. Seize the moment, believe in yourself, and make every moment count! As I watch you grow year after year, I see how intelligent, inquisitive, and observant you have become. Your amazing, commanding personality lights up a room. I hope to inspire you to develop a love of learning. I dedicate this dissertation to you as an example of what you can accomplish if you never give up on your goals. Many obstacles have come my way in my life, but perseverance is what gets you places in this world.

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CHAPTER 1: Introduction

The concept of a “middle school” was introduced over 60 years ago to address the unique social, psychological, and academic needs of students that could not be addressed at the high school or even “junior high” school levels (Allen, 1992; Manning, 2000). During the transition to middle school, most adolescents begin to face a myriad of new social, emotional and academic challenges. These years are a time when academic expectations are raised, teacher support is reduced, and independent learning is expected (Barber & Olsen, 2004). By the time students enter middle school they bring with them not only established academic skills but also developed patterns of studying and socializing. In addition, students have developed specific attitudes towards school and each academic subject based on their previous performances (Pintrich & De Groot, 1990; Linnenbrink & Pintrich, 2002). These factors affect how students handle the new challenges that come with middle school.

For students who cannot navigate these challenges, the middle school years can be a negative experience that leads to dropping out of high school. Although students bring specific behaviors and attitudes to middle school, the struggles they often encounter during this time may bring about decreases in such things as academic motivation, academic self-efficacy, academic engagement, and ultimately academic achievement (Alspaugh, 1998; Barber & Olsen, 2004; Carnegie Council on Adolescent Development, 1989; Eccles et al., 1993; Wigfield, Eccles, Mac Iver, Reuman, & Midgley, 1991). Decreases in achievement are frequently followed by a disinterest in school and eventual dropping out (Alexander, Entwisle, & Kabbini, 2001; Blackorby & Wagner, 1996; Bowers, 2010). Even for those students not at risk for dropping out, many leave middle school ill-prepared for the academic demands of high school, which subsequently may affect their success in college (NMSA, 2006). Therefore, it is valuable to examine factors associated with academic success in middle school to improve the education of many students.

In an effort to identify those students at risk for dropping out of high school and improve the scholastic performance for all students, previous research has focused on a variety of school, family, and student variables that influence achievement (Carroll, 1963; Bloom, 1974; Lee & Shute, 2010; Walberg, 1981). School variables have included educational expectations (Mulhall, Flowers, Mertens, 2002; Ou & Reynolds, 2008), school size, curriculum flexibility (Driscoll, Halcoussis, & Svorny, 2003; Gadwa & Griggs, 1985), and teacher involvement (Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008). Family variables that have shown a significant positive correlation with achievement include parental involvement (Bronstein, Ginsburg, & Herrera, 2005) and socioeconomic status (Sirin, 2005).

Studies of student variables have included such factors as intelligence (Sattler, 2001), previous achievement (Bowers, 2010; DiPerna, Volpe, & Elliott, 2002, 2005; Lounsbury, Sundstrom, Loveland, & Gibson, 2003; Parkerson, Lomax, Schiller, & Walberg, 1984), and gender (Pintrich & De Groot, 1990; Wigfield, Eccles, & Pintrich, 1996). Although intelligence and previous achievement consistently have emerged as two of the strongest individual predictors of current student achievement (Vanderwood, McGrew, Flanagan, & Keith, 2001), several studies have found approximately half of achievement variance unexplained by these two variables. In addition, higher IQs cannot always overcome the negative effects of risk factors in students (Finn & Rock, 1997; Grigorenko & Sternberg, 1997; Leeson, Ciarrochi, & Heaven, 2008; Murayama, Pekrun, Lichtenfeld, & vom Hofe, 2012). Likewise, although previous achievement has been established as one of the strongest predictors of future achievement, other student variables such as interpersonal skills (Malecki & Elliott, 2002), academic self-efficacy

(Silverthorn, DuBois, & Crombie, 2005), academic engagement (Gettinger & Seibert, 2002; Singh, Granville, & Dika, 2002), academic motivation (Eccles, et. al., 1993), and study skills (Wang, Haertel, & Walberg, 1990, 1993) also have demonstrated relationships with future achievement.

Such variables, or “academic enablers,” have demonstrated direct and indirect relationships with academic achievement (e.g., Blair, 2002; DiPerna, Volpe, & Elliott, 2005; Duckworth, 2009; Duckworth & Seligman, 2005; McClelland, Morrison, & Holmes, 2000; Singh, Granville, & Dika, 2002; Sirin & Sirin, 2004; Pintrich & De Groot, 1990; Wentzel, 1996). Therefore, while constructs such as cognitive ability are less amenable to change and other variables such as gender not amenable to change, student academic enablers have been shown to improve as the result of interventions (Bellanca, & Brandt, 2010; Deshler & Schumaker, 1993; Durlak, Weissberg, Dymnicki, Tayler, & Schellinger, 2011; Greenwood, 1991; Hattie, Biggs, & Purdie, 1996). As a result, psychologists and educators alike are interested in better understanding these relationships and interventions to improve academic enablers as means to improve achievement and reduce dropout rates (Zins, Bloodworth, Weissberg, & Walberg, 2004).

Based on the research of Walberg (1981), Wang et al. (1990, 1993) and others, determined that, in addition to academic skills (i.e., math, language, and critical thinking skills), behaviors and attitudes influence students’ academic achievement. DiPerna and Elliott (2000) defined these behaviors and attitudes as academic enablers “that allow a student to participate in, and ultimately benefit from, academic instruction in the classroom” (p. 294). Their academic enablers included interpersonal skills, engagement behaviors, motivation, and study skills.

After determining that many previous studies only focused on only one or two academic enablers at a time, DiPerna, Volpe, and Elliott (2002, 2005) tested a comprehensive model of student academic enablers and academic achievement with several samples of elementary level students. The DiPerna et al. model included prior achievement, academic motivation (i.e., persistence of mastery goals), study skills, social skills (i.e., interpersonal skills), and classroom participation (i.e., engagement). Through the use of structural equation modeling, the authors found that students' prior achievement and interpersonal skills influenced their motivation, which subsequently influenced study skills, engagement and later academic achievement. DiPerna et al. (2005) tested the 2002 model as well as alternative models and still found the original model to be most appropriate for explaining the variance in elementary math achievement.

Currently, there are several limitations to the body of literature examining relationships between academic enablers and achievement. First, most research has focused on achievement with samples at the elementary level. Second, due to methodological differences across studies the relationships between some of the academic enablers and achievement are still not clear. For example, while some studies measured short-term or concurrent gains in achievement, others studied the effects of enablers on long-term achievement gains over many years. Some studies also measured enablers through teacher or parent reports, while others utilized student self-reports. Similarly, differences in the measurement of achievement (i.e., student grades vs. standardized achievement tests vs. high school graduation) and operational definitions of academic enablers have contributed to the lack of clarity regarding the relationships between student academic enablers and achievement. In addition, although some researchers measured the effects of multiple enablers on achievement, they often omitted control variables such as previous achievement, intelligence, gender, or socioeconomic status. Finally, although the DiPerna et al. (2005, 2005) models included many of the enablers measured in this study, it did not include gender, cognitive ability, or academic self-efficacy. In addition, it utilized teacher report as a measure of academic achievement.

Therefore, the purpose of the present study was to examine the relationships between multiple student academic enablers and subsequent language arts and math achievement with a sample of middle school students. The academic enablers of interest included academic self-efficacy, academic motivation, academic engagement, study skills, and interpersonal skills. In the following section, I review the extant literature examining the relationships between the aforementioned academic enablers and academic achievement.

CHAPTER 2: Literature Review

Student Academic Enablers Associated with Achievement

Although academic skills and cognitive abilities play a large part in the achievement gains of students, several authors have determined that particular student behaviors and attitudes positively affect student achievement as well (Carroll 1963; Walberg, 1981; DiPerna & Elliott, 1999, 2000; DiPerna, Volpe, & Elliott, 2002, 2005). The study of the relationship between student academic enablers and academic achievement has included variables such as academic motivation (e.g., Eccles et. al., 1993), academic self-efficacy (e.g., Silverthorn, DuBois, & Crombie, 2005), interpersonal skills (e.g., Malecki, & Elliott, 2002), behavioral engagement (e.g., Gettinger & Seibert, 2002; Singh et al., 2002), and study skills (e.g., Wang, Haertel, & Walberg, 1990, 1993). Furthermore, research studies examining these variables have examined concurrent and longitudinal relationships. In addition, not all studies included control variables in their analyses.

Academic Self-Efficacy. Overall, academic self-efficacy has been defined as a self-appraisal of one's ability to perform and succeed in tasks associated with different academic subjects or levels (Bandura, 1977; Pintrich & De Groot, 1990; Pintrich, Smith, Garcia, & McKeachie, 1993). According to Zimmerman (1996) self-efficacy can be domain specific (e.g., math skills) or task specific (e.g. solving math equations). For the purposes of this study, academic self-efficacy was measured at the domain specific level.

The measurement of academic self-efficacy has been based on the expectancy theory (Pintrich & De Groot; Pintrich et al., 1993). This theory purports that students will partake in particular self-regulating behaviors based on how confident they are in their abilities to succeed at a task related to the domain of interest (e.g., math or language arts). Specifically, when students feel they are capable of doing well in a class or understanding the material, they will try a variety of study behaviors to persist and succeed when faced with challenges (Eccles, Wigfield, & Schiefele, 1998). High levels of academic self-efficacy often improve achievement indirectly by not only increasing academic enabling behaviors but also the self-regulation of those behaviors as well (Linnenbrink & Pintrich, 2002; Long et al., 2007; Pajares & Graham, 1999; Pajares & Kranzel, 1995; Pajares & Schunk, 2001; Pintrich & De Groot, 1990). Students with high levels of self-efficacy tend to attribute failure to lack of effort; therefore, they spend time on analyzing obstacles to goals and adjusting their efforts accordingly. Conversely, students who have low levels of self-efficacy tend to attribute their failures to lack of ability; therefore, they spend less time on problem-solving and give up more easily (Bandura & Wood 1989; Pajares, 1996; Pintrich & De Groot, 1990).

Students who have experienced academic success in the past use that success to inform self-efficacy beliefs at the task-specific and domain levels (Linnenbrink & Pintrich, 2002; Pajares & Grahm, 1999; Pajares & Schunk, 1999; Pintrich & Schunk, 2002). Students with higher levels of self-efficacy tend to have higher levels of task persistence, academic engagement, and self-regulation (Linnenbrink & Pintrich; Pajares & Schunk; Pintrich & De Groot, 1990). Consequently, students with higher levels of various forms of self-efficacy tend to have higher levels of achievement gains over time (Linnenbrink & Pintrich; Schunk, 1995; Long et al., 2007; Pajares & Schunk, 2001). In addition, those students with higher levels of self-efficacy tend to take more challenging courses, thus exposing themselves to a higher level of academic knowledge than their peers with low levels of self-efficacy (Eccles et al., 1993).

Most research has found that high levels of academic self-efficacy contribute to academic success for students at all educational levels. Long et al. (2007) studied several motivational variables, including academic self-efficacy, and their relationships to the grade point averages (GPA) of eighth and ninth grade students (*N* = 414) from a large Midwestern, urban school district. Hierarchical regression analyses were conducted on self-reported levels of subject specific self-efficacy beliefs, goal orientations, and domain interests to determine the relationships. After controlling for gender, self-efficacy emerged as one of the stronger predictors of GPA for both eighth and ninth grade students. In addition, Pajares and Graham (1999) found that task-specific self-efficacy beliefs were able to significantly predict fall and spring math achievement for a group of middle school students even after controlling for other variables of interest such as previous achievement, engagement and math self-concept.

Pintrich and De Groot (1990) conducted a correlational analysis with student self-report data from a modified version of the Motivated Strategies for Learning Questionnaire (MSLQ) with 173 seventh graders. The authors measured how certain aspects of motivation were related to each other and academic performance, as measured by final course grades, exams and quizzes, homework grades, and seatwork in class. Their findings indicated that among other enablers, higher levels of intrinsic motivation and academic self-efficacy were significantly related to better use of cognitive and self-regulation strategies, which were directly related to achievement gains. These strategies were then related to exams and quizzes, homework grades, in-class seatwork and grades. However, the authors noted that students not only needed to believe they were able to complete work, they also had to have good metacognitive skills.

The influence of self-efficacy appears to continue into the college years as well. For example, Coutinho and Neuman (2008) examined the influence of self-efficacy and other student characteristics on undergraduate student achievement. Participants completed a survey that included measures of achievement-goal orientation, learning style, self-efficacy, and metacognition. The authors used structural equation modeling to identify a best-fitting model for the data, and based on that model, the self-efficacy variable was the strongest predictor of performance. The authors concluded that students who had more academic confidence experienced more scholastic success.

Academic Motivation. Various theories of motivation have been identified as being key components to better academic outcomes for students (Covington, 2000). Students who are motivated not only participate more in the classroom, they also have higher graduation rates (Lau & Roeser, 2002; Kushman et al., 2000; Singh, et al., 2002). In general, motivation has been defined as a psychological process that involves a student's beliefs, values, and goals (Wigfield & Eccles, 2002). Motivation can be intrinsic (i.e., wanting to learn for the sake of learning) or extrinsic (i.e., influenced by external factors) (Linnenbrink & Pintrich, 2002; Murayama et al., 2012).

For the purposes of the current study, motivation was defined as a "student's approach, persistence, and level of interest regarding academic subjects" (DiPerna & Elliott, 2000, p.6). This definition is based on mastery goal orientation and intrinsic academic motivation. From this perspective, motivation to learn and master the work presented in a class comes from within the student. The student is motivated by a need to understand the material taught in class and do his or her best. Therefore, the student engages more in the classroom and persists when faced with challenges because he or she believes that hard work will pay off in higher levels of achievement (Ames, 1992; Dweck & Leggett, 1988; Eliott & Dweck, 1988; Elliott & Harackiewicz, 1996).

Research has found mastery goal motivation to be related to language arts and math achievement at many levels of education. In addition, it has been found to be a factor in concurrent and long-term achievement as well (Anderson & Keith 1997; Ginsburg & Bronstein, 1993; Gottfried, 1985; Murayama et al., 2012; Unrau & Schlackman, 2006). For example, DiPerna et al. (2002) tested a multivariate model of academic enablers and language arts achievement with elementary students in Grades K-6. Teachers rated the academic enablers in the beginning and end of the school year as well as the academic skills of the students. Using structural equation modeling, the authors found evidence that, in addition to previous achievement, motivation played a key role in predicting achievement through its significant relationship with study skills and engagement for all grades. Moreover, DiPerna et al. (2005) studied the fit of their model for math achievement and found similar results to their 2002 study.

Likewise, Casillas et al. (2012) conducted a comprehensive study with a large sample of middle-school students (*N*=4660) and collected data on school, demographic, academic, behavioral, and psychosocial factors of the students. The authors conducted multiple linear regression analyses and found motivation to be significantly related to later academic achievement. Long et al. (2007) found that learning goals showed positive, significant correlations with middle school students' achievement while work-avoidance goals did not. Finally, Cleary and Chen (2009) measured the relationships between students' motivation and self-regulation use in a large sample of sixth and seventh grade students and found them both to be related to achievement. Motivation had a stronger relationship with math grades in seventh grade than it did in sixth.

In addition to promoting higher grades, academic motivation may be a protective factor in the achievement of at-risk high school students. Students with higher levels of motivation tend to display persistence in the presence of challenges typically faced by at-risk students (Anderson & Keith, 1997; Heckman & Rubinstein, 2001). Anderson and Keith (1997) utilized structural equation modeling to analyze longitudinal data from a large cohort of at-risk high school students and concluded that motivation not only directly and indirectly influenced overall achievement (as measured by general achievement tests), but also served as a protective factor for at-risk students. Included in the model were student characteristics such as family SES, parental involvement, ability, ethnicity, gender, and academic coursework. Results of the analysis indicated that all variables in the model, with the exception of parental involvement, had significant total effects on achievement. Although ability had the strongest effect on the achievement of the at-risk students, motivation exerted a significant total effect as well. Moreover, it appeared to be a protective factor for those students at-risk for failure and demonstrated a stronger relationship with achievement for girls than boys.

Despite this relative consistency in findings, other research has yielded conflicting results. That is, when cognitive ability is taken into account the predictive power of motivation is diminished. For example, Gagne and St. Pere (2001) studied the short-term achievement gains of 205 Canadian female middle school students and found student, teacher, and parent reports of student motivation to be unrelated to IQ and achievement. The authors measured the students' IQ in the beginning of the semester via two IQ tests and three motivational measures (intrinsic, extrinsic, and persistence) twice during the semester. Parent and teacher ratings of student motivation were also collected twice for each type of motivation. However, none of the ratings of motivation were able to predict student achievement after taking cognitive ability into account.

Academic engagement. Also known as "behavioral engagement," academic engagement denotes students who attend to and participate in classroom instruction (DiPerna & Elliott, 2000; Fredricks, Blumenfeld, & Paris, 2004). Greenwood, Delquadri, & Hall, 1984).

They display behaviors such as performing calculations, taking notes, participating in tasks, reading aloud and silently, discussing academic topics, and asking and responding to questions (Appleton, Christenson, & Furlong, 2008; DiPerna & Elliott, 2000; Greenwood, et al. 1984; Marks, 2000). The construct has been hypothesized to be influenced by academic enablers such as motivation, academic self-efficacy, and interpersonal skills (Benner, Graham, & Mistry, 2008; DiPerna et al. 2002, 2005; Greenwood, 1991).

Although academic engagement is measured through the aforementioned observable learning-related behaviors in the classroom, it is hypothesized to be a manifestation of emotional and cognitive engagement as well (Fredericks, Blumenfeld, & Paris, 2004). Theory posits that students learn how to engage in instruction by observing others in the classroom and actively engage in topics that are interesting and enjoyable for them (Bonfenbrenner, 1979). Through socializing in school and the classroom, students learn to focus on important tasks and synthesize new information as it is presented to them by asking questions. Often, a student’s personality characteristics, his or her positive experiences when paying attention in settings outside of the classroom, and the anticipated value of participation in the classroom all influence student’s academic engagement in the classroom (Csikszentmihalyi, 1990).

Academic engagement often provides a direct rather than an indirect effect on achievement. Enhancing academic engagement in the classroom may also serve as a protective factor for those students who are at risk for failure (Connell, Spencer, & Aber, 1994; Finn & Rock, 1997; Greenwood, 1991). Furthermore, academic engagement has been shown to be related to both report card grades and standardized achievement test scores, and similar to motivation, it can vary from subject to subject (Finn & Rock, 1997; Hughes, Luo, Kwok, &

Loyd, 2008). For the purposes of this study, behavioral engagement was defined as "behaviors that reflect attentive, active participation in classroom instruction" (DiPerna & Elliott, 2000, p.6)

In a study involving at-risk high school students, Finn and Rock (1997) examined the effects of engagement behaviors on reading comprehension, science, history, and graduation rates of a large sample of low-income, minority students. The research included students from 492 schools and followed them from eighth through twelfth grade. Data regarding student engagement was collected via teacher and student questionnaires. At the end of Grade 12, at-risk students who engaged in behaviors such as coming to class and school on time, being prepared for class and participating in class work, and employing the extra effort to complete homework earned better grades and were more likely to graduate from high school than those who did not. This outcome was observed even after controlling for SES, family composition, and psychological characteristics such as self-esteem and locus of control.

Academic engagement also can have short-term or long-term effects. Singh et al. (2002) examined concurrent relationships between motivation, engagement, and math achievement, while Hughes et al. (2008) measured the effects of engagement over a 3-year period with a large subsample (i.e., 3,227 cases) from a nationally representative sample of eighth-grade students. Motivation and engagement were measured via self-report and achievement was measured via report card grades and standardized achievement tests. Using SEM, the authors found that the constructs of motivation and engagement explained 46% of the variance in math achievement. Furthermore, engagement had a significant direct effect on achievement. However, no control variables were entered into the equations.

In a longitudinal study, Hughes et al. (2008) examined the effects of effortful engagement from Grade 1 to Grade 3 via teacher reports with a sample of 671 academically at-risk children.

Through the use of latent-variable structural equation modeling, the authors found that effortful engagement had a direct effect on both math and reading academic achievement over a 3-year time period even after controlling for several variables including previous achievement and teacher-student relationships. In addition, there was a reciprocal relationship between achievement, effortful engagement, and teacher-student relationships.

Not only can academic engagement enhance teacher-student relationships and increase achievement levels, it can be taught and improved upon in the classroom. For example, Greenwood (1991) followed three groups of elementary school students from a high socioeconomic school and a low socioeconomic school. The authors compared the students' time engaged in academic activities and achievement gains in reading, language, and math over the course of 3 years. The three groups consisted of an at-risk experimental group, an equivalent at-risk control group, and a non-risk comparison group. The teachers of the experimental group employed a class wide peer tutoring (CWPT) program and measured students' engagement behaviors through observations. Results of the study indicated that after controlling for several variables including initial IQ and previous achievement, those students who were engaged in more academic activities had higher achievement gains in reading, language, and math on standardized tests than those students who were not as engaged in academic activities.

Study skills. Study skills have been broadly defined as a "student's knowledge of appropriate study strategies and methods" while study habits have been described as "the degree to which the student engages in regular acts of studying that are characterized by appropriate studying routines (e.g., reviews of material) occurring in an environment that is conducive to studying" (Credé & Kuncel, 2011, p.427). These study skills and habits are hypothesized to be influenced by a student's attitudes toward the act of studying (Credé & Kuncel, 2011).

For the purposes of this research, study skills were defined as "behaviors or strategies that facilitate the processing of new material" (DiPerna & Elliott, 2000, p.6). The theoretical approach most closely associated with this definition is related to the theories of metacognition and self-regulation. Specifically, when students have an assortment of study strategies from which to choose and the ability to understand the importance of those strategies, they are able to adjust their study habits to suit the demands of the academic task (Gettinger & Seibert, 2002). Metacognition describes a student's awareness of his or her own cognitive processes. It has been defined as the "knowledge, awareness, and control of one's own learning" Baird (1990, p.184). Self-regulation involves one's ability to be consistently involved in the learning process and plan according to the needs of a task (Zimmerman, 1986). Most often, students with well-developed self-regulation strategies have high levels of self-efficacy, they seek help from teachers and peers, and make good use of their time (Ley & Young, 1998). In addition, effective use of study skills requires a student to accurately monitor and adjust the use of study tactics according to the demands of the subject and requirements of a class.

Students can improve their study skills through explicit instruction, practice, and feedback (Devine, 1987; Scheid, 1993). For example, Bulgren, Schumaker, and Deshler (1997) found that when teachers modeled and presented strategy-based instruction as an ongoing part of the curriculum, most of the students in the study were able to successfully apply the study strategies. Moreover, when students participate in the development of their own study strategies, they individualize the strategies to suit their personal studying styles (Gettinger & Seibert, 2002).

Previous research has indicated that effective use of study skills is frequently correlated with academic competence in all subjects and higher achievement gains over time (Deshler & Schumaker, 1993; Gettinger & Seibert, 2002). DiPerna et al. (2002, 2005) found teacher rated study skills had a small, but significant relationship to achievement gains in both language arts and math at the early and later elementary grade levels. In addition, Cooper, Robinson, and Patall (2006) completed a synthesis of 15 years of homework research and found strong correlations between homework and achievement. These relationships were stronger as the students advanced from middle to high school.

Although better study skills are related to better academic performance, cognitive ability appears to play a key role in the use of these skills and magnitude of their relationship with achievement. For example, Hattie, Biggs, and Purdie (1996) conducted a meta-analysis and examined 270 effect sizes based on 51 studies that provided interventions to students on either learning skills, study skills, or both. The authors measured the effects of the interventions to improve study skills use, motivation, and affect and found the strongest effects sizes for cognitive ability and motivation on academic performance. Regardless of intervention, however, students with higher cognitive ability were better able to make use of their newly acquired study skills than those with lower abilities. Likewise, Aluja and Blanch studied a sample of 887 students from Catalonia, Spain and found cognitive ability to be the best indicator of future achievement. Utilizing multiple regression analyses and structural equation modeling the authors studied scholastic ability, self-reported study habits, and personality factors, and found scholastic ability explained 36-39% of the variance in future achievement.

Interpersonal skills. Definitions of positive interpersonal skills include characteristics such as sharing, helping, communicating, and complimenting those around you. Good interpersonal skills include those behaviors that foster good communication, cooperation, and self-control skills necessary to positively interact with other students and adults in the classroom. (DiPerna & Elliott, 2000; DiPerna, Volpe, & Elliott, 2005). Gresham and Elliott (1990) provided a general definition of positive interpersonal skills that includes behaviors which enable a person to interact with others in ways that elicit positive responses and assist in avoiding negative responses. For the purposes of this study interpersonal skills were defined as "cooperative learning behaviors necessary to interact with other people" (DiPerna & Elliott, 2000, p.6). These include skills related to social interactions, work interactions, and responsive behaviors in the classroom (DiPerna & Elliott, 2000).

Competent interpersonal skills contribute to a student's ability to benefit from classroom activities, earn higher grades, and make greater gains in achievement (Downer, Rimm-Kaufman, & Pianta, 2007; Ray & Elliott, 2006; Welsh, Parke, Widaman, & O'Neil, 2001; Wentzel, 1991, 1993; Wentzel & Watkins, 2002). For example, a student with good interpersonal skills will most likely have a higher rate of participation in the interactive learning in the classroom than a student with poor interpersonal skills (Sieber, 1979). Furthermore, when interventions are employed to improve interpersonal skills, not only do they produce improvements in interpersonal skills, they are related with increases in academic performance (Elliott, Malecki, & Demaray, 2001; Miranda, Webb, & Brigman & Peluso, 2007, Brigman, & Campbell, 2003; Campbell & Brigman, 2005). Positive interpersonal skills may also enhance the teacher-student relationship thereby indirectly aiding in academic development (Wentzel, 1993).

Ray and Elliott (2006) investigated the concurrent relationship between social adjustment (i.e., social skills, social support, and self-concept) and math and language arts/reading achievement with a small sample of students in the fourth and eighth grades. The authors collected data regarding students' social adjustment via teacher and student ratings in the current year. Analyses indicated that positive social skills had an indirect positive effect on both reading and math scores through social adjustment; however, the authors did not control for any confounding variables.

Malecki and Elliott (2002) conducted a longitudinal analysis examining the relationship between teacher rated and student self-reported social behaviors and standardized academic achievement scores. The study sample consisted of 139 ethnically diverse third- and fourth-grade students from a large urban school district. Social behaviors were divided into prosocial skills and problem behaviors. Correlations between the social skills ratings and concurrent and future reading achievement scores were positive and ranged from .31 to .54. Conversely, correlations between the problem behavior ratings and Iowa Test of Basic Skills (ITBS) scores were negative and ranged from -.29 to -.39, but only significantly correlated with concurrent academic achievement. When utilizing regression, teacher rated social skills were the only significant positive predictor of future academic achievement. However, the authors did not control for any demographic variables or cognitive ability.

Wentzel (1993) analyzed the relationship between the interpersonal skills and academic achievement of 423 students in Grades 6 and 7. She collected teacher ratings of students' prosocial behaviors and found those behaviors to be independently, significantly related to both grade point averages and Stanford Test of Basic Skills (STBS) scores. Furthermore, prosocial behaviors were an independent, significant predictor of standardized achievement scores even when academic behavior, teacher's preferences for students, IQ, gender, ethnicity, family structure, and attendance were taken into account. However, student prosocial ratings explained 17% variance in grade point average compared to 7% of the variance in standardized test scores.

As such, the effects of interpersonal skills on achievement may diminish when other student variables are taken into account. For example, Duncan et al. (2007) controlled for several such variables including prior cognitive ability, attention skills, and socioemotional skills, while analyzing the effects of school readiness skills on later achievement. The authors used longitudinal data from six national nonexperimental studies and utilized regression analyses to examine the links between socio-emotional, attention, and academic skills at school entry and later reading and math achievement. The authors found that academic skills at school entry were the best predictors of later achievement whereas socio-emotional skills were not significant predictors of later achievement. These relationships were consistent among male and female students as well as for students from families of high and low socioeconomic status. In addition, the results were similar whether standardized testing or teacher report was used for achievement measures. Furthermore, Grimm, Steele, Mashburn, Burchinal, and Pianta (2010) reanalyzed the data from Duncan et al. and found similar results.

Additional Student and Family Variables Associated with Achievement

Several other variables have been shown to demonstrate moderate to large relationships with academic achievement in prior studies. This evidence is briefly summarized in the remainder of the literature review, and measures of these constructs were included as control variables in the current analyses.

Previous achievement. Of all the student factors associated with academic success, previous academic achievement has been found to be one of the strongest predictors of later achievement in both small and large samples (e.g., Bishop, 2003; DiPerna et al., 2002; McCormick, Stoner, & Duncan, 1994). Entwistle and Alexander (1990) hypothesized this is because achievement reflects a cumulative process which involves developing new skills, refining existing skills, and mastering previously learned skills. Some studies note that longitudinal achievement trajectories can be predicted based on scores from first grade

(Alexander, Entwisle, & Dauber, 1993; Duncan et al., 2007; Hooper, Roberts, Sideris, Burchinal, & Zeisel, 2010). Previous achievement is often measured via group standardized achievement scores, but has also been measured through individual achievement tests, teacher judgment, and report card grades (e.g. DiPerna & Elliott, 2002; Finn& Rock, 1997; Wentzel, 1993).

Cognitive ability. Similar to prior achievement, there are a number of previous studies indicating a substantial relationship between cognitive ability and academic achievement (Deary, Strand, Smith, and Fernandes, 2007; Luo, Thompson, & Detterman, 2003; Neisser et al., 1996). An overall measure or "Full Scale IQ" is often considered a better predictor of academic achievement than more specific factors or subtest scores (Sattler, 2001). In many school districts, intelligence test scores are the most frequently used predictors of academic achievement (Wilson & Reschly, 1996) due to their high correlations with achievement scores (Grigorenko & Sternberg, 1997; Mayes & Calhoun, 2007; Vanderwood et al., 2001). Some correlations between IQ scores and achievement are so high that several investigators have theorized IQ and achievement are different aspects of the same construct (e.g., Lynn, Meisenberg, Mikk, & Williams, 2007).

Free/Reduced Lunch Status. Family socioeconomic status (SES) has been established as a consistent predictor of children's achievement gains over time (Sirin, 2005). It has been found that students from families of lower household income often score lower on standardized test scores regardless of their race or ethnicity (Sutton & Soderstrom, 2001). While this affect is seen more at the elementary than secondary levels, it is important factor in the prediction of achievement (Nye, Hedges, & Konstantopoulos, 2002). As a proxy for measuring SES, free lunch status (FRL) is often used due to the low income requirements for obtaining free or reduced lunch (Kuperminc, Leadbeater, & Blatt, 2001). Therefore, FRL status was used as a proxy for SES in this study.

Gender. Gender differences in math achievement (Leahey & Guo, 2001; Yee & Eccles, 1988; Hyde, Fennema, & Lamon, 1990) and language arts achievement (Phillips, Norris, Osmond, & Maynard, 2002; Ready, LoGerfo, Brukham, & Lee, 2005) have been documented in several studies. Gender is also associated with differences in self-ratings of academic enablers (Long, Monoi, Harper, Knoblauch, & Murphy, 2007; McGinnis, 2009; Wentzel, 1996). For example, boys tend to rate themselves as having higher academic self-efficacy than girls, especially at the middle grades (Pintrich & De Groot, 1990; Wigfield, Eccles, & Pintrich, 1996) and girls have demonstrated higher levels of academic engagement (Valiente et al, 2008).

Rationale and Hypotheses

In sum, academic enablers, such as interpersonal skills, self-efficacy, motivation, engagement, and study skills have been found to add incremental validity to predicting achievement outcomes in math, language arts, and general achievement measures. However, the findings tended to differ depending on achievement measure (i.e., teacher grades or standardized achievement test scores) and the control variables entered in the predictive equations. Furthermore, academic enablers have demonstrated direct and indirect effects on future achievement; however, most models of academic enablers on achievement have not included all of the enablers included in the current study. Finally, because existing research lacks consistency in methodological designs and definition and measurements of enablers, definitive conclusions regarding the relationships between enablers and achievement are difficult to ascertain.

As such, the research examining a comprehensive model of the relationships between student academic enablers and attitudes and academic achievement in middle school is limited. In addition, although intelligence and previous achievement have emerged as two of the strongest predictors of student achievement, there is a significant amount of variance unaccounted for in achievement gains. Although previous studies have considered each of these academic enablers in relation with academic achievement, few studies (e.g., DiPerna et al., 2002, 2005) have examined comprehensive models that incorporate all of these constructs to investigate the relative contribution of each variable to achievement, and even those studies did not include academic self-efficacy. Given the limited studies with middle school students relative to those with younger and older populations, the primary purpose of this study was to examine the relationships between academic enablers and academic outcomes in the middle grades. Using hierarchical regression analyses, each enabler's unique relationship with achievement was isolated from the other enablers and known predictors such as previous achievement, cognitive ability, socioeconomic status, and gender.

Specifically, the study answered the following research question:

After controlling for key student characteristics (i.e., FRL, gender, previous achievement, and cognitive ability), what is the magnitude of the relationships between student academic enablers (i.e., motivation, study skills, interpersonal skills, self-efficacy, and academic engagement) and future achievement in language and mathematics?

Based on theory and previous research, the following hypotheses were tested:

1. Academic self-efficacy demonstrates a moderate relationship with future language arts and math achievement in the middle grades.

2. Academic motivation demonstrates a moderate relationship with future language arts and math achievement in the middle grades.
3. Academic engagement demonstrates a moderate relationship with future language arts and math achievement in the middle grades.
4. Study skills demonstrate a small relationship with future language arts and math achievement in the middle grades.
5. Interpersonal skills demonstrate a small relationship with future language arts and math achievement in the middle grades.

CHAPTER 3: Method

Setting

The study was conducted in a large municipality located in New Jersey. According to the 2006-2008 estimates based off of the 2000 census, the population of the city is estimated to be about 88,300 people and the median family income is approximately $82,361. The racial/ethnic composition includes 91.5% White, 1.9% Black, .1% American Indian/Alaska Native, 7.1% Hispanic/Latino, 3.0% Asian, less than 1% Pacific Islander, 0.1% multiracial, and 1.7% other. The above percentages do not equal 100% due to Hispanic and Latinos belonging to other races. Approximately 88.4% of the population speaks English as a primary language (U.S. Census Bureau, 2000).

The school district in which the sample was collected educates approximately 17,000 students in 18 schools: 12 elementary (kindergarten - Grade 5), 3 intermediate (Grade 6 - 8), and 3 high schools (Grade 9 - 12). The sample was collected from one of the intermediate (middle) schools in the participating district. During the time of the data collection, the total number of registered, active students at the school was about 1,578. Approximately 96% of those students primarily spoke English in the home. The racial composition of the student population was 90% Caucasian, 2% African American, 5% Hispanic, 3% Asian/Pacific Islander, and <1% multiracial. Of those students, 13% were classified as “eligible for special education and related services” and 1% had a 504 Plan. Approximately 72% of students with disabilities were educated in general education classes, 27% were educated in self-contained special education classes for those students with mild learning disabilities, and 1% of students were educated in a self-contained class for autistic students. Finally, 6.3% of the students purchasing lunches had reduced fees and 10.4% of the students received free lunches based on income standards.

Participants

Of those students whose parents signed permission slips to participate in the study, 802 were present on the day data were collected in their classrooms (The district would not allow for a make-up day of data collection.) Two students declined to participate on the day of data collection and two students were unable to complete the protocol. Of the 798 students who filled out the questionnaires, 28 had no Otis-Lennon School Ability Test – School Ability Index (OLSAT-SAI) scores; 17 had no May 2010 New Jersey Assessment of Skills and Knowledge (NJASK) scores; and 20 had no OLSAT or May 2009 NJASK scores. Participants with these missing scores were due to living outside the district at the time of the test administrations. Of the remaining 733 questionnaires, 15 of participants left one or two items unanswered on one or two of the scales. Visual inspection indicated that these missing values were -random. Due to the small number of missing items, item answers were imputed by taking the current total from the scale, dividing it by the number of items on the scale and rounding to the nearest whole number (Cohen et al., 2003). All data analysis procedures were conducted with and without the imputed data and comparable results were found. The final sample size was 733.

Table 1

Demographic Characteristics of Participants by Grade Level

		Grade					
		6		7		8	
Gender		*n*	%	*n*	%	*n*	%
	Male	99	45	107	47	132	47
	Female	122	55	123	54	150	53
Race							
	White/Caucasian	195	88	214	93	256	91
	Black/African American	4	2	4	2	4	1
	Hispanic	11	5	8	4	11	4
	Asian	10	4.5	4	2	11	4
	Pacific Islander	1	0.5	0	0	0	0
Free Lunch Status							
	Full Price	192	87	198	86	243	86
	Free/Reduced	29	13	32	14	39	14

Measures

Otis-Lennon School Ability Test. School Ability Index (SAI) scores from the Otis-Lennon School Ability Test – Eighth Edition (OLSAT-8, Otis & Lennon, 2003) were used as an estimate of the students' current cognitive ability in this study. The OLSAT-8 is a nationally standardized pencil and paper, multiple choice, group administered school ability test for Grades K through 12. The OLSAT-8 is intended to measure cognitive abilities as they relate to success in school. The test measures a student's ability to understand relationships, use abstract thinking, and apply generalizations so that its scores may be used to assess a student's ability to succeed in the curriculum. It includes verbal and nonverbal items to assess the cognitive ability a student brings to the classroom. The test provides a Nonverbal Ability Index, a Verbal Ability Index, and an overall School Ability Index. All index scores have a mean of 100 and a standard deviation of 16 (Otis & Lennon, 2003).

Verbal items measure skills in the areas of verbal comprehension and verbal reasoning. Verbal comprehension items include those such as vocabulary, following directions, and sentence arrangement. Verbal reasoning items include those such as verbal analogies, inference, and verbal classifications. Nonverbal reasoning measures skills in the areas of figural and quantitative reasoning. Figural reasoning items include those such as figural classification, figural analogies, and pattern matrix. Finally, quantitative reasoning items include those such as number series, number inferences, and number matrices.

The OLSAT-8 has been utilized in several studies and numerous dissertations when estimating participants' cognitive abilities (Antonak, 1988; Duckworth & Seligman, 2005; Greenwood, 1991; Pearson, 2005; Wilde, 1996). The authors reported Kuder-Richardson-20 reliability coefficients ranging from .78 to .97 for the total scores, .68 to .96 for the verbal items and .63 to .95 for the nonverbal items (Otis & Lennon). The manual also includes correlations ranging from .82 to .92 between the two forms (A and B) of the OLSAT-8 as alternate-form validity evidence (Otis & Lennon). In addition, the Otis-Lennon School Ability test scores have shown correlations with the Stanford Achievement Tests that range from .56 to .64 (Otis & Lennon, 2003). Finally, Antonak (1988) utilized multivariate analyses to examine the relationship between scores on the OLSAT-8 and the Stanford Achievement Test at grades 2, 4, and 6 for 272 students and found the OLSAT-8 School Ability Index scores to be a strong predictor of achievement for students in the second and fourth grades, but not sixth grade. In addition, the Otis-Lennon School Ability test scores have shown correlations with the Stanford Achievement Tests that range from .56 to .64 (Otis & Lennon, 2003).

New Jersey Assessment of Skills and Knowledge (NJASK). The New Jersey Assessment of Skills and Knowledge (NJASK) is the standardized state achievement test for students in Grades 3 through 8. Questions are based on the New Jersey's Core Curriculum Content Standards and consist of multiple choice, short-answer, and essay questions. The NJASK produces criterion referenced test scores reflecting a student's level of proficiency in academic achievement. Scores between 250 and 300 are indicative of advanced proficient skills; scores from 200-249 indicate proficient skills, and scores below 200 indicate partially proficiency of skills. The alpha coefficients for the 2009 and 2010 NJASK scores ranged from .88 to .90 for language arts and .91 to .92 for math (New Jersey Department of Education, 2009, 2010).

The academic skills measured by the NJASK include math and language arts skills. The math skills include numerical operations; geometry and measurement; patterns and algebra; data analysis, probability, and discrete math; and mathematical processes. The language arts skills include interpreting, analyzing critiquing, and generating text. Questions and tasks that concentrate on interpreting text required students to identify main ideas, supporting details, directions, paraphrasing, text organization, and purposes for reading. The tests are group administered by classroom in May of each academic year. Questions that concentrate on analyzing/critiquing text required students to predict tentative meanings, and draw conclusions or form opinions about the text and the author's techniques. Questions that concentrate on generating text required students to either view a picture prompt or read a short passage containing detailed information and use the information to make decisions, solve a problem, or write a story.

Academic Competence Evaluation Scales (ACES – Student; DiPerna & Elliott, 2000). The ACES-Student is a standardized, self-report instrument for students in Grades 6-12. Its purpose is to measure students' academic skills and enablers to monitor skill development and inform intervention planning. The ACES has two primary scales: Academic Skills and Academic Enablers. Academic skills include reading and language arts, math, and critical thinking skills. Academic enablers are defined as "the attitudes and behaviors that allow a student to participate in, and ultimately benefit from academic instruction in the classroom" (DiPerna & Elliott, 2002, *p*.294). Specifically, the academic enablers measured by the ACES include interpersonal skills, engagement, motivation, and study skills (DiPerna & Elliott, 2000). Students rate themselves on a 5-point Likert scale ranging from (1 = *Never* to 5 = *Almost Always*) and item scores are summed to create total scores for each scale. Initial reliability evidence on the ACES-Student revealed internal consistency coefficients ranging from .83 to .94 and test-retest coefficients ranging from .68 to .84 for all subscales (DiPerna & Elliott, 2000). During the initial validity studies, results of exploratory factor analyses supported the model of academic competence proposed by the authors. In addition, the ACES-Student factor structure was found to be highly consistent with the ACES-Teacher factor structure which provided some convergent evidence for the subscales.

The Interpersonal Skills, Engagement, Motivation, and Study Skills subscales were used in this study. The interpersonal skills subscale of the ACES contains items measuring skills related to social interactions, work interactions, and responsive behaviors in the classroom. The engagement subscale measures a student's level of active participation in the classroom. Items reflect the number of questions a student asks, whether he or she volunteers answers or assumes leadership roles in groups. The Motivation subscale measures a student's enthusiasm and perseverance toward academic subjects and includes items that reflect responsibility, preference for challenging tasks, and goal-directed behavior. Finally, the Study Skills subscale reflects behaviors and skills that facilitate the processing of new information. The items on this scale primarily fall within three domains: work preparation, work completion, and work review (DiPerna & Elliott, 2000).

Motivated Strategies for Learning Questionnaire (MSLQ) – Self-Efficacy subscale. The Motivated Strategies for Learning Questionnaire (MSLQ) is also a paper and pencil student self-report instrument. It was developed based on the social-cognitive theory of motivation and self-regulated learning strategies (Duncan & McKeachie, 2005; Pintrich et al., 1993). This theory purports that students' levels of motivation directly affect the way they regulate their learning activities (Pintrich et al., 1993; Pintrich & De Groot, 1990). Students who self-regulate their learning strategies are metacognitively, motivationally, and behaviorally active in ones' own learning process and in achieving one's own goals (Eccles & Wigfield, 2002). Moreover, motivation and self-regulation are not fixed characteristics of the learner, but transient traits that vary depending upon how the learner views his or her interest and capabilities in a subject.

Originally created to measure college students' motivational orientations and their use of different self-regulated learning strategies, the MSLQ consists of 81 items divided into two sections: the motivation section and the learning strategies section. The learning strategies section consists of 50 items and the motivation section consists of 31 items. When taken as a whole, the MSLQ contains 15 subscales within the two sections that may be used together or alone depending on the needs of the professional administering the scale. The self-efficacy subscale is within the motivation section (Pintrich et al., 1991).

The current study utilized the eight items from the self-efficacy subscale (α = .89) of the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich & De Groot, 1990) to assess the students' beliefs about their abilities to complete the work in their language arts and math classes. This scale is based on the expectancy theory, which purports that students will partake in particular self-regulating behaviors based on how confident they are in their abilities to succeed in at a task related to the domain of interest (e.g., math or language arts). MSLQ questions are in the form of a 7-point Likert scale (1 = *not at all true of me* to 7 = *very true of me*), and the item-level scores are averaged to create the self-efficacy score. The self-efficacy items assess levels of perceived competence and confidence in performance of class work and ask students to compare their abilities to others in the class. For the purposes of this study, self-efficacy was measured at the academic subject level. That is, for each of the eight items "English class" or "math" was substituted for "course" in the original items. For example, "Compared with other students in my English class, I expect to do well," was used instead of "Compared with others students in this course."

Although the MSLQ was created to measure motivation and learning strategy use of college students, it has also been used in studies assessing the motivation and self-regulation of students in middle and high school as well (Bong, 2001; Duncan & McKeachie, 2005; Eshel & Kohavi, 2003; Hamman, Berthelot, Saia, & Crowley, 2000; Pintrich, Roeser, & De Groot, 1994; Wolters, Yu, & Pintrich, 1996). In addition, through the use of factor analysis Pintrich and De Groot (1990) found that the self-efficacy items fell into one distinct factor differentiating the items from the intrinsic value and test anxiety items. Moreover, regression analysis revealed that the self-efficacy subscale was a significant predictor of academic performance for seventh graders (Pintrich & De Groot).

Although some researchers question the validity of student paper and pencil self-reports, others believe that many adolescents have developed the skills necessary to produce reliable and valid self-report scores (Stone & Lemanek, 1990). By adolescence, many respondents have acquired the necessary language skills to provide consistent and fairly accurate assessments of their own thoughts and behaviors (Bee & Mitchell, 1980). Moreover, because adolescents have developed adequate social-cognitive skills, they can provide self-descriptions that include psychological constructs and interpersonal characteristics. In addition, adolescents are able to respond to items assessing abstract concepts such as temperament and disposition, beliefs, attitudes and values, and self-perception.

Procedure

Recruitment. After obtaining approval from the University Institutional Review Board and school district administration, the researcher obtained permission from the principal and assistant principal of the participating school. In September of that year, all students in general education classes at the intermediate school (Grades 6, 7, and 8), were read a letter of introduction in their science classes, which explained a general overview of the study and when data was going to be collected. Each student was given a permission packet to take home. The packet included an introductory letter to the parent and two copies of the active consent form, one of which was to be returned by the student in a sealed envelope. Students and parents were informed that participation in the study was voluntary and that participants could drop out of the study at any time. Students earned a homework grade for returning the consent form regardless of participation. The response rate was approximately 50%, which provided a potential for 828 students in the study. After the initial potential sample size was reached, all protocols were created in a counterbalanced method and given a unique number.

Data Collection. Data collection occurred over the course of one academic year. Student records were reviewed in the beginning and end of the year to collect demographic data as well as Grade 3 OLSAT-8 SAI and NJASK scores. The administration of student questionnaires (ACES and MSLQ Self-efficacy questions) occurred over the course of 4 weeks during late October and early November of the academic year. The primary researcher collected all of the data. Questionnaires were distributed and collected during the participants' science classes. Before the questionnaires were distributed to a class, students were reminded of the purpose of the study, the confidentiality procedures, and the possible benefits of participating. Students were encouraged to be honest with their answers and reminded that their names would not be on the questionnaire. In addition, the students were reminded that they would be agreeing to participate in the study by filling out the questionnaire and that they could withdraw at any time during the study. After the initial directions, students who opted not to participate were instructed to work quietly at their desks. The researcher answered any questions to clarify items on the protocol (e.g., explaining what "seldom" meant) for participating students. The questionnaires were quickly scanned by the researcher as they were handed in; and if there were missing answers, the student was asked to finish the questionnaire. If a student was absent on the day of data collection, no information was obtained from that student because the district did not allow make up days for data collection.

Research Design and Analysis

The purpose of the current research was to investigate the relationships between multiple student enablers (self-efficacy, motivation, interpersonal skills, academic engagement, and study skills) and future math and language arts achievement in a sample of middle school while controlling for certain student characteristics. As such, hierarchical multiple regression analyses were used to determine the incremental value added by each enabler after controlling for the influence of previous achievement, cognitive ability, FRL, and gender. Analyses were conducted separately for language arts and math achievement by grade level (i.e., Grades 6, 7, and 8).

All analyses were conducted utilizing SPSS 20.0 for Windows based on the methods outlined in Keith (2006) and Cohn, Cohen, West, and Aiken (2003). Variables or a set of variables that predicted up to 9% of the variance were interpreted to have a small relationship with achievement, those that explained 10% to 24% to have a moderate relationship, and those variables that explained 25% of the variance or more to have a large relationship with the achievement (Cohen et al., 2003). When examining the significant standardized beta coefficients in this study, those betas above .05 indicated small but meaningful effect on the achievement, those with betas above .10 indicate moderate effects, and those with betas above .25 indicate large effects (Keith, 2006).

Hierarchical Multiple Regression

Hierarchical multiple regression is part of a larger set of multiple regression analysis techniques, which includes simultaneous and stepwise regression. A hierarchical multiple regression approach was chosen for this study rather than simultaneous or stepwise approaches for several reasons. First, the purpose of the research was to examine the relationships between the predictor variables of interest and the criterion variable based on previous research and theory. Simultaneous and stepwise regression approaches should be used solely to explore relationships and maximize predictions of the criterion variable. Simultaneous regression is primarily interested in understanding the overall relationship between all predictor variables (cumulative and unique) and the criterion variable when examined simultaneously. Stepwise regression is primarily interested in maximizing the linear combination of predictor variables when considering a specific sample. In utilizing hierarchical regression, however, the researcher is not only interested in determining the unique contribution of each predictor variable to the criterion variable, but there is an additional purpose to add to the explanation of relationships by creating models to test specific theoretically based hypotheses. In addition, the researcher can control for certain variables.

Second, it was necessary to control for FRL status, gender, cognitive ability, and previous achievement. In simultaneous regression, the researcher enters all of the predictor variables into the regression equation at the same time. This technique evaluates the significance and magnitude of all the regression coefficients between all of the predictor variables and the criterion variable. In stepwise regression the researcher utilizes a computer program to determine the order of entry of predictor variables in the regression equation. The program analyzes all relationships between the criterion and predictor variables and order of entry is determined by the amount of variance each predictor explains in the equation. Those predictor variables that explain the most variance are entered first and the rest follow in descending order. Stepwise regression tends to over utilize random variations in the data and produce results that tend to be relevant to only the specific sample data. As such, results from a stepwise regression tend to be difficult to replicate. Moreover, computer programs can inflate the results of the regression resulting in more Type I errors (Menard, 1995.)

In hierarchical regression, the researcher controls the number and order of entry of the predictor variables into the equation. The predictors may be entered individually or in groups to control for the effects of certain predictors on the criterion variable. The order of predictor variable entry is chosen before the data is analyzed and is based on a logical and theoretical rationale. As a predictor variable is entered into the equation, its value is determined by the amount of additional variance it explains in the equation at the point of entry (Tabachnick & Fidell, 2010). Therefore, hierarchical regression estimates the unique incremental variance explained by each additional variable or groups of variables as they are entered into the equation (Cohen, et al., 2003).

F-tests are used to compute the significance of each added variable or set of variables. The statistical power of the F-test is likely to be maximized since the results of the test are not confounded with predictor variables that are less important (Cohen et al., 2003). When hierarchical regression is utilized the fundamental question of the research is: Does a certain predictor variable or group of variables significantly add to the prediction of a criterion variable after variance due to other predictor variables are accounted for (Tabachnick & Fidell)?

Cohen et al. (2003) recommended using several basic principles when selecting the order of entry for predictor variables. First, the order of entry may be chosen by causal priority so that "no IV entering later should be a presumptive cause of an IV that has been entered earlier (Cohen et al., *p*. 158)." This procedure removes the influence of a confounding variable that may be simultaneously contributing variance to the predictor variable and the criterion variable. Second, the order of entry may be determined by research relevance. In this case, the predictor variables that have previously established relationships with the criterion variable should be entered in the order of the strengths of the relationships (Cohen et al.). Third, researchers may want to analyze alternative sequences of predictor variables if previous research findings regarding causal relationships have been ambiguous or if the purpose of the research is to determine the appropriate causal priority of predictor variables (Cohen et al.).

The order of entry for the variables in this study was based on theory and previous research findings. Subsequently, the variables of previous achievement, cognitive ability, FRL, and gender were entered at Step 1 to control for the influence of these variables on achievement. This step was followed by five additional steps entering the academic enabler variables one by one to determine the unique variance predicted by each enabler. The change in R^2 value was calculated to determine the percent variance accounted for by each group of independent variables. Regression coefficients with a *p*-value of .05 or less were considered statistically significant (Cohen et al., 2003). Finally in the supplemental analysis, an alternative model was examined to determine if the magnitude of the relationships between achievement and the student variables changed with the order of entry. The final equation for the achievement model was as follows:

$$ACH = \beta_0 + \beta_1 (PrACH) + \beta_2 (COG) + \beta_3 (FRL) + \beta_4 (GEN) + \beta_5 (SELF) + \beta_6 (MOT) + \beta_7 (ENG) + \beta_8 (STS) + \beta_9 (INTER) + e$$

Where ACH was later achievement for either language arts or math; PrACH was previous language arts or mathematics achievement; COG was cognitive ability; FRL was free/reduced lunch status; GEN was student gender; SELF was language arts or math self-efficacy; MOT was academic motivation; ENG was academic engagement; STS was study skills; INTER was interpersonal skills; and *e* was the error term.

Assumptions. As with all multiple linear regression, hierarchical multiple regression operates on several assumptions about the sample data. These assumptions are (a) adequate sample size, (b) absence of outliers among the cases, (c) a linear relationship between the predictor variables and the criterion variable, (c) absence of multicollinearity among the predictor variables, and (d) normality, linearity, homoscedasticity, and independence of residuals (Cohen et al., 2003; Tabachnick & Fidell). The examination of assumptions can be done through visual inspection of graphic representations of the data and the use of statistical indices.

Adequate sample size. Multiple regression operates on the assumption that the sample is adequate to produce accurate parameter estimates. There have been several guidelines cited in the literature when determining desired sample size. Green (1991) provided the formula $N \geq 50 + 8m$ (where m is the number of predictors) for testing multiple correlations. In addition, Keith (2006) cited a simple rule of thumb of 10 to 20 participants for each predictor variable. However, a power analysis is suggested in addition to these guidelines (Cohen, et al., 2003; Keith, 2006). When used to determine a desired sample size for multiple linear regression, one needs to determine the desired alpha level, the expected effect size, the desired level of power, and the number of predictor variables to be used. The levels used for these input variables are determined by past research, expert opinion, and the purpose of the current research (Cohen et al., 2003).

For the purposes of this study, G-Power was used to determine the sample size requirement (Faul & Erdfelder, 1992). The criteria for the power analysis were determined a priori based on past research and the recommendations of Cohen et al. (2003), Judd, McClelland, and Ryan (2009), Tabachnick and Fidell (2010), and Keith (2006). The chosen alpha level was .05, the chosen effect size was .15, and a power level of .90 was chosen based on the fact that the study was exploratory in nature. In addition, desired sample sizes were determined for each grade level considering that the model would be tested separately for each grade. Based on these criteria, it was determined that the sample sizes required for each grade would need to be at least $N = 116$ students.

Absence of outliers. Given that multiple regression utilizes correlations to determine the relationships among the variables, it is subject to the distortion brought on by outliers. An outlier is a particularly unusual case in the data set that appears to come from a different population. It may be an extreme score on one variable or multiple variables (Tabachnick & Fidell, 2010). The problem arises when the outlier pulls the regression line toward itself and distorts the solution. The outlier may result in regression coefficients that are more accurate for the outlier and less accurate for the majority of the cases; thus creating misleading results (Cohen et al., 2003). Initial examination of the data included visual inspection of box and whisker plots, scatterplots, and histograms. Next, z-score transformations of the variables were examined to detect outliers. Predictor variables with z-scores ± 3 standard deviations from the mean (< 3.29) were examined. Outliers were also detected by reviewing casewise diagnostics for studentized residuals with an absolute value greater than 3.0 (Judd et al., 2009, Keith, 2006). Finally, Cook's D was calculated to determine the influence of outliers. Cook's D examines the influence of the outlier on the data by comparing the predicted values of the criterion variable from the regression equation when the outlier is included versus from when it is not included from the analyses (Cohen et al.). Cohen et al. recommend a cutoff of 1 for the Cook's D statistic when examining moderate to large data sets. Analyses were also run with and without outliers to determine if leaving them out affected the outcome of the study.

Absence of multicollinearity. Hierarchical multiple regression operates on the assumption that each predictor variable is explaining a unique amount of variance in the criterion variable. The goal is to have a high amount of variance explained in the criterion variable by multiple independent predictors, not by multiple, redundant predictors. Multicollinearity exists when two or more predictor variables are too highly correlated. It presents a problem because multicollinearity decreases the reliability of regression coefficients, consequently making it difficult to determine the unique contribution of the predictor variables (Cohen et al., 2003; Keith, 2006; Tabachnick & Fidell, 2010).

There are several methods to use when inspecting regression data for multicollinearity. The first is an examination of the correlation matrix. If the any of the correlations are close to one, redundancy among those variables may be problem. Tabachnick and Fidell (2010) suggested that statistical problems occur at squared correlations at or above .90.

In addition, the variance inflation factor (VIF) and the tolerance level may be utilized. The VIF is an indicator of the amount of inflated variance found in the equation due to multicollinearity. It produces an index which measures how much the variance of an estimated regression coefficient is inflated because of collinearity (Cohen et al., 2003). Completely uncorrelated predictor variables would produce a VIF of 1.0. Cohen and colleagues noted that VIF values below 10 indicate no significant problems with multicollinearity.

A second tool used is the tolerance level. Tolerance is the inverse of the VIF in that its number represents the amount of variance in one predictor variable that is independent of the variance in the other predictor variables. Tolerance levels can range from 0 (no independence from other variables) to 1 (complete independence). The closer to zero the tolerance value is for a variable; the more dependent it is on the other predictor variables. On the other hand, a high tolerance value indicates that the examined predictor variable is independent of the other variables. Therefore, a common rule of thumb suggests that tolerance values at or above .10 indicate little multicollinearity between the variables.

Normality, linearity, homoscedasticity, and independence of residuals. Simply stated, residuals are the differences between the predicted and obtained values of the dependent variable in the sample. In multiple regression, the residuals are assumed to be normally distributed. To test for normality of residuals, Cohen et al. (2003) suggested plotting a histogram of the residuals and then overlaying a normal curve with the same mean and standard deviation as the data. If the histogram and normal curve are similar, then the distribution of the residuals is normal. Second, the residuals should have a straight-line relationship with predicted criterion scores (i.e., linearity). Graphical methods, such as the normal probability plot (p-p plot) can be used to determine if the distribution of the residuals is linear (Cohen et al. 2003; Tabachnick & Fidell, 2010). The residuals can be plotted against each predictor variable and the predicted values. Researchers can examine the graphs for any deviation from linearity. Third, the variance of the residuals is approximately equal for all predicted values of the criterion variable (i.e., homoscedasticity; Cohen, et al.; Tabachnick & Fidell). The same graphs used to detect linearity can also be used to detect homoscedasticity (Cohen, et al.). When the residuals are homoscedastic, the band enclosing the residuals will be approximately equal in width at all values of the predicted criterion score. Finally, independence of residuals is another assumption of regression. A violation of this assumption will not affect the regression coefficients; however, it may affect standard errors which affect significance tests (Cohen et al., 2003). The Durbin-Watson test statistic was computed to assess if the residuals met this assumption. Any value ranging from 1 to 3 was considered acceptable (Cohen, Field, 2013).

CHAPTER 4: Results

Assumptions

Before conducting the hierarchical analyses, the following statistical assumptions were evaluated for the data set: (a) adequate sample size, (b) absence of outliers among the cases, (c) absence of multicollinearity among the predictor variables, and (d) normality, linearity, homoscedasticity, and independence of residuals (Cohen et al., 2003).

As noted in the Method section, the a priori determined minimum acceptable sample size for a hierarchical multiple regression was $N = 116$. The sample sizes for the study analyses for each grade were as follows: 221, 230, and 282 for Grades 6, 7, and 8 respectively. Therefore, all subsets of data exceeded minimum sample size required to conduct a multiple regression.

There were 42 (5%) univariate outliers discovered when examining box and whisker plots, scatterplots, histograms, and z-score transformations. However, all were determined to be legitimate cases and kept in the analyses. Additionally, casewise diagnostics indicated that one case in Grade 6, four cases in Grade 7, and one case in Grade 8 standardized residuals were beyond 3 standard deviations away from the mean but found to be legitimate cases. Thus, they were left in the analyses as they were seen as valuable data to measure the ability of the independent variables to predict the criterion variable (Keith, 2006). However, to test to stability of the results the analyses were run without the outliers and results were found to be comparable.

To determine the possibility of multicollinearity issues among the predictor variables, the correlation matrix was examined along with computing the variance inflation factor (VIF) and the tolerance level for each grade level in the data set. There were no bivariate correlations in any of the correlation matrices at .90 or above. Furthermore, the tolerance values for the data ranged from .33 to 1.00 and the VIF values ranged from 1.00 to 3.00. Therefore, all VIF and tolerance values fell within the acceptable ranges for all variables and grades in the study.

Finally, the normal probability plots of the standardized residuals, histograms, and the Durbin-Watson test statistic were all utilized to determine if the residuals met the required assumptions. Visual inspections of the p-p plots and histograms presented a normally distributed set of residuals for all grades and academic domains. In addition, Durbin-Watson indices were between the values of 1 and 3. This indicated that the residuals met the assumption of normality, linearity, homoscedasticity, and independence.

Internal Consistency

Cronbach's coefficient alpha (Cronbach, 1951) was used to estimate reliabilities of the measurements for the predictor variables. Coefficient alphas were calculated for the following scales: Language Arts Self-efficacy, Math Self-efficacy, Interpersonal skills, Academic Engagement, Academic Motivation, and Study Skills. As shown in Table 2, the internal reliability estimates of the scale items with the current sample ranged from .86 to .96. All variables met the minimally acceptable coefficient of .80 for screening instruments and research purposes (Salvia & Ysseldyke, 2001). Reliability estimates for the self-efficacy scales were comparable to those reported in the manual (Pintrich & De Groot, 1990) and those found in studies utilizing the instrument with adolescents (Pintrich et al., 1993). Likewise, the reliability estimates for the subscales used from the ACES-Student form were also comparable to the manual (DiPerna & Elliott, 2000).

Table 2

Internal Reliability Estimates for the Language Arts Self-Efficacy, Math Self-Efficacy, Interpersonal Skills, Academic Engagement, Academic Motivation, and Study Skills scales

	Number of Items	Grade 6	Grade 7	Grade 8
Language Arts Self-Efficacy	8	.90	.91	.92
Math Self-Efficacy	8	.95	.95	.96
Interpersonal Skills	10	.76	.81	.79
Academic Engagement	8	.78	.82	.82
Academic Motivation	9	.79	.85	.86
Study Skills	11	.84	.84	.85

Multiple Regression Analyses

The main purpose of this study was to examine the relationships between middle school students' academic enablers and their later math and language achievement scores. Specifically, the study aimed to determine if a student's subject specific self-efficacy beliefs, levels of motivation; and study, academic engagement, and interpersonal skills could predict future achievement over the course of seven months above and beyond certain student variables. Therefore, a hierarchical regression analysis was chosen for this study.

Step 1 of the regression model included the control variables of previous achievement, cognitive ability, student free/reduced lunch status, and gender. Steps 2-6 added each of the academic enablers one by one to measure their unique contribution of prediction to academic achievement. Analyses were completed separately for each grade and achievement domain to determine if the relationships between the predictor and outcomes variables differed for each set of regressions. In addition, the descriptive statistics were measured. The means, standard deviations, skewness, kurtosis, and range of values were calculated for each predictor variable in each grade. Skewness was considered significantly high if it exceeded 2.0. In addition, a kurtosis exceeding 7.0 was considered significantly high (West, Finch, & Curran, 1995).

Sixth Grade

Descriptive statistics for sixth grade are presented in Table 3. The mean of the cognitive ability scores fell within the average range (*M* = 105.04; *SD* = 13.11). In addition, on average, sixth grade students in the sample scored in the proficient range (i.e., 200-250) for both language arts and math achievement. This was the case for both previous and future achievement. None of the variables had a skewness index greater than 2.0 or a kurtosis index greater than 7.0.

Table 3

Descriptive Statistics for all Predictor Variables for Grade 6

	M	*SD*	*Skewness*	*Kurtosis*	*Min*	*Max*
Cognitive Ability	105.04	13.11	-0.10	-0.33	70	142
Previous Language Arts	217.52	20.54	0.05	0.06	165	275
Previous Math	241.85	27.68	-0.11	0.13	154	300
Future Language Arts	212.30	21.55	0.11	0.15	158	282
Future Math	222.34	30.53	0.25	0.01	145	300
Language Arts Self-Efficacy	5.81	1.03	-1.20	1.25	2	7
Math Self-Efficacy	5.75	1.23	-1.44	2.03	1	7
Interpersonal Skills	43.19	4.77	-0.99	1.26	22	50
Academic engagement	30.81	5.50	-0.42	0.08	11	40
Academic Motivation	37.12	5.20	-0.51	0.35	16	45
Study Skills	48.30	5.82	-1.32	1.67	28	55

Note. *N* = 221. SD = Standard Deviation; Min = Minimum scale score; Max = Maximum scale score. Self-efficacy scores are the average of all item scores; Interpersonal Skills, Academic Engagement, Academic Motivation, and Study Skills are the total of item ratings in that scale.

Language arts. The bivariate correlations between all variables in the Grade 6 language arts model are reported in Table 4. All predictor variables, with the exception of gender and FRL, had significant correlations with future Grade 6 language arts achievement. Significant correlations between the predictor variables and future achievement ranged from weak (r = .11) for interpersonal skills to strong (r = .66) for previous language achievement. There was also a strong correlation between cognitive ability and future language arts achievement (r = .62; p <.001). All of the academic enablers had weak correlations with future language arts achievement (r = .11 - .18), but moderate to strong correlations with each other (r = .44 - .64).

Table 4

Correlations for the Variables in the Grade 6 Language Arts Achievement Model

	Language Arts Achievement	Gender	Free/ Reduced Lunch	Cognitive Ability	Previous Language Arts	Language Arts Self-Efficacy	Interpersonal Skills	Academic Engagement	Academic Motivation	Study Skills
Language Arts Achievement	-									
Gender	.08	-								
Free/Reduced Lunch	-.04	.05	-							
Cognitive Ability	.62[c]	.00	-.10	-						
Previous Language Arts	.66[c]	.13[a]	-.02	.47[c]	-					
Language Arts Self-Efficacy	.16[a]	.16[b]	-.08	.06	.24[c]	-				
Interpersonal Skills	.11[a]	.25[c]	-.11	.06	.14[a]	.46[c]	-			
Academic engagement	.19[a]	.11[a]	-.10	.12[a]	.27[c]	.44[c]	.52[c]	-		
Academic Motivation	.18[a]	.16[b]	-.07	.10	.24[c]	.52[c]	.60[c]	.63[c]	-	
Study Skills	.14[a]	.23[c]	-.10	.04	.24[c]	.51[c]	.64[c]	.60[c]	.63[c]	-

Note. *N= 221; a =p* <. 05, *b = p* <. 01, *c = p* <. 001

Results of the hierarchical multiple regression for Grade 6 language arts achievement are presented in Table 5. The control variables at Step 1 explained 56% of the variance in language arts achievement (FΔ [4, 216] = 68.14, p < .001). After the control variables were entered, language arts self-efficacy, academic motivation, academic engagement, study skills, and interpersonal skills were entered one at a time. None of the enabler variables were able to explain any significant additional amounts of variance in the model. In the final step of the model, previous language arts and cognitive ability were the only variables to have significant relationships with later language arts achievement (β = .47, *p* < .001; and β = .39, *p* < .001; respectively). This model left 44% of Grade 6 language arts achievement unexplained.

Table 5

Hierarchical Multiple Regression Analysis Predicting Grade 6 Language Arts Achievement

Predictor Variables	B	Std. Error	β	t	ΔR^2	$F\Delta$
1. Control Variables					.56	66.14[c]
Previous Language Arts	.49	.06	.47	.470[c]		
Cognitive Ability	.64	.09	.39	.393[c]		
Free/Reduced Lunch	.68	2.94	.01	.011		
Gender	.52	2.06	.01	.012		
2. Language Arts Self-Efficacy	.15	1.18	.01	.130	.000	.16
3. Academic Motivation	.14	.28	.03	.502	.001	.27
4. Academic Engagement	-.04	.24	-.01	-.164	.000	.04
5. Study Skills	-.04	.26	-.01	-.149	.000	.01
6. Interpersonal Skills	.04	.29	.01	.135	.000	.02

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient. [a]*p* <. 05, [b] *p* <. 01, [c]*p* <. 001

Mathematics. The bivariate correlations between all variables in the Grade 6 mathematics achievement model can be found in Table 6. All predictor variables, with the exception of gender and FRL, and interpersonal skills had significant correlations with future mathematics achievement. Significant correlations between the predictor variables and future achievement ranged from weak (*r* = .12) for study skills to strong (*r* = .72) for previous math achievement. There was also a strong correlation between cognitive ability and future math achievement (*r* = .66). The academic enablers had insignificant to moderate correlations with future math achievement (*r* = .10 - .30), but moderate to strong correlations with each other (*r* = .27 - .64).

Table 6

Correlations for the Variables in the Grade 6 Math Achievement Model

	Math Achievement	Gender	Free/ Reduced Lunch	Cognitive Ability	Previous Math	Math Self-Efficacy	Interpersonal Skills	Academic Engagement	Academic Motivation	Study Skills
Math Achievement	-									
Gender	-.04	-								
Free/Reduced Lunch	-.08	.05	-							
Cognitive Ability	.66[c]	-.00	-.10	-						
Previous Math	.72[c]	-.10	-.07	.63[c]	-					
Math Self-Efficacy	.30[c]	.01	-.10	.18[b]	.19[a]	-				
Interpersonal Skills	.10	.25[c]	-.11	.06	-.01	.28[c]	-			
Academic engagement	.19[b]	.11[a]	-.10	.12[a]	.06	.36[c]	.52[c]	-		
Academic Motivation	.14[a]	.16[b]	-.07	.10	.07	.41[c]	.60[c]	.63[c]	-	
Study Skills	.12[a]	.23[c]	-.10	.04	.01	.27[c]	.64[c]	.60[c]	.63[c]	-

Note. N = 221; [a] =*p* <. 05, [b] = *p* <. 01, [c] = *p* <. 001

Results of the hierarchical multiple regression for Grade 6 mathematics achievement are presented in Table 7. The control variables at Step 1 of the model, predicted 59% of the variance (FΔ [4, 216] = 76.77, $p < .001$). After the control variables were entered, math self-efficacy explained an additional 2% of variance above and beyond the control variables, which was statistically significant (FΔ [1, 215] = 12.75, $p < .001$). None of the other enabler variables explained any meaningful amounts of additional variance in the model. In the final step of the model, previous language arts, cognitive ability, math self-efficacy had significant relationships with later math achievement (β = .49, $p < .001$; and β = .393 $p < .001$; β = .14, $p < .01$ respectively). This model left 38% of Grade 6 math achievement unexplained.

Table 7

Hierarchical Multiple Regression Analysis Predicting Grade 6 Math Achievement

Predictor Variables	B	Std. Error	β	t	ΔR^2	$F\Delta$
1. Control Variables					.587	76.77[c]
Previous Math	.55	.06	.49	8.74[c]		
Cognitive Ability	.77	.13	.33	5.87[c]		
Free/Reduced Lunch	1.50	3.96	.02	.379		
Gender	-.49	2.78	-.01	-.176		
2. Math Self-Efficacy	3.49	1.21	.14	2.898[b]	.023	12.75[c]
3. Academic Motivation	-.42	.38	-.07	-1.108	.000	.09
4. Academic Engagement	.44	.33	.08	1.339	.006	3.19
5. Study Skills	.26	.34	.05	.764	.002	.89
6. Interpersonal Skills	.13	.39	.02	.323	.000	.10

Note. $N = 221$. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient.
[a]$p <. 05$, [b] $p <. 01$, [c]$p <. 001$

Seventh Grade

Descriptive statistics for seventh grade are presented in Table 8. The mean of the cognitive ability scores fell within the average range ($M = 106.54$; $SD = 13.44$). In addition, on average, seventh grade students in the sample scored in the proficient range (i.e., 200-250) for both language arts and math achievement. This was the case for both previous and future achievement.   None of the variables had a skewness index greater than 2.0 or a kurtosis index greater than 7.0.

Table 8

Descriptive Statistics for all Predictor Variables for Grade 7

	M	*SD*	*Skewness*	*Kurtosis*	*Min*	*Max*
Cognitive Ability	106.62	13.45	-.061	-.104	72	145
Previous Language Arts	216.77	19.75	.007	-.143	164	270
Previous Math	233.07	32.11	.100	-.389	142	300
Future Language Arts	221.67	26.05	-.061	-.291	157	300
Future Math	228.89	37.57	-.153	-.402	122	300
Language Arts Self-Efficacy	5.71	1.02	-1.168	1.189	2	7
Math Self-Efficacy	5.72	1.30	-1.350	1.189	2	7
Interpersonal Skills	41.97	5.62	-1.155	1.706	22	50
Academic engagement	30.05	6.04	-.487	-.279	12	40
Academic Motivation	35.80	6.30	-.775	.112	16	45
Study Skills	46.40	6.28	-.715	-.157	27	55

Note. N = 230. SD = Standard Deviation; Min = Minimum scale score; Max = Maximum scale score. Self-efficacy scores are the average of all item scores; Interpersonal Skills, Engagement, Motivation, and Study Skills are the total of item ratings in that scale.

Language arts. Bivariate correlations between all variables in the Grade 7 language arts model can be found in Table 9. All predictor variables, with the exception of gender, FRL, and study skills had significant correlations with later achievement. Significant correlations between the predictor variables and future achievement ranged from weak (r = .11) for interpersonal skills to very strong (r = .81) for previous language achievement. There was also a strong correlation between cognitive ability and future language arts achievement (r = .62). All of the academic enablers had insignificant to weak correlations with future language arts achievement (r = .06 - .24), but moderate to strong correlations with each other (r = .39 - .70).

Table 9

Correlations for the Variables in the Grade 7 Language Arts Achievement Model

	Language Arts Achievement	Gender	Free/ Reduced Lunch	Cognitive Ability	Previous Language Arts	Language Arts Self-Efficacy	Interpersonal Skills	Academic Engagement	Academic Motivation	Study Skills
Language Arts Achievement	-									
Gender	.10	-								
Free/Reduced Lunch	-.26[c]	.02	-							
Cognitive Ability	.65[c]	-.02	-.32[c]	-						
Previous Language Arts	.81 [c]	.09	-.26[c]	.67[c]	-					
Language Arts Self-Efficacy	.24[a]	.20[b]	-.02[a]	.12[a]	.24[c]	-				
Interpersonal Skills	.11[a]	.40[c]	-.11[a]	.08	.13[a]	.39[c]	-			
Academic engagement	.12[a]	.11[a]	.04	.11	.14[a]	.39[c]	.51[c]	-		
Academic Motivation	.13[a]	.14[a]	-.07	.08	.13[a]	.50[c]	.54[c]	.65[c]	-	
Study Skills	.06	.28[c]	.01	.01	.06	.49[c]	.61[c]	.62[c]	.70[c]	-

Note. *N* = 230; [a] p <. 05, [b] p <. 01, [c] p <. 001

Results of the hierarchical multiple regression for Grade 7 language arts achievement are presented in Table 10. The control variables in Step 1 of the model, explained 68% of the variance in later language arts achievement (FΔ [4, 225] = 121.35, p < .001). After the control variables were entered, none of the enabler variables were able to explain any significant amounts of additional variance in the model. In the final step of the model, previous language arts and cognitive ability were the only variables to have significant relationships with later language arts achievement (β = .66, *p* < .001; and β = .21, *p* < .001; respectively). This model left 32% of Grade 7 language arts achievement unexplained.

Table 10

Hierarchical Multiple Regression Analysis Predicting Grade 7 Language Arts Achievement

Predictor Variables	B	Std. Error	β	t	ΔR^2	$F\Delta$
1. Control Variables					.683	121.35[c]
Previous Language Arts	.87	.04	.66	12.410[c]		
Cognitive Ability	.40	.10	.21	3.947[c]		
Free/Reduced Lunch	-1.51	3.07	-.02	-.491		
Gender	2.39	2.21	.05	1.082		
2. Language Arts Self-Efficacy	1.22	1.23	.05	.991	.002	1.14
3. Academic Motivation	.13	.25	.03	.529	.000	.01
4. Academic Engagement	-.08	.23	-.02	-.335	.000	.31
5. Study Skills	-.02	.25	-.004	-.067	.000	.05
6. Interpersonal Skills	-.15	.25	-.03	-.619	.001	.38

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient.
[a]*p* <. 05, [b] *p* <. 01, [c]*p* <. 001

Mathematics. The bivariate correlations between all variables in the Grade 7 mathematics achievement model can be found in Table 11. All predictor variables, with the exception of gender, interpersonal skills and study skills had significant correlations with later mathematics achievement. Significant correlations between the predictor variables and future achievement ranged from weak (r = .11) for academic motivation to strong (r = .82) for previous math achievement. There was also a strong correlation between cognitive ability and future math achievement (r = .68). The academic enablers had insignificant to weak correlations with future math achievement (r = .05 - .22), but moderate to strong correlations with each other (r = .30 - .70).

Table 11

Correlations for the Variables in the Grade 7 Math Achievement Model

	Math Achievement	Gender	Free/ Reduced Lunch	Cognitive Ability	Previous Math	Math Self-Efficacy	Interpersonal Skills	Academic Engagement	Academic Motivation	Study Skills
Math Achievement	-									
Gender	-.05	-								
Free/Reduced Lunch	-.25[c]	.02	-							
Cognitive Ability	.68[c]	-.02	-.32[c]	-						
Previous Math	.82[c]	-.07	-.24[c]	.71[c]	-					
Math Self-Efficacy	.22[b]	.00	.03	.06	.19[b]	-				
Interpersonal Skills	.05	.40[c]	-.11[a]	.08	.03	.30[c]	-			
Academic Engagement	.13[a]	.11[a]	.04	.11	.07	.36[c]	.51[c]	-		
Academic Motivation	.11[a]	.14[a]	-.07	.08	.05	.53[c]	.54[c]	.65[c]	-	
Study Skills	.02	.28[c]	.01	.01	-.02	.46[c]	.61[c]	.62[c]	.70[c]	-

Note. *N = 230;* [a] *p* <. 05, [b] *p* <. 01, [c] *p* <. 001

Results of the hierarchical multiple regression for Grade 7 mathematics achievement are presented in Table 12. The control variables in the model explained 69% of the variance in later math achievement (FΔ [4, 225] = 126.97, $p < .001$). After the control variables were entered, math self-efficacy explained an additional 1% of variance, which was statistically significant (FΔ [1, 224] = 12.75, p < .05). None of the remaining enablers explained any additional variance in the model. In the final step of the model, previous language arts and cognitive ability were the only variables to have significant relationships with later math achievement (β = .66, $p < .001$; and β = .19 $p < .01$; respectively). This left 30% of the model predicting Grade 7 math achievement unexplained.

Table 12

Hierarchical Multiple Regression Analysis Predicting Grade 7 Math Achievement

Predictor Variables	B	Std. Error	β	t	ΔR^2	*F*Δ
1. Control Variables					.683	126.97[c]
Previous Math	.77	.06	.66	12.357[c]		
Cognitive Ability	.52	.15	.19	3.521[b]		
Free/Reduced Lunch	-3.77	4.23	-.04	-.891		
Gender	.73	2.04	.01	.240		
2. Math Self-Efficacy	2.24	1.36	.08	1.650	.006	4.65[a]
3. Academic Motivation	.20	.35	.03	.565	.001	.38
4. Academic Engagement	.40	.32	.07	1.263	.001	.70
5. Study Skills	-.32	.35	-.05	-.923	.002	1.30
6. Interpersonal Skills	-.24	.34	-.04	-.696	.001	.48

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient.
$^a p <. 05$, $^b p <. 01$, $^c p <. 001$

Eighth Grade

Descriptive statistics for eighth grade are presented in Table 13. The mean of the cognitive ability scores of the sixth grade students fell within the average range (*M* = 106.40; *SD* = 14.03). In addition, on average, seventh grade students in the sample scored in the proficient range (i.e., 200-250) for both language arts and math achievement. This was the case for both previous and future achievement. None of the variables had a skewness index greater than 2.0 or a kurtosis index greater than 7.0.

Table 13

Descriptive Statistics for all Predictor Variables for Grade 8

	M	*SD*	*Skewness*	*Kurtosis*	*Min*	*Max*
Cognitive Ability	106.40	14.03	-.110	-.534	70	138
Previous Language Arts	222.90	27.22	.347	.442	143	300
Previous Math	226.87	33.82	-.015	-.521	149	300
Future Language Arts	229.40	22.18	.292	-.062	173	300
Future Math	235.05	37.21	-.079	-.683	141	300
Language Arts Self-Efficacy	5.59	1.05	-1.146	1.745	1	7
Math Self-Efficacy	5.45	1.44	-1.047	.532	1	7
Interpersonal Skills	41.52	5.48	-.938	.868	22	50
Academic Engagement	29.40	6.06	-.458	-.162	8	40
Academic Motivation	34.66	6.37	-.637	.045	11	45
Study Skills	45.71	6.60	-.870	.542	22	55

Note. *N* = 282. SD = Standard Deviation; Min = Minimum scale score; Max = Maximum scale score. Self-efficacy scores are the average of all item scores; Interpersonal Skills, Engagement, Motivation, and Study Skills are the total of item ratings in that scale.

Language arts. The bivariate correlations between all variables in the Grade 8 language arts model can be found in Table 14. All predictor variables, with the exception of gender, had significant correlations with later achievement. Significant correlations between the predictor variables and future achievement ranged from weak (r = .11) for study skills to very strong (r = .81) for previous language achievement. There was also a strong correlation between cognitive ability and future language arts achievement (r = .62). All of the academic enablers had weak correlations with future language arts achievement (r = .11 - .25), but moderate to strong correlations with each other (r = .39 - .76).

Table 14

Correlations for the Variables in the Grade 8 Language Arts Achievement Model

	Language Arts Achievement	Gender	Free/ Reduced Lunch	Cognitive Ability	Previous Language Arts	Language Arts Self-Efficacy	Interpersonal Skills	Academic Engagement	Academic Motivation	Study Skills
Language Arts Achievement	-									
Gender	-.07	-								
Free/Reduced Lunch	-.14[a]	.03	-							
Cognitive Ability	.66[c]	-.09	-.13[a]	-						
Previous Language Arts	.81[c]	-.13[a]	-.10	.63[c]	-					
Language Arts Self-Efficacy	.12[a]	-.12[a]	.03	.05	.16[b]	-				
Interpersonal Skills	.20[c]	-.04	.01	.10[a]	.17[b]	.42[c]	-			
Academic engagement	.25[c]	-.10[a]	-.02	.21[c]	.25[c]	.39[c]	.53[c]	-		
Academic Motivation	.13[a]	-.06	-.04	.03	.13[a]	.45[c]	.62[c]	.55[c]	-	
Study Skills	.11[a]	-.07	-.04	.01	.11[a]	.50[c]	.64[c]	.46[c]	.76[c]	-

Note. N = 282; [a] p <. 05, [b] p <. 01, [c] p <. 001

Results of the hierarchical multiple regression for Grade 8 language arts achievement are presented in Table 15. The control variables in Step 1 of the model explained 70% of the variance in future language arts achievement (FΔ [4, 277] = 161.82, p < .001). After the control variables were entered, none of the enabler variables were able to explain any additional amounts of variance in the model. In the final step of the model, previous language arts and cognitive ability were the only variables to have significant relationships with later language arts achievement (β = .66, *p* < .001; and β = .23, *p* < .001; respectively). This model left 30% of Grade 8 future language arts achievement unexplained.

Table 15

Hierarchical Multiple Regression Analysis Predicting Grade 8 Language Arts Achievement

Predictor Variables	B	Std. Error	β	t	ΔR^2	*F*Δ
1. Control Variables					.700	161.82
Previous Language Arts	.54	.04	.66	15.273		
Cognitive Ability	.37	.07	.23	5.413		
Free/Reduced Lunch	-3.04	2.14	-.05	1.062		
Gender	1.57	1.48	.04	-1.420		
2. Language Arts Self-Efficacy	-1.17	.83	-.06	-1.401	.000	.16
3. Academic Motivation	-.003	.19	-.001	-.014	.002	2.21
4. Academic Engagement	.06	.16	.02	.381	.001	.64
5. Study Skills	.05	.19	.02	.283	.001	.60
6. Interpersonal Skills	.29	.19	.07	1.509	.002	2.28

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient.

[a]*p* <. 05, [b] *p* <. 01, [c]*p* <. 001

Mathematics. The bivariate correlations between all variables in the Grade 7 mathematics achievement model can be found in Table 16. All predictor variables, with the exception of gender and study skills, had significant correlations with later mathematics achievement. Significant correlations between the predictor variables and future achievement ranged from weak (r = .12) for academic motivation to strong (r = .82) for previous math achievement. There was also a strong correlation between cognitive ability and future math achievement (r = .70). The academic enablers had insignificant to moderate correlations with future math achievement (r = .07 - .30), but moderate to strong correlations with each other (r = .30 - .76).

Table 16

Correlations for the Variables in the Grade 8 Math Achievement Model

	Math Achievement	Gender	Free/ Reduced Lunch	Cognitive Ability	Previous Math	Math Self-Efficacy	Interpersonal Skills	Academic Engagement	Academic Motivation	Study Skills
Math Achievement	-									
Gender	-.09	-								
Free/Reduced Lunch	-.16[b]	.03	-							
Cognitive Ability	.70[c]	-.09	-.13[a]	-						
Previous Math	.82[c]	-.14[a]	-.14[b]	.75[c]	-					
Math Self-Efficacy	.30[c]	-.10	-.02	.16[b]	.28[c]	-				
Interpersonal Skills	.13[a]	-.04	.01	.10[a]	.12[a]	.34[c]	-			
Academic Engagement	.21[c]	-.10[a]	-.02	.21[c]	.16[b]	.30[c]	.53[c]	-		
Academic Motivation	.12 [a]	-.06	-.04	.03	.06	.45[c]	.62[c]	.55[c]	-	
Study Skills	.07	-.07	-.04	.01	.04	.33[c]	.64[c]	.46[c]	.76[c]	-

Note. N = 282; [a] p <. 05, [b] p <. 01, [c] p <. 001

Results of the hierarchical multiple regression for Grade 8 mathematics achievement are presented in Table 17. The control variables at Step 1 of the model explained 69% of the variance in later math achievement (FΔ [4, 277] = 153.41, $p < .001$). After the control variables were entered math self-efficacy explained an additional 1% of variance, which was statistically significant (FΔ [1, 276] = 12.75, p < .01). None of the remaining enablers explained any additional variance in the model. In the final step of the model, previous language arts and cognitive ability were the only variables to have significant relationships with later math achievement (β = .65, $p < .001$; and β = .20 $p < .001$; respectively). This left 30% of the model predicting Grade 8 future math achievement unexplained.

Table 17

Hierarchical Multiple Regression Analysis Predicting Grade 8 Math Achievement

Predictor Variables	B	Std. Error	β	t	ΔR^2	$F\Delta$
1. Control Variables					.69	153.41[c]
Previous Math	.72	.06	.65	12.458		
Cognitive Ability	.52	.13	.20	3.857		
Free/Reduced Lunch	-4.21	3.60	-.04	-1.171		
Gender	2.20	2.49	.03	.883		
2. Math Self-Efficacy	1.96	1.01	.08	1.935	.008	7.58[b]
3. Academic Motivation	.28	.33	.05	.831	.002	1.48
4. Academic Engagement	.28	.26	.05	1.081	.001	.82
5.. Study Skills	-.06	.30	-.01	-.198	.000	.20
6 Interpersonal Skills	-.22	.32	-.03	-.683	.001	.47

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient.

[a]*p* <. 05, [b] *p* <. 01, [c]*p* <. 001

Supplemental Analyses

Although it is important to include such variables as previous achievement and cognitive ability in the regression analyses due to their documented relationships with future achievement (e.g., Neisser et al., 1996). I ran a second set of analyses without the aforementioned control variables so that results may be compared to previous studies that also omitted these variables (e.g., Hughes et al. 2008; Malecki & Elliott, 2002; Ray & Elliott, 2006; Singh et al., 2002). Similar to the primary analyses academic self-efficacy, academic motivation, academic engagement, study skills, and interpersonal skills were entered in that order in a step by step design to determine the unique contribution of each enabler.

Results of the analyses can be found in Appendix A-C. When the control variables were omitted from the model in the supplemental analyses, the results were similar to the primary analyses, with the exception of academic self-efficacy. The contribution of academic self-efficacy was variable across academic domains and grades; however, it was able to explain a small amount of variance (2-9%) in both math and language arts achievement at all grade levels. These relationships appeared to be the strongest for sixth and eighth grade math achievement where math self-efficacy was able to explain 9% of variance in later math achievement. Although language arts self-efficacy significantly predicted 6% of the variance in future language arts achievement for Grade 7, math self-efficacy appeared to have the strongest and most consistent relationship (5-9% of variance) with future math achievement at all grade levels. Academic engagement exhibited very small relationship with future language arts and math achievement for Grade 8 explaining 4% and 3% respectively. None of the other academic enabler variables demonstrated significant relationships with later language arts or math achievement.

CHAPTER 5: Discussion

The middle school years are a particularly challenging time for students to succeed in school. Previous research has noted that several school, home, and student variables play a role in academic success. Among those variables, student academic enablers may be the most amenable to change, thus improving academic enablers could have long-term benefits if effective interventions can be put into place. Few previous studies, however, have examined the influence of multiple academic enablers at once on language arts or math achievement for middle school students, and none have explored the comprehensive model of enablers (i.e., academic self-efficacy, academic motivation, academic engagement, study skills, and interpersonal skills) included in this study. Therefore, the primary purpose of the current study was to investigate the relationships between the aforementioned student enablers and later language arts and math achievement in the middle grades, after controlling for key student characteristics.

Contrary to expectations, the academic enablers did not substantially add to the prediction of later reading or math achievement after controlling for key student characteristics. Consistent with past research, results of the study indicated that cognitive ability and previous achievement had the greatest ability to predict later standardized achievement test scores (e.g. Aluja & Blanch, 2004; Deary et al., 2007; Fennema, & Lamon, 1990; Gagne & St. Pere, 2001). These findings were consistent across grades and academic domains. The only enabler to demonstrate a statistically significant relationship with later achievement in the primary analyses was math self-efficacy; however, this relationship was inconsistent and very small in nature. Results of the supplemental analyses were comparable to the primary analyses in that math self-efficacy explained a varying amount of variance depending on the grade and academic domain;

however, this relationship was still small based on the criteria set forth in this study (Cohen et al, 2003).

Summary of Key Findings and Interpretations

The academic enablers in this study were used to predict both math and language arts achievement for students in the sixth, seventh, and eighth grades, while controlling for previous achievement, cognitive ability, free/reduced lunch status, and gender. Based on previous research, it was hypothesized that academic motivation, academic engagement, and academic self-efficacy would each demonstrate a moderate, significant relationship with later language arts and math achievement. It was also hypothesized that interpersonal skills and study skills would demonstrate a significant relationship with later achievement; however, this relationship would be smaller. The following paragraphs will explain the details of the current findings for each academic enabler and how these results compare to previous findings.

Overall, the hypotheses regarding academic motivation and academic engagement were not supported. While the results of Gagne and St. Pere (2001) supported the results of this study because they found no significant relationships between motivation and achievement after controlling for cognitive ability, some past studies were inconsistent with the current results and concluded that motivation was directly related to standardized tests of general achievement even when ability was taken into account (Anderson & Keith, 2007; Singh et al., 2002). Likewise the results of the current study are supported by McGinnis (2009), who found that after controlling for cognitive ability and previous achievement, engagement behaviors added very little in the ability to predict current math or language arts achievement. However, several studies have found significant, positive effects of academic engagement on future achievement (math and language arts) on both standardized test scores (Greenwood 1991; Hughes et al., 2008) and report card grades (Finn & Rock, 1997; Singh et al., 2002). Lastly, although the supplemental analyses indicated that with only the enablers in the model, academic engagement explained a significant amount of variance in the model (4% and 3% respectively), the amount of variance was very small and only for Grade 8 language arts and math achievement.

The hypothesis that academic self-efficacy would have a moderate relationship with later achievement was generally not supported. Overall, although academic self-efficacy was only able to explain a significant amount of variance in later achievement the amount was negligible (i.e., 1% - 2%). Furthermore, although the supplemental analyses indicated that math self-efficacy demonstrated a stronger relationship with later achievement when the control variables were omitted from the model, this relationship was variable and small (i.e., 2-9% of variance explained) but similar to some studies without control variables (e.g., Pintrich and De Groot, 1990). Previous studies have found significant relationships between self-efficacy and achievement with and without control variables. These relationships, however, have been much more prevalent for classroom performance and grades (e.g., Long et al., 2007).

It was also hypothesized that study skills and interpersonal skills would each demonstrate a small, but significant relationship with achievement in both language arts and math for all grades, after controlling for the key student characteristics. These hypotheses were not supported. When examining a direct relationship between study skills and achievement both McGinnis (2009) and Aluja and Blanch (2004) found study skills added very little to the prediction of current math or language arts achievement after controlling for cognitive ability. However unlike the current sample, previous research has found direct and indirect relationships between study skills and achievement (DiPerna et al., 2002, 2005). The current findings regarding the relationship between interpersonal skills and achievement were consistent with past research that included previous achievement or cognitive ability in the model (Aluja & Blanch; Duncan et al., 2007; McGinnis), but inconsistent with Wentzel (1993) who controlled for ability. However, Wentzel used teacher rated prosocial skills and those ratings had a much stronger relationship with report card grades than standardized achievement test scores.

There are several possible explanations for the findings in this study. First, the informants for the measurement of the enablers have varied across previous studies. For example, self-report measures have been used in several studies (e.g., Long et al., 2007; Malecki & Elliott, 2002; Singh et al., 2002; Wentzel, 1993) because while some behaviors are easily visible and measurable (e.g., a student who raises her hand and answers questions), others cannot be observed (e.g., to know a student's attitude toward math). Therefore, some constructs are best assessed through self-report because they can provide insight into the internal experiences of a student that cannot be measured by observation (Finch & McIntosh, 1990; March & Albano, 1996). Previous studies also have used teacher or parent report in lieu of self-report or in conjunction with self-report for the measures of several academic enablers (e.g., Anderson & Keith, 1997; Casillas et al., 2012; DiPerna et al., 2002, 2005, Wentzel, 1993). These differences in informants may cause differences in research results as it is possible that some students may be unable to provide objective, accurate assessments of their enablers. Additionally, teacher ratings of enablers are more likely to be aligned with course grades or ratings of academic skills if teachers also factor enabling behaviors (e.g., doing homework, staying on task, and answering questions in class) into those measures of achievement.

Second, the academic enablers in this study have been operationally defined differently in the literature. For example, although this study focused on goal directed behaviors of intrinsic motivation, other studies included measures of optimism and general commitment to school in their definitions (Casillas et al., 2012) or task value and task interest (Cleary & Chen, 2009). While academic engagement was measured via classroom academic behaviors in this study, other research has measured behaviors such as coming to class on time and being prepared (Singh et al. 2002), which is more closely associated with how study skills were measured in this research. Finally, study skills have been broadly defined across studies. Many studies focused only on homework completion (see Cooper et al., 2006), while others included self-regulation of effective use of study strategies (see Hattie et al., 1996). Thus, the definition of academic enablers, and how those definitions are operationalized by the measures, may explain different results across different studies.

Third, there has been variations in the methods used to measure academic achievement. For example, while some of the previous studies have focused on general achievement (Anderson & Keith, 1997), this study measured the effects of the enablers on math and language arts achievement separately. Even the specific way language arts and math achievement have been measured across studies has differed. For example, DiPerna et al. (2002, 2005) utilized the ACES-Teacher forms to measure academic achievement for both math and language arts, but other studies have measured achievement through report card grades (Finn & Rock, 1997; Long et al., 2007; Pintrich & De Groot, 1990; Singh et al., 2002; Wentzel, 1993). It is plausible that enablers in the middle grades may have stronger relationships with report card grades than standardized test scores. One potential explanation of this relationship is that GPA may reflect both academic skills and other behaviors associated with success in school such as completing homework, attending class, and being successful in a cooperative learning environment (Duckworth, Peterson, Matthews, & Kelly, 2007; Wentzel, 1993). However, in studies in which the authors measured the variables in a similar manner to the current study (e.g., Duncan et al.

2007, Gagne and St. Pere, 2001; McGinnis, 2009), the observed relationships were more consistent with these results.

In addition, it is possible that the academic enablers themselves are related. It has been noted that when two or more predictor variables (e.g., X_1, X_2, X_3, etc.) in a regression model are related to one another as well as the criterion variable, including all of those related variables in a regression model may bias the results (Cohen et al., 2003). Although the bivariate correlations, VIF levels, and tolerance levels did not indicate high levels of multicollinearity among the enablers in this study, previous research has suggested that they are related (Aluja & Blanch, 2004; DiPerna, et al., 2002, 2005; Long et al., 2007). The fact that some correlations between enablers reached .76 also suggests that they are related to one another. This would cause difficulty in finding shared but unique variance between each individual variable and the criterion variable. As previously stated, when the model is over identified, it may make it difficult to understand the impact each variable has on the criterion variable. Although there were no indications of multicollinearity, the enabler variables may be related enough that interpretation is difficult.

Limitations and Directions for Future Research

There are several limitations that must be considered when interpreting the results of this study. First, although the sample size was adequate, the sample was not demographically representative of the U.S. middle school population because over 80% of the sample was Caucasian and from a single school in the Northeast. This study should be replicated with a larger, more diverse sample of middle school students that is more demographically representative of the U.S. middle school population. Second, although student lunch aid status is often used as a proxy for SES (Kuperminc, Leadbeater, & Blatt, 2001), other methods of measurement have been suggested to be more representative (Entwisle & Astone, 1994; Harwell & LeBeau, 2010; Hauser, 1994). Therefore, a more comprehensive measurement of SES should be used in future studies.

Third, the sole use of a paper and pencil self-report to measure the academic enablers in this study may have reduced validity of the data. Several studies have noted inaccuracies with student self-reports (e.g., Chen & Zimmerman, 2007; Cornell, Lovegrove, & Baly, 2014; Kuncel, Crede, & Thomas, 2005; Winne & Jamieson-Noel, 2002). Although student self-report is used to measure some psychological constructs (e.g., self-efficacy and motivation) there are two possible confounding effects of utilizing this method: (a) the social desirability factor and (b) inaccurate assessments by students. While adolescents usually have the ability to provide more accurate assessments of inner thoughts and feelings, the tendency for students to provide socially desirable answers should be taken into account when using self-reports to measure academic behaviors. Social desirability is the tendency to respond to questions in a socially acceptable direction. The problem of social desirability arises because even if a student is trying to give honest answers, it is difficult for one to be objective and impartial when judging his or her own behaviors and adolescents may actually believe their inaccurate assessments (Cronbach, 1970; Fisher & Katz, 2000; Gramzow & Williard, 2006; Paulhus, 1984). The adolescent is faced with the challenge of integrating a self-system that includes the organization of an internally consistent self-identity and a comparison to peers (Bernstein, 1980). Therefore, the students might have compared themselves to their peers, who may have had higher or lower abilities as their own, which would make it difficult to provide an objective measure.

Fourth, it is also quite possible that the conceptualization of what constitutes "Never; Seldom, Sometimes, Often, or Almost Always," are simply interpreted differently by students than they are by teachers. These answer choices are subject to interpretation. Students' assessments of their behavior may be more closely aligned with their personal classroom experiences. For example, the answer to one item "I follow classroom rules," could easily be interpreted differently by students than by teachers. Most students in the general education classroom would most likely answer "Often," or "Almost Always." On the other hand students who "sometimes" follow the rules in the eyes of the teacher, quite possibly could think that they "Almost Always" follow the rules. It is possible that the scores on the ACES-Student simply follow a pattern at the higher end of the ratings, which is supported by reviewing the psychometric data provided in the ACES manual. Therefore, it is conceivable that the differences seen in teacher and student reports regarding the psychological constructs such as academic enablers are operationalized and envisioned by students in different ways than teachers.

Given these potential limitations, teacher reports, student interviews, and observational data should be obtained in addition to student paper and pencil self-reports in an effort to increase the accuracy of the measurement of the enablers. While the use of self-report measures in academic enabler research is valuable to gain insight into the affective components of the enabler constructs, teacher reports should continue to be collected due to their ability to accurately assess student academic enablers as well as attenuate the effects of social desirability (DiPerna et al., 2002, 2005). However, student interviews should also be obtained to aid in the understanding of the self-report items and due to the fact that some teacher judgments may be less accurate due to levels of teacher-student relationships (Gagne & St. Pere, 2001). Finally, direct observations of student enablers should also be obtained to corroborate the findings in light of the mixed results in the research of teacher judgment and the possibility of social desirability effects even during student interviews.

Finally, the use of the NJASK scores to measure previous and future achievement and may have limited the findings. Given that the state assessment is used to measure a student's yearly progress in the New Jersey curriculum, it is possible that the item content in the NJASK in the current year might have been very similar to the item content in the previous year. In addition, often in such high-stakes tests such as the NJASK, whole school efforts in addition to teacher efforts are focused on educating students on test content and practicing items throughout the school year (Tienken, 2008a; Tienken, 2008b). Due to these factors, it may become difficult to ascertain the sensitivity of these tests to measure achievement gains (Tienken). Therefore, due to the possible limitations in the statewide assessments and the evidence regarding the influence of some enablers on grades in middle school (e.g., Wentzel, 1993, 1996), future research should include report card grades and teacher judgments of academic skills. Several studies including, Smith, Jussim, and Eccles (1999), found that teachers' expectations were able to accurately predict student math performance better than a student's own assessment of his or her performance. Also, considering that high school graduation is one of the measures of academic success, future studies should, if possible, measure the graduation rate of students in the study.

In light of the bivariate correlations between enablers in the current research, future research should focus on continuing to examine the underlying relationships between the enablers and their relationships with achievement. Past research has indicated that the enablers examined in this study have some underlying relationships (e.g., Anderson & Keith, 1997; Coutinho & Neuman; 2008; DiPerna et al., 2002; 2005). Future studies should employ the use of structural equation modeling to further explore these relationships. Given the possible confounding factors of data collection previously noted, multiple data collection techniques need to be utilized in structural equation modeling research as well (e.g., teacher reports, direct observations, student interviews, and grades).

Finally, although ability and previous achievement predicted a large amount of variance in future achievement, there was still a large amount of variance unaccounted for in the model (30 - 44%). Therefore, future research on achievement models should include additional variables that are amenable to interventions such as parental involvement and teacher-student relationships. Several studies have indicated that parent involvement has a strong influence on achievement throughout a student's entire academic career (e.g., Hughes & Kwok, 2007; Monti, Pomerantz, & Roisman, 2014; Topor, Keane, Shelton, Calkins, 2010). Likewise, several studies have indicated that healthy teacher-student relationships may not only increase a student's sense of belonging to the school, but also improve student academic enablers such as motivation, engagement, and others (Buyse, Verschueren, Verachtert, & Van Damme, 2009; Hughes et al., 2008; Klem & Connell, 2004; Wentzel, 1997, 1998), which would in turn increase achievement.

Implications of Findings

The findings of the current study have several implications for research and practice. The most apparent implication of the current findings is the importance of including previous achievement in future models predicting academic achievement. A possible reason as to why previous achievement demonstrated such a strong relationship with later achievement across all grades and achievement domains is that achievement scores are an aggregate measure of previously learned skills and accrued learning (Entwisle & Alexander, 1990). As noted, previous research that did not include this variable in the model found stronger relationships between academic enablers and alter achievement than was found in this study. These findings appear to illustrate how the exclusion of important variables in an equation may lead to inflating the variance accounted for by predictor variables (Cohen et al., 2003; Tabachnick & Fidell, 2010). Therefore, future research attempting to predict achievement gains should first account for the academic skills previously accrued by the student.

Second, the lack of support for a relationship between the student self-report of enablers and academic achievement may mean that there is no relationships between enablers and achievement at the middle school level or it may indicate the limitations of solely using student paper and pencil self-reports to measure these enablers at this level. Therefore, additional methods of data collection are needed in future research to expand our understanding of the role these enablers may play in middle school achievement and aid in the measurement of the constructs. Classroom observations, student interviews, and teacher interviews may foster a greater understanding how these constructs are perceived by students and teachers and manifested by students, thereby improving the measurement and understanding of their role in middle school achievement and success.

Finally, previous research with some of the enablers in this study has indicated that enablers such as motivation and self-efficacy are influenced by previous achievement and success (Linnenbrink & Pintrich, 2002; Pintrich & De Groot, 1990) and these enablers subsequently influence other enablers such as academic engagement and study skills (DiPerna et al., 2002, 2005), which are more closely related to achievement. Therefore, it would appear that focusing instructional support and interventions to increase students' opportunities for success in the primary grades may improve students' levels of academic self-efficacy and motivation. This would then theoretically improve their academic engagement, as well as other enablers, which would then facilitate the reciprocal relationship between these enablers and achievement; thus, improving the strength of these types of relationships in the middle grades.

Conclusions

Although the findings in this study were inconsistent with some findings in previous studies, a focus on the use of enablers to improve the academic achievement of middle school students is still a valuable endeavor. Due to the increasing social, emotional, and academic demands placed on students in middle school, some students may be at-risk for academic failure. Research examining achievement models have included school, home, and student factors. Included in the student factors are academic enablers. By understanding the relationships between academic enablers and achievement, educators can target interventions on those academic enablers that increase chances for success in school and provide long-lasting effects to support achievement gains.

Before the current study, research regarding the relationships between academic enablers and achievement focused mostly on elementary and high school students. Although some previous research indicated that past achievement and cognitive ability had the strongest relationships with future achievement, other studies indicated that academic motivation, academic self-efficacy, academic engagement, and study skills significantly influenced achievement as well. Therefore, the purpose of the current study was to explore the relationships between the aforementioned academic enablers and the achievement of students in middle school. Results of the current analyses indicated that cognitive ability and previous achievement had the strongest relationships with later language arts and math achievement, as measured by standardized test scores. Gender, free/reduced lunch status, and the academic enablers did not significantly add to the prediction of achievement scores, as measured in this study.

Although the results of the current study are contradictory to hypotheses and some previous research, variations in the methodologies of studies may explain some of the differences. Perhaps the most predominant difference would be the inclusion of cognitive ability and previous achievement in the model of this study. This was evident in the supplemental analyses when the control variables were omitted from the model. Academic self-efficacy was able to consistently explain small amounts of variance in achievement for all grades and academic engagement was able to predict very small, but significant amounts of variance for eighth grade achievement. Studies that have included previous achievement and cognitive ability have had similar results to this study (e.g., Duncan et al., 2007). Another methodological difference is that teacher report has been one method of collecting data regarding academic enablers in some previous studies (e.g., DiPerna et al., 2002, 2005), whereas this study used student paper and pencil self-report. Finally, report card grades, teacher skills assessment, and class quiz scores (DiPerna et al.; Long et al., 2007; Pintrich & De Groot, 1990; Wentzel, 1993) have all been used as measurements for achievement in previous research, while this study only used state testing scores.

Moreover, variations of the definitions, conceptualizations, and measurement of academic enablers in the research could explain the different findings in this study. It appears from previous research that although the enablers measured in this study may have varying degrees of relationships with academic achievement, they have been measured differently across the literature. While the only studies to measure most of the same enablers in this study and using the same operational definitions of measurement were DiPerna et al. (2002, 2005), those studies were at the earlier grades and utilized teacher report. Therefore, additional methods of data collection are needed in future research to expand our understanding of the role these enablers may play in middle school achievement. Enablers should be measured via multiple sources, such as classroom observations, student interviews, and teacher and parent reports. In this way, the measurement of academic enablers may improve by increasing an understanding of how students, teachers, and parents would perceive and measure the manifestations of these constructs.

Finally as with other studies, although cognitive ability and previous achievement explained the largest amount of variance in later academic achievement, there remained a large amount of variance unaccounted for in the model. To clearly understand how to maintain and improve the academic achievement of middle school students, a comprehensive model which includes additional factors besides previous achievement and cognitive ability needs to be explored. Although this study focused on student enablers due to the utility of student focused interventions, the impact of other variables on achievement should be measured. Future models of achievement should examine the influence of parental school involvement and teacher-student relationships in middle school. Although not always a direct correlation with achievement, these relationships have been found to correlate with other constructs related to academic achievement (Topor et al., 2010; Wentzel, 1998). Finally, recent research has found promising results measuring student perseverance and self-discipline and their relationships with academic achievement and long-term success. Future models of student achievement should incorporate these factors as well and measure their relationships with each other (Duckworth, 2009; Duckworth, Peterson, Matthews, & Kelly, 2007; Duckworth, & Seligman, 2005).

References

Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (1993). First grade classroom behavior: Its short- and long-term consequences for school performance. *Child Development, 64,* 801-814.

Alexander, K. L., Entwisle, D. R., & Kabbini, N. S. (2001). The dropout process in life course perspective: Early risk factors at home and school. *Teachers College Record, 103,* 760-882.

Allensworth, E. M., & Easton, J. Q. (2005). *The on-track indicator as a predictor of high school graduation*. Chicago, IL: Consortium on Chicago School Research at the University of Chicago. Retrieved from http://ccsr.uchicago.edu/publications/p78.pdf

Allensworth, E. M., & Easton, J. Q. (2007). *What matters for staying on-track and graduating in Chicago public high schools?* Chicago, IL: Consortium on Chicago School Research at the University of Chicago. Retrieved from http://ccsr.uchicago.edu/publications/07%20What%20Matters%20Final.pdf

Alspaugh, J. W. (1998). Achievement loss associated with the transition to middle school and high school. *The Journal of Educational Research*, *92,* 20-25. doi:10.1080/00220679809597572

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*, 261-271.

Anderson, E. S., & Keith, T. Z. (1997). A longitudinal test of a model of academic success for at-risk high school students. *The Journal of Educational Research, 90,* 259-269.

Antonak, R. F. (1988). Relationships between group IQ and scholastic achievement at grades two, four and six. *Educational Research Quarterly*, *12*(2), 23-29.

Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. *Psychology in the Schools, 45,* 369-386.

Baird, J.R. (1990) Metacognition, purposeful enquiry and conceptual change, in: E. Hegarty-Hazel (Ed.)The Student Laboratory and the Science Curriculum. London: Routledge.

Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1994). *Regulative function of perceived self-efficacy*. In M. G. Rumsey, C. B. Walker, & J. H. Harris (Eds.), Personnel selection and classification (pp. 261–271). Hillsdale, NJ: Lawrence Erlbaum Associates.

Bandura, A. (1997). *Self-Efficacy: The exercise of control.* New York: Freeman.

Bandura, A., & Wood, R. (1989). Effect of perceived controllability and performance standards on self-regulation of complex decision making. *Journal of Personality and Social Psychology, 56*, 805–814.

Barber, B. K., & Olsen, J. A. (2004). Assessing the transitions to middle and high school. *Journal of Adolescent Research, 19,* 3-30.

Bee, H. L., & Mitchell, S. K. (1980). *The developing person: A life-span approach.* New York: Harper & Row.

Bellanca, J. & Brandt, R. (2010). *21st Century Skills: Rethinking How Students Learn.* Bloomington, IN: Solution Tree Press.

Benner A. D., Graham S., Mistry R. S. (2008). Discerning direct and mediated effects of ecological structures and processes of adolescents' educational outcomes. *Developmental Psychology, 44,* 840-854. doi: 10.1037/0012-1649.44.3.840

Bernstein, K. L. (1980). The development of the self-system during adolescence. *The Journal of Genetic Psychology, 136,* 231-245.

Bishop, A. G. (2003). Prediction of first-grade reading achievement: A comparison of fall and winter kindergarten screenings. *Learning Disability Quarterly, 26,* 189-201.

Blackorby, J. & Wagner, M. (1996). Longitudinal postschool outcomes of youth with disabilities: Findings from the National Longitudinal Transition Study. *Exceptional Children, 62*, 399-413.

Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurological conceptualization of children's functioning at school entry. *American Psychologist, 57,* 111-127.

Bloom, B. S. (1974). Time and learning. *American Psychologist, 29,* 682-688.

Bong, M. (2001). Between- and within-domain relations of academic motivation among middle and high school students: Self-efficacy, task-value, and achievement goals. *Journal of Educational Psychology, 93*, 23-34.

Bowers, A.J. (2010). Grades and Graduation: A longitudinal risk perspective to identify student dropouts. *The Journal of Educational Research, 103*, 191-207. doi:10.1080/00220670903382970

Brigman, G., & Campbell, C. (2003). Helping students improve academic achievement and school success behavior. *Professional School Counseling, 7*, 91-98.

Bronstein, P, Ginsburg, G. S., & Herrera, I. S. (2005). Parental Predictors of Motivational Orientation in Early Adolescence: A Longitudinal Study. *Journal of Youth and Adolescence, 34,* 559–575.

Bulgren, J. A., Schumaker, J. B., Deshler, D. D. (1997). Use of recall enhancement routine and strategies in inclusive secondary classes. *Learning Disabilities Research & Practice, 12,* 198-208.

Buyse, E., Verschueren, K., Verachtert, P., & Van Damme, J. (2009). Predicting school adjustment in early elementary school: Impact of teacher-child relationship quality and relational classroom climate. Elementary School Journal, 110(2), 119-141. Retrieved from http://dx.doi.org/10.1086/605768

Campbell, C. A., & Brigman, G. (2005). Closing the Achievement Gap: A Structured Approach to Group Counseling. *Journal for Specialists in Group Work, 30*, 67.

Carnegie Council on Adolescent Development. (1989). Turning points: Preparing American youth for the 21st century. New York: Carnegie Corporation of New York.

Carroll, J. B. (1963). A model of school learning. *Teachers College Record, 64*, 723-733.

Casillas, A., Robbins, S., Allen, J., Kuo, Y.-L., Hanson, M. A., & Schmeiser, C. (2012, February 13). Predicting Early Academic Failure in High School from Prior Academic Achievement, Psychosocial Characteristics, and Behavior. *Journal of Educational Psychology*. Advance online publication. doi: 10.1037/a0027180

Catsambis, S. (1994). The path to math: Gender and racial-ethnic differences in math participation from middle school to high school. *Sociology of Education, 67,* 199-215.

Chen, P. & Zimmerman, B. (2007). A cross-national comparison study on the accuracy of self-efficacy beliefs of middle-school math students. *The Journal of Experimental Education, 75,* 221-244.

Cleary, T. J., & Chen, P. P. (2009). Self-Regulation, motivation, and math achievement in middle school: Variations across grade level and math context. Journal of School Psychology, 47, 291-314. doi: 10.1016/j.jsp.2009.04.002

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.

Connell, J. P., Spencer, M. B., Aber, J. L., (1994). Educational Risk and Resilience in African-American Youth: Context, Self, Action, and Outcomes in School. *Child Development, 65*, 493-506.

Cool, V. A., & Keith, T. Z. (1991). Testing a model of school learning: Direct and indirect effects on academic achievement. *Contemporary Educational Psychology, 16*, 28-44.

Cooper, H., Robinson, J. C., & Patall, E. A. (2006). Does homework improve academic achievement? A synthesis of research, 1987-2003. *Review of Educational Research, 76*, 1-62. doi:10.3102/00346543076001001.

Coutinho, S. A., & Neuman, G. (2008). A model of metacognition, achievement goal orientation, learning style and self-efficacy. *Learning Environments Research, 11,* 131-151.

Covington, M. V. (2000). Goal theory, motivation, and school achievement: An integrative review. Annual Review of Psychology, 51, 171-200. doi:10.1146/annurev.psych.51.1.171

Deary, I. J., Strand, S., Smith, P., Fernandes, C., (2007). Intelligence and educational achievement. *Intelligence, 35,* 13-21

Deshler, D. D., & Schumaker, J. B. (1993). Strategy mastery by at-risk students: Not a simple matter. *The Elementary School Journal, 94,* 153-167.

Devine, T. G. (1987). *Teaching study skills: A guide for teachers.* Boston: Allyn and Bacon.

DiPerna, J. C., & Elliott, S. N. (1999). Development and validation of the academic competence evaluation scales. *Journal of Psychoeducational Assessment, 17,* 207-225.

DiPerna, J. C., & Elliott, S. N. (2000). *Academic Competence Evaluation Scales.* San Antonio, TX: The Psychological Corporation.

DiPerna, J. C., & Elliott, S. N. (2002). Promoting academic enablers to improve student achievement: An introduction to the miniseries. *School Psychology Review, 31,* 293-297.

DiPerna, J. C., Volpe, R. J., & Elliott, S. N. (2002). A model of academic enablers and elementary reading/language arts achievement. *School Psychology Review, 31,* 298-312.

DiPerna, J. C., Volpe, R. J., & Elliott, S. N. (2005). A model of academic enablers and math achievement in elementary grades. *Journal School Psychology, 43,* 379-392.

Downer, J. T., Rimm-Kaufman, S. E., & Pianta, R. C. (2007). How do classroom conditions and children's risk for school problems contribute to children's behavioral engagement in learning? *School Psychology Review, 36,* 413-432.

Driscoll, D., Halcoussis, D., & Svorny, S. (2003). School district size and student performance. *Economics of Education Review, 22,* 193-201.

Duckworth, A. L. (2009). (Over and) Beyond High-Stakes Testing. *American Psychologist, 64,* 279-280. doi: 10.1037/a0014923.

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92,* 1087–1101. doi: 10.1037/0022-3514.92.6.1087

Duckworth, A. L., & Seligman, M. (2005). Self-discipline outdoes IQ in predicting academic performance of adolescents. *Psychological Science, 16,* 939-944. doi:10.1111/j.1467-9280.2005.01641.x

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., et al. (2007). School readiness and later achievement. *Developmental Psychology, 43,* 1428-1446.

Duncan, T. G., & McKeachie, W. J. (2005). The making of the motivated strategies for learning questionnaire. *Educational Psychologist*, *40,* 117-128.

Durlak, J.A., Weissberg, R.P., Dymnicki, A.B., Taylor, R.D., Schellinger, K.B. (2011). The Impact of Enhancing Students' Social and Emotional Learning: A Meta-Analysis of School-Based Universal Interventions. *Child Development, 82,* 405-432.

Eccles, J. S., Adler, T. F., & Meece, J. L. (1984). Sex differences in achievement: A test of alternate theories. *Journal of Personality and Social Psychology*, *46*, 26-43.

Eccles, J. S., Wigfield, A., Medgley, C., Reuman, D., Mac Iver, D., Feldlaufer, H. (1993). Negative effects of traditional middle schools on students' motivation. *The Elementary School Journal, 93,* 553-574.

Eccles, J. S., Wigfield, A., & Schiefele, U. (1998). Motivation to succeed. In W. Damon (Series Ed.) and N. Eisenberg (Vol. Ed.), Handbook of child psychology (5th ed., Vol. III, pp. 1017–1095). New York: Wiley.

Eisenberg, N., Martin, C. L., & Fabes, R. A. (1996). Gender development and gender differences. In D. C. Berliner & R. C. Calfee (Eds.), *The handbook of educational psychology* (pp. 358-396). New York: Macmillan.

Elliott, E. S. & Dweck, L. S. (1988). Goals: An approach to motivation and achievement, *Journal of Personality and Social Psychology*, *54,* 5-12

Elliott, A. J. & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70,* 461-475.

Elliott, S. N., Malecki, C. K., & Demaray, M. K. (2001). New directions in social skills assessment and intervention for elementary and middle school students. *Exceptionality, 9,* 19-32.

Entwisle, D. R., & Astone, N. M. (1994). Some practical guidelines for measuring youth's race/ethnicity and socioeconomic status. *Child Development, 65,* 1521-1540.

Faul, F., & Erdfelder, E. (1992). GPOWER (Version 2.0) [Computer program]. Bonn, Germany: Bonn University.

Eshel, Y., & Kohavi, R. (2003). Perceived classroom control, self-regulating learning strategies, and academic achievement. *Educational Psychology, 23,* 249-260.

Fennema, E. & Hart, L. E. (1994). Gender and the JRME. *Journal for Research in Math Education, 25,* 648-659.

Field, A. (2013). *Discovering statistics using SPSS* (4th ed.). Thousand Oaks, CA : Sage Publications Ltd.

Finch, A. J., & McIntosh, J. (1990). Assessment of anxieties and fears in children. In A. M. La Greca (Ed.), *Through the eyes of the child: Obtaining self-reports from children and adolescents* (pp. 234-258). Boston: Allyn and Bacon.

Finn, J. D., & Rock, D. A., (1997). Academic success among students at risk for failure. *Journal of Applied Psychology, 82,* 221-234.

Fisher, R. J., & Katz, J. E. (2000). Social-desirability bias and the validity of self-reported values. *Psychology & Marketing, 17*(2), 105-120. doi:10.1002/(SICI)1520- 6793(200002)

Francis, D. J., Shaywitz, S. E., Stuebing, K. K., Shaywitz, B. A., & Fletcher, J. M. (1996). Developmental lag versus deficit models of reading disability: A longitudinal, individual growth curve analysis. *Journal of Educational Psychology, 88,* 3-17.

Fredericks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research, 74*, 59-109.

Gadwa, K. & Griggs, S. A. (1985). The school dropout: Implications for counselors. *The School Counselor, 33,* 9-17.

Gagne, F. & St. Pere, F. (2001). When IQ is controlled, does motivation still predict achievement? *Intelligence, 30*, 71-100.

Gettinger, M., & Seibert, J. K. (2002). Contributions of study skills to academic competence. *School Psychology Review, 31,* 350-365.

Ginsburg, G. S., & Bronstein, P. (1993). Family factors related to children's intrinsic/extrinsic motivational orientation and academic performance. *Child Development, 64,* 1461-1474.

Gottfried, A. E. (1985). Academic intrinsic motivation in elementary and junior high school students. *Journal of Educational Psychology, 77(6),* 631-645.

Gramzow, R. H., & Williard, G. (2006). Exaggerating current and past performance: Motivated self-enhancement versus reconstructive memory. *Personality and Social Psychology Bulletin, 32,* 1114-1125.

Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research, 26,* 499–510.

Greenwood, C. R. (1991). Longitudinal analysis of time, engagement, and achievement in at-risk versus non-risk students. *Exceptional Children, 57,* 521-535.

Greenwood, C. R., Delquadri, J., & Hall, R. V. (1984). Opportunity to respond and student academic performance. In W. Heward, T. Heron, D. Hill, & J. TrapPorter (Eds.), *Behavior analysis in education* (pp. 58-88). Columbus, OH: Merrill.

Gresham, F. M., & Elliott, S. N. (1990). *The Social Skills Rating System.* Circle Pines, MN: American Guidance Service.

Grigorenko, E. L., & Sternberg, R. J. (1997). Styles of learning, abilities, and academic performance. *Exceptional Children*, *63*, 295-312.

Grimm, K. J., Steele, J. S., Mashburn, A. J., Burchinal, M., & Pianta, R. C. (2010). Early behavioral associations of achievement trajectories. *Developmental Psychology, 46*, 976-983.

Hamman, E., Berthelot, J., Saia, J., & Crowley, E. (2000). Teacher's coaching of learning and its relation to students' strategic learning. Journal of Educational Psychology, 92, 342-348.

Harwell, M., & LeBeau, B. (2010). Student eligibility for a free lunch as an SES measure in educational research. Educational Researcher, 39, 120-131. DOI: 10.3102/0013189X103625

Hattie, J., Biggs, J., & Purdie, N. (1996). Effects of learning skills interventions on student learning: *A meta-analysis. Review of Educational Research, 66,* 9-136.

Hauser, R. M. (1994). Measuring socioeconomic status in studies of child development. *Child Development, 65,* 1541-1545.

Heckman, J. J. and Y. Rubinstein. The Importance of Noncognitive Skills: Lessons from the GED Testing Program. *American Economic Review, 91(2),* May 2001, 145–149.

Hernandez, D. J. (1997). Child development and the social demography of childhood. *Child Development, 68,* 149-169.

Hooper, S. R., Roberts, J., Sideris, J., Burchinal, M., Zeisel, S. (2010). Longitudinal predictors of reading and math trajectories through middle school for African American versus Caucasian students across two samples. *Developmental Psychology*, *46*, 1018-1029. doi: 10.1037/a0018877

Hughes, J., & Kwok, O. (2007). Influence of student-teacher and parent-teacher relationships on lower achieving readers' engagement and achievement in the primary grades. *Journal of Educational Psychology*, *99*, 39-51. doi:http://dx.doi.org/10.1037/0022-0663.99.1.39

Hughes, J. N., Luo, W., Kwok, O.-M., & Loyd, L. K. (2008). Teacher student support, effortful engagement, and achievement: a 3-year longitudinal study. *Journal of Educational Psychology*, *100(1)*, 1-14. http://dx.doi.org/10.1037/0022 0663.100.1.1.

Hyde, J., Fennema, E., & Lamon, S. J. (1988). Gender differences in mathematical performance: A meta-analysis, *Psychological Bulletin*, *107*, 139-155.

Judd, C. M., McClelland, G. H., & Ryan, C. S. (2009). *Data analysis: A model comparison approach* (2nd ed.). New York, NY: Routledge.

Keith, T. Z. (2002). Commentary: Academic enablers and school learning. *School Psychology Review*, *31*, 394-402.

Keith, T. Z. (2006). *Multiple Regression and Beyond*. Boston: Pearson Education, Inc.

Klem, A. M., & Connell, J. P. (2004). Relationships matter: Linking teacher support to student engagement and achievement. *Journal of School Health*, *74*, 262-273.

Kuncel, N. R., Crede, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of Educational Research*, *75*, 63-82.

Kuperminc, G.P., Leadbeater, B.J., & Blatt, S.J. (2001). School Social Climate and Individual Differences in Vulnerability to Psychopathology among Middle School Students. *Journal of School Psychology, 39,* 141–159, doi: ttp://dx.doi.org.ezaccess.libraries.psu.edu/10.1016/S0022-4405(01)00059-0.

Kushman, J.W., Sieber, C., & Harold, K. P. (2000). This isn't the place for me: School dropout. In D. Capuzzi & D. R. Gross (Eds.), *Youth risk: A prevention resource for counselors, teachers, and parents* (3rd ed.), pp. 471-507). Alexandria, VA: American Counseling Association.

Lau, S., & Roeser, R. W. (2002). Cognitive abilities and motivational processes in high school students' situational engagement and achievement in science. *Educational Assessment, 8,* 139-162.

Lavin, C. (1996). The relationship between the Wechsler Intelligence Scale for Children - Third Edition and the Kaufman Test of Educational Achievement, *Psychology in the Schools, 33,* 119-123.

Leahey, E. & Guo, G. (2001). Gender differences in mathematical trajectories. *Social Forces, 80,* 2, 713-732.

Lee, J., & Shute, V. J. (2010). Personal and social-contextual factors in K-12 academic performance: An integrative perspective on student learning. *Educational Psychologist, 45,* 185-202. doi:10.1080/00461520.2010.493471

Leeson, P., Ciarrochi, J., & Heaven, P. (2008). Cognitive ability, personality, and academic performance in adolescence. *Personality and Individual Differences, 45,* 630–635.

Ley, K., & Young, D.B. (1998). Self-regulation behaviors in underprepared (developmental) and regular admission college students. *Contemporary Educational Psychology, 23,* 42–64.

Lindberg, S. M., Hyde, J. S., Petersen, J. L., & Linn, M. C. (2010). New trends in gender and math performance: A meta-analysis. Psychological Bulletin, 136(6), 1123-1135.

Linnenbrink, E. A., & Pintrich, P. R. (2002). Motivation as an enabler for academic success. *School Psychology Review, 31,* 313-327.

Long, J. F., Monoi, S., Harper, B., Knoblauch, D., & Murphy, P. K. (2007). Academic motivation and achievement among urban adolescents. *Urban Education, 42(3),* 196-222. doi:10.1177/0042085907300447

Lounsbury, J. W., Sundstrom, E., Loveland, J. L., & Gibson, L. W., (2003). Broad versus narrow personality traits in predicting academic performance of adolescents. *Learning and Individual Differences, 14,* 67-77. doi:10.1016/j.lindif.2003.08.001

Luo, D., Thompson, L. A., & Detterman, D. K. (2003). The causal factor underlying the correlation between psychometric g and scholastic performance. *Intelligence, 31,* 67-83.

Lynn, R., Meisenberg, G., Mikk, J., Williams, A. (2007). National IQs predict differences in scholastic achievement in 67 countries. *Journal of Biosocial Science, 39,* 861-874.

Malecki, C. K., & Elliott, S. N. (2002). Children’s social behaviors as predictors of academic achievement: A longitudinal analysis. *School Psychology Quarterly, 17,* 1-23.

Manning, M. L. (2000). A brief history of the middle school. *Clearing House, 73,* 192 (ERIC Journal No. EJ601016).

March, J. S., & Albano, A. M. (1996). Assessment of anxiety in children and adolescents. *American Psychiatric Press Review of Psychiatry, 15,* 405-427.

Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American Education Research Journal, 37,* 153-184.

Mayes, S. D., & Calhoun, S. L. (2007). Wechsler Intelligence Scale for Children-Third and -Fourth Edition: Predictors of Academic Achievement in Children with Attention-Deficit/Hyperactivity Disorder. *School Psychology Quarterly, 22*, 234-249.

McClelland, M. M., Morrison, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly, 15*, 307-329.

McCormick, C. E., Stoner, S. B., & Duncan, S. (1994). Kindergarten predictors of first-grade reading achievement: A regular classroom sample. *Psychological Reports, 74,* 403-407.

McGinnis, A.M. (2009). Student behaviors as predictors of later academic achievement: School entry through fifth grade [doctoral dissertation]. Retrieved from http://search.proquest.com.ezaccess.libraries.psu.edu/docview/304984364

Menard, S. (1995). *Applied Logistic Regression Analysis.* Sage Publications.Series: Quantitative Applications in the Social Sciences, No. 106.

Miranda, A., Webb, L., Brigman, G., & Peluso, P. (2007, June). Student success skills: A promising program to close the academic achievement gap for African American and Latino students. *Professional School Counseling, 10*, 490-497.

Monti, J. D., Pomerantz, E. M., & Roisman, G. I. (2014). Can parents' involvement in Children's education offset the effects of early insensitivity on academic functioning? *Journal of Educational Psychology,* doi:http://dx.doi.org/10.1037/a0035906.

Mulhall, P. F., Flowers, N., & Mertens, S. B. (2002). Research on middle school renewal. *Middle School Journal, 34,* 56-61.

Murayama, K., Pekrun, R., Lichtenfeld, S. and vom Hofe, R. (2012), Predicting Long-Term Growth in Students' Math Achievement: The Unique Contributions of Motivation and Cognitive Strategies. *Child Development*, *84*, 1475-1490. doi: 10.1111/cdev.12036

Myers, M. T. (2001). Preparing students for an uncertain future. Liberal Education, 87, 22-25.

National Center for Education Statistics (2011). The Nation's Report Card: Math 2011(NCES 2012–458). Institute of Education Sciences, U.S. Department of Education, Washington, D.C.

National Center for Education Statistics (2011). The Nation's Report Card: Reading 2011(NCES 2012–458). Institute of Education Sciences, U.S. Department of Education, Washington, D.C.

National Middle School Association (September 20, 2006). NMSA's recommendations for the reauthorization. Presented at the National Symposium on Middle Level Education: Where do we go from here? Washington, D.C. sponsored by NMSA, the council of chief state school officers and the alliance for excellent education.

Neisser, U., Boodoo, G., Bouchard, T. J., Boykin, A. W., Brody, N., Ceci, S. J., et al. (1996). Intelligence: Knowns and unknowns. *American Psychologist*, *51*, 77-101.

New Jersey Department of Education. (2009). Grades 3-8 *New Jersey assessment of skills and knowledge: Technical report*. Trenton, NJ: New Jersey Department of Education.

New Jersey Department of Education. (2010). Grades 3-8 *New Jersey assessment of skills and knowledge: Technical report*. Trenton, NJ: New Jersey Department of Education.

Nye, B., Hedges, L. V., & Konstantopoulos, S. (2002). Do low-achieving students benefit more from small classes? Evidence from the Tennessee class size experiment. *Educational Evaluation and Policy Analysis. 24*, 201-217.

Nield, R. C., & Balfanz, R. (2006). Unfilled promises: The dimensions and characteristics of Philadelphia's dropout crisis, 2000-2005. Baltimore: Center for Social Organization of Schools, Johns Hopkins University.

Otis, A. S., & Lennon, R. T. (2003). Otis-Lennon School Abilities Test – Manual for administering and interpreting. San Antonio, TX: The Psychological Corporation.

Ou, S., & Reynolds, A. J. (2008). Predictors of educational attainment in the Chicago longitudinal study. *School Psychology Quarterly*, *23*, 199.

Pajares, F. (1996). Self-efficacy beliefs in achievement settings. *Review of Educational Research, 66,* 543-578.

Pajares, F., & Graham, L. (1999). Self-efficacy, motivation constructs, and math performance of entering middle school students. *Contemporary Educational Psychology, 24(2),* 124-139. doi: 10.1006/ceps.1998.0991

Pajares F., & Kranzel, J. (1995). Self-efficacy beliefs and general mental ability in mathematical problem-solving: A path analysis. *Journal of Educational Psychology, 86*, 193-203.

Pajares, F., & Schunk, D. H. (2001). Self-beliefs and school success: Self-efficacy, self-concept, and school achievement. In R. Riding & S. Rayner (Eds.), *Self-perception* (pp. 239-266). London: Ablex Publishing.

Parkerson, J. A., Lomax, R. G., Schiller, D. P., & Walberg, H. J. (1984). Exploring causal models of educational achievement. *Journal of Educational Psychology, 76*, 638-646.

Pearson, J. (2005). The relationship of social skills and learning behaviors to academic achievement in a low-income urban elementary school population. Dissertation Abstracts International Section A: Humanities and Social Sciences, 66(5-A), 2005, 1641v

Phillips, L., Norris, S., Osmond, W., & Maynard, A. (2002). Relative reading achievement: A longitudinal study of 187 children from first through sixth grades. *Journal of Educational Psychology, 94*, 3-13. doi:10.1037/0022-0663.94.1.3

Pintrich, P. R., & De Groot, E. V. (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82,* 33-40.

Pintrich, P. R., Roeser, R. W., & De Groot, E. A. M. (1994). Classroom and individual difference in early adolescents' motivation and self-regulated learning. *Journal of Early Adolescence, 14,* 139-161.

Pintrich, P. R., & Schunk, D. H. (2002). *Motivation in education: Theory, research, and applications* (2nd ed.). Upper Saddle River, NJ: Prentice Hall.

Pintrich, P. R., Smith, D. A. F., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and Psychological Measurement, 53,* 801–803.

Ray, C. E., & Elliott, S. N. (2006). Social adjustment and academic achievement: A predictive model for students with diverse academic and behavior competencies. *School Psychology Review, 35,* 493-501.

Ready, D., LoGerfo, L., Brukham, D., & Lee, V. (2005). Explaining girls' advantage in kindergarten literacy learning: Do classroom behaviors make a difference? *The Elementary School Journal*, *106*, 21-38.

Rumberger, R. W., & Lin, A. A. (2008). *Why students drop out of school: A review of 25 years of research*. Santa Barbara, CA: California Dropout Research Project. Retrieved from http://cdrp.ucsb.edu/dropouts/pubs_reports.htm#15.

Salvia, J., & Ysseldyke, J. (2001). *Assessment* (8th ed.). Boston: Houghton Mifflin.

Sattler, J. M. (2001). Assessment of children: Cognitive applications (4th ed.). San Diego: Author.

Schaefer, B. A., & McDermott, P. A. (1999). Learning behavior and intelligence as explanations for children's scholastic achievement. *Journal of School Psychology, 37,* 299-313.

Scheid, K. (1993). Helping students become strategic learners: Guidelines for teaching. Cambridge, MA: Brookline.

Schunk, D. H. (1995). Self-efficacy and education and instruction. In J. E. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 281-303). New York: Plenum Press.

Sieber, R. T. (1979). Classmates as workmates: Informal peer activity in the elementary school. *Anthropology and Education Quarterly, 10,* 207-235.

Silverman, W. K., & Kurtines, W. M. (1996). *Anxiety and phobic disorders: A pragmatic approach.* New York: Plenum Press.

Silverthorn, N., DuBois, D. L., Crombie, G. (2005). Self-perceptions of ability and achievement across the high school transition: Investigation of a state-trait model. *The Journal of Experimental Education, 73,* 191-218.

Singh, K., Granville, M., Dika, S. (2002). Math and science achievement: Effects of motivation, interest, and classroom engagemen. *Journal of Educational Research; 95,* 323-332.

Sirin, S. R. (2005). Socioeconomic status and academic achievement: A meta-analytic review of research. *Review of Educational Research, 75,* 417-453.

Sirin, S. R., & Rogers-Sirin, L. (2004). Exploring school engagement of middle-class African-American adolescents. *Youth & Society, 35,* 323-340.

Stanard, R. P. (2003). High school graduation rates in the United States: Implications for the counseling profession. *Journal of Counseling and Development, 81*, 217–222.

Stearns, E., Moller, S., Blau, J., & Potochnick, S. (2007). Staying back and dropping out: The relationship between grade retention and school dropout. *Sociology of Education, 80,* 210-240.

Stone, W. L., & Lemanek, K. L. (1990). Developmental issues in children's self-reports. In A. M. La Greca (Ed.), *Through the eyes of the child: Obtaining self-reports from children and adolescents* (pp. 234-258). Boston, MA: Allyn & Bacon.

Sutton, A. & Soderstrom, I. (2001). Predicting elementary and secondary school achievement with school-related demographic factors. *The Journal of Educational Research. 92*, 330-338

Tabachnick, B. G., & Fidell, L. S. (2010). *Using multivariate statistics* (6th ed.). Boston: Allyn and Bacon.

Tienken, C.H. (2008a). A descriptive study of the technical characteristics of the results from New Jersey's Assessments of Skills and Knowledge in grades 3, 4, and 8. New Jersey *Journal of Supervision Curriculum Development 2,* 46-61.

Tienken, C.H. (2008b). The characteristics of state assessment results. Academic Exchange Quarterly, 12(3), 34-39.

Topor, D. R., Keane, S. P., Shelton, T. L., Calkins, S. D. (2010). Parent involvement and student academic performance: A multiple mediational analysis. *Journal of Prevention & Intervention in the Community, 38*, 183-197. doi:10.1080/10852352.2010.486297

Unrau, N.J., & Schlackman, J. (2006). Motivation and its relationship with reading achievement in an urban middle school. *Journal of Educational Research , 100 ,* 81-101.

U.S. Census Bureau (2000). American FactFinder. Retrieved May 29, 2010, from http://www.factfinder.census.gov/servlet/ACSSAFFFacts?_event=&geo_id=16000US3473110&_geoContext=01000US%7C04000US34%7C16000US3473110&_street=&_county=toms+river&_cityTown=toms+river&_state=04000US34&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=160&_submenuId=factsheet_1&ds_name=DEC_2000_SAFF&_ci_nbr=null&qr_name=null&reg=null%3Anull&_keyword=&_industry=

Valiente, C., Lemery-Chalfant, K., Swanson, J., & Reiser, M. (2008). Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *Journal of Educational Psychology, 100,* 67–77.

Vanderwood, M. L., McGrew, K. S., Flanagan, D. P., & Keith, T. Z. (2001). The contribution of general and specific cognitive abilities to reading achievement. *Learning & Individual Differences*, *13,* 159-188.

Walberg, H. J. (1981). A psychological theory of educational productivity. In F. H. Farley & N. Gordon (Eds.), *Psychology and educati*on (pp. 81-110). Chicago: National Society for the Study of Education.

Wang, M.C., Haertel, G.D., Walberg, H.J. (1990). What influences learning? A content analysis of review literature. *Journal of Educational Research*, *84,* 30-43.

Wang, M.C., Haertel, G.D., Walberg, H.J. (1993). Toward a knowledge base for school learning. *Review of Educational Research, 63,* 249-294.

Welsh, M., Parke, R. D., Widaman, K., O'Neil, R. (2001). Linkages between children's social and academic competence: A longitudinal analysis. *Journal of School Psychology, 39,* 463-481.

Wentzel, K. R. (1991). Relations between social competence and academic achievement in early adolescence. *Child Development, 62,* 1066-1078.

Wentzel, K. R. (1993). Does being good make the grade? Social behavior and academic competence in middle school. *Journal of Educational Psychology, 85*, 357-364.

Wentzel, K. R. (1996). Social and academic motivation in middle school: Concurrent and long-term relations to academic effort. *The Journal of Early Adolescence, 16,* 390-406. doi:10.1177/0272431696016004002.

Wentzel, K. R. (1997). Student motivation in middle school: The role of perceived pedagogical caring. *Journal of Educational Psychology, 89*, 411-419. doi: 10.1037/0022-0663.89.3.411

Wentzel, K. R. (1998). Social relationships and motivation in middle school: The role of parents, teachers, and peers. *Journal of Educational Psychology, 90,* 202-209.

Wentzel, K. R., & Watkins, D. E. (2002). Peer relationships and collaborative learning as contexts for academic enablers. *School Psychology Review, 31,* 366-377.

Wigfield, A. L., & Eccles, J. A. (2002). Motivational beliefs, values, and goals. *Annual Review of Psychology, 53*, 109-132.

Wigfield, A. L., Eccles, J. S., & Pintrich, P. R. (1996). Development between the ages of 11 and 25. In D. C. Berliner & R. C. Calfee (Eds.), *Handbook of educational psychology* (pp. 148-185). New York: Simon & Schuster Macmillan.

Wigfield, A. L., Eccles, J. A. Mac Iver, D., Reuman, D. A., & Midgley, C. (1991). Transitions during early adolescence: Changes in children's domain-specific self-perceptions and general self-esteem across the transition to junior high school. *Developmental Psychology, 27*, 552-565.

Wilde, J. K. (1996). The relationship between rational thinking and intelligence in children. *Journal of Rational-Emotive & Cognitive Behavior Therapy*, 14, 187-192. doi:10.1007/BF02238269

Wilson, M. S., & Reschly, D. J. (1996). Assessment in school psychology training and practice. *School Psychology Review, 25,* 9-23.

Winne, P. H., & Jamieson-Noel, D. (2002). Exploring student's calibration of self-reports about study tactics and achievement. *Contemporary Educational Psychology, 27*, 551-572.

Wolters, C. A., Yu, S. & Pintrich, P. R. (1996). The relation between goal orientation and students' motivation beliefs and self-regulated learning. *Learning and Individual Differences, 8* 211-238.

Yee, D. & Eccles, J. (1988). Parent perceptions and attributions for children's math achievement. *Sex Roles, 19,* 317-334.

Yen, C., Konold, T. R., & McDermott, P. A. (2004). Does learning behavior augment cognitive ability as an indicator of academic achievement? *Journal of School Psychology, 42*(2), 157-169. doi: 10.1016/j. jsp.2003.12.001.

Zimmerman, B.J. (1986). Development of self-regulated learning: Which are the key sub-processes. *Contemporary Educational Psychology, 16,* 307–313.

Zimmerman, B. J. (1996). Enhancing student academic and health functioning: A self-regulatory perspective. *School Psychology Quarterly, 11,* 47-66.

Zins, J. E., Bloodworth, M. R., Weissberg, R. P., & Walberg, H. J. (2004). The scientific base linking emotional learning to student success and academic outcomes. In J. E. Zins, R. P. Weissberg, M. C. Wang, & H. J. Walberg (Eds.), *Building academic success on social and emotional learning, What does the research say?* (pp. 3-22). New York: Teachers College Press.

Appendix A: Supplemental Analyses Grade 6

Summary of Hierarchical Multiple Regression Analysis Predicting Grade 6 Language Arts Achievement Enablers Only

Step	Predictor Variables	B	Std. Error	β	t	R^2	ΔR^2	$F\Delta$
1	Language Arts Self-Efficacy	1.52	1.70	.07	.89	.024	.024	5.49[a]
2	Academic Motivation	.37	.41	.09	.90	.038	.014	3.16
3	Academic Engagement	.45	.35	.12	1.30	.046	.007	1.68
4	Study Skills	.02	.37	.01	.05	.046	.000	.01
5	Interpersonal Skills	-.18	.42	-.04	-.43	.047	.001	.19

Note. $N = 221$. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient.
[a]p <. 05, [b]p <. 01, [c]p <. 001

Summary of Hierarchical Multiple Regression Analysis Predicting Grade 6 Mathematics Achievement Enablers Only

Step	Predictor Variables	B	Std. Error	β	t	R^2	ΔR^2	$F\Delta$
1	Math Self-Efficacy	7.10	1.80	.28	3.95[c]	.093	.093	22.38[c]
2	Academic Motivation	-.25	.58	-.04	-.44	.093	.000	.08
3	Academic Engagement	.66	.49	.12	1.34	.101	.008	1.96
4	Study Skills	.06	.52	.01	.11	.101	.000	.00
5	Interpersonal Skills	-.16	.58	-.02	-.27	.101	.000	.07

Note. $N = 221$. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient.
[a]p <. 05, [b]p <. 01, [c]p <. 001

Appendix B: Supplemental Analyses Grade 7

Summary of Hierarchical Multiple Regression Analysis Predicting Grade 7 Language Arts Achievement Enablers Only

Predictor Variables	B	Std. Error	β	*t*	R^2	ΔR^2	$F\Delta$
Step							
1 Language Arts Self-Efficacy	6.43	2.04	.24	3.15[b]	.055	.055	13.18[c]
2 Academic Motivation	.23	.42	.05	.54	.055	.000	.06
3 Academic Engagement	.27	.39	.06	.69	.055	.001	.13
4 Study Skills	-.72	.42	-.17	-1.72	.066	.010	2.42
5 Interpersonal Skills	.31	.39	.07	.78	.068	.003	.61

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient.
[a]*p* <. 05, [b] *p* <. 01, [c]*p* <. 001

Summary of Hierarchical Multiple Regression Analysis Predicting Grade 7 Mathematics Achievement Enablers Only

Predictor Variables	B	Std. Error	β	*t*	R^2	ΔR^2	$F\Delta$
Step							
1 Math Self-Efficacy	.703	2.28	.24	3.08[b]	.046	.046	10.98[b]
2 Academic Motivation	.17	.61	.03	.29	.046	.000	.00
3 Academic Engagement	.90	.55	.15	1.63	.051	.005	1.10
4 Study Skills	-1.23	.59	-.21	-2.07[a]	.070	.019	4.61[a]
5 Interpersonal Skills	.09	.55	.01	.16	.070	.000	.02

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient
[a]*p* <. 05, [b] *p* <. 01, [c]*p* <. 001

Appendix C: Supplemental Analyses Grade 8

Summary of Hierarchical Multiple Regression Analysis Predicting Language Arts Achievement Grade 8 Enablers Only

Predictor Variables	B	Std. Error	β	*t*	R^2	ΔR^2	$F\Delta$
Step							
1 Language Arts Self-Efficacy	-.17	1.45	-.008	-.12	.009	.009	2.62
2 Academic Motivation	-.12	.33	-.03	-.35	.019	.010	2.90
3 Academic Engagement	.80	.27	.22	2.97[b]	.062	.042	12.53[c]
4 Study Skills	-.17	.33	-.05	-.51	.062	.000	.00
5 Interpersonal Skills	.59	.34	.14	1.73	.072	.010	2.99

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient
[a]p <. 05, [b] p <. 01, [c]p <. 001

Summary of Hierarchical Multiple Regression Analysis Predicting Grade 8 Mathematics Achievement Enablers Only

Predictor Variables	B	Std. Error	β	*t*	R^2	ΔR^2	$F\Delta$
Step							
1 Math Self-Efficacy	7.79	1.65	.30	4.73[c]	.091	.091	28.19[c]
2 Academic Motivation	-.50	.56	-.09	-.89	.092	.000	.07
3 Academic Engagement	1.14	.43	.19	2.64[b]	.117	.025	7.89[b]
4 Study Skills	-.33	.52	-.06	-.64	.118	.001	.32
5 Interpersonal Skills	.17	.55	.02	.31	.118	.000	.09

Note. *N* = 221. B = Unstandardized coefficient; Std. Error = Standard Error; β = Standardized Coefficient
[a]p <. 05, [b] p <. 01, [c]p <. 001

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Mobile Therapist and Behavior Specialist **January 2000 to September 2001**
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Bennett, D., & Gibbons, T. A. (2000). Efficacy of child cognitive-behavioral interventions for antisocial behavior: A meta-analysis. *Family and Child Behavior Therapy, 22.*

Bennett, D., & Gibbons, T. A. (1998). Efficacy of child cognitive-behavioral interventions for antisocial behavior: A meta-analysis. Presented at The Association for the Advancement of Behavior Therapy National Conference, Washington, D.C.

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