SELF-REGULATED LEARNING AND MOTIVATION BELIEF DIFFERENCES AMONG GIFTED AND NON-GIFTED MIDDLE SCHOOL STUDENTS ACROSS ACHIEVEMENT LEVELS

A DISSERTATION

SUBMITTED TO THE FACULTY

OF

THE GRADUATE SCHOOL OF APPLIED AND PROFRESSIONAL PSYCHOLOGY

RUTGERS,

THE STATE UNIVERSITY OF NEW JERSEY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIRMENTS

FOR THE DEGREE

OF

DOCTOR OF PSYCHOLOGY

NEW BRUNSWICK, NEW JERSEY OCTOBER 2015

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Abstract

This dissertation examined self-regulated learning (SRL) and motivation beliefs (i.e., self-efficacy, perceived responsibility) across ability (i.e., gifted, advanced, average) and achievement groups (i.e., high achievers, low achievers) in a sample of 135 suburban middle school students (i.e., fifth and sixth grade). In order to expand upon previous literature in this domain, the current study aimed to investigate both adaptive and maladaptive SRL strategies within the context of mathematics classes. In addition, teacher ratings of SRL were used in conjunction with self-report measures to assess the variables from multiple sources. Measures used included the Self-Regulation Strategy Inventory—Self-Report (SRSI-SR), Self-Regulation Strategy Inventory—Teacher Report (SRSI-TRS), Sources of Mathematics Self-Efficacy Scale (SMES), and Perceived Responsibility Scale (PRS). Independent-samples *t*-tests and correlation analyses were used to identify differences in the dependent variables between groups of high and low achievers. Analysis of variance was utilized to assess ability group differences in SRL and motivation beliefs, and to assess ability group differences among students of one achievement level (i.e., high achievers). A key finding was significant differences in maladaptive SRL, self-efficacy, and teacher ratings of SRL between high and low achievement groups. Teacher ratings indicated group differences between gifted and advanced students' use of SRL strategies in comparison with average students, with gifted and advanced students using SRL strategies more frequently. This result was consistent within an isolated sample of high achieving students. The study supports previous findings of a relationship between SRL and academic achievement. In addition, the results highlight the importance of teacher ratings in assessing SRL and identifying students who may benefit from SRL training. Future research should continue investigating the interaction of student ability and achievement level in SRL and motivation beliefs.

Acknowledgments

I would like to thank a number of people who have supported and encouraged me throughout the dissertation process, as well as during my graduate school journey. First and foremost, I would like to thank my dissertation committee, Dr. Timothy Cleary and Dr. Ken Schneider, for their endless guidance, time, and patience throughout this project. I am greatly appreciative for their mentorship and their influence on my development as a professional in the field of school psychology.

Words cannot express my deep gratitude and love for my family who have encouraged me throughout each and every obstacle. To my parents, thank you for supporting me and all of my goals unconditionally. I am blessed to be your daughter. To Michael and Anthony, thank you for serving as role models and being there for me throughout my life. To Stephen, thank you for all of your help along the way and for your patience, love, and understanding.

I am also forever grateful for the people I have met during my time at GSAPP. To all of my friends at GSAPP and beyond, I thank you for your support, encouragement, and humor. Lastly, I would like to thank Dr. Robert Phillips for continuing to inspire me as a professional and as a person. I value your mentorship and faith in my abilities.

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Introduction

Over the past several decades, the importance and positive impact of self-regulated learning (SRL) on the academic achievement of students has been demonstrated across a multitude of contexts and applications (Ruban & Reis, 2006; Schunk & Zimmerman, 1998; Zimmerman, 1990). SRL refers to "self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals" (Schunk & Zimmerman, 1994; Zimmerman, 2000). Given the strong link between achievement and SRL, educators have also become interested in identifying effective self-regulated strategies and teaching them to low achieving students as an intervention to improve academic performance (Cleary, Platten, & Nelson, 2008; Cleary & Zimmerman, 2004). Such intervention with underachieving students is essential as there are many important implications and consequences of student underperformance across the developmental spectrum.

Underachievement tends to appear in middle school and often continues into high school (Peterson & Colangelo, 1996). This is important as academic success in middle school and high school can influence both college success and occupational achievements (McCall, Evahn, & Kratzer, 1992). Furthermore, low achieving students have been shown to be less likely to complete college and remain in their jobs, than their higher achieving counterparts (McCall et al., 1992). They also may begin to perceive themselves as inadequate, leading to a negative attitude toward school, self, and learning, making early intervention essential (Emerick, 1992).

Although one may assume that students who have more advanced abilities would achieve at a high level, there is emerging evidence that a large number of high ability students, including gifted students, struggle in school (Morisano & Shore, 2010; Rimm, 1995; Seeley, 1984). While it is common practice for schools to group students based on their ability level, with academic

achievement varying within these ability groups, there has not been much investigation into the differences in SRL across these groups of students in terms of academic achievement. The gifted population offers a prime sample for investigation into high and low achievement given the frequent identification and education of this ability group within schools. In fact, the majority of studies on underachievement have focused on gifted students (Preckel, Holling, & Vock, 2006), in part, because of the large gap that exists between students' ability or intellectual skills and school performance. Furthermore, it has been argued that school instruction is mostly directed to students of average or low ability, often missing the needs of high ability students and making them more susceptible to low achievement (Preckel et al., 2006). In practice, high ability low achievers are often unidentified and therefore do not receive interventions to remediate their academic difficulties.

Although the literature has demonstrated the relationship between SRL and achievement (McClelland & Cameron, 2011; Ruban & Reis, 2006; Zimmerman & Martinez-Pons, 1986), the types of SRL exhibited by high ability high achievers (McCoach & Seigle, 2003; VanBoxtel & Monks, 1992), and the impact of self-efficacy on SRL strategy use (Cleary & Zimmerman, 2004; Zimmerman, 2000), there are several gaps to address. For example, minimal research has directly compared SRL processes of high and low achievers of various ability levels, specifically including gifted students as a group of primary interest. Furthermore, most studies on gifted achievement and SRL have used a narrow range of SRL measures, with primary emphasis placed on student measures (e.g., self-report, interview, computer tasks). Given that research has shown that student self-reports of behaviors are often inaccurate, research that uses multiple sources of SRL assessment are needed. The current study will address these gaps by directly comparing

high and low achieving students across various ability levels and by utilizing a multi-dimensional assessment approach to measure SRL processes among students.

Definition of Self-Regulated Learning (SRL)

Over the past several decades, SRL has received increased attention in academic contexts. Researchers have examined the importance of SRL processes among various types of populations, including students with learning disabilities and behavioral difficulties on one hand and those who possess superior or gifted intellectual capacities on the other (Baum, Renzulli, & Herbert, 1995; Calero, García-Martín, Jiménez, Kazén, & Araque, 2007; Neber & Schommer-Aikins, 2002; Zimmerman & Martinez-Pons, 1990). Due to the potential role of SRL in academic achievement, it is important to define and understand SRL as a construct.

SRL is defined as "self-generated thoughts, feelings, and behaviors that are oriented to attaining goals" (Zimmerman, 2002, p. 65). It is generally viewed as a "complex, multi-faceted process that integrates motivational variables (e.g., self-efficacy, task interest) with other self-processes (e.g., goal-setting, use of learning strategies, self-recording) in order to help a person effectively manage or regulate one's behaviors" (Cleary, 2006, p. 308). SRL has been described as a process operationalized in terms of a contextualized cyclical feedback loop, in which individuals plan and initiate learning attempts and then use feedback to modify and adapt their learning methods to optimize their performance (Cleary & Platten, 2013). This loop has been described in three phases. The forethought phase consists of goal setting, strategic planning, and motivation and occurs prior to learning. During students' attempts to learn, or the performance phase, students will engage in various sub-processes, such as self-control, self-observation, metacognitive monitoring, and self-recording. Finally, after learning or performance, students engage in the self-reflection phase, which consists of other regulatory sub-processes including

self-evaluation, attributions, and adaptive inferences (Cleary & Platten, 2013). Students who exhibit strong SRL skills will tend to display a high level of motivation, use a variety of cognitive strategies, and exhibit sophisticated metacognitive abilities (Wolters, 2003), or the awareness of and knowledge about one's own thinking (Zimmerman, 2002). According to social cognitive theory, a key feature of self-regulated learners is their proactive use of strategies, which can be conceptualized as purposeful actions and processes directed toward goal attainment (Zimmerman, 1989).

Motivation is defined as the initiation and sustenance of goal-directed behavior (Cleary, 2011) and is therefore closely connected with the use of self-regulatory strategies. Self-efficacy is one motivational belief connected with SRL that is of particular interest. Self-efficacy refers to beliefs about one's ability to use self-regulatory processes, such as goal setting, self-monitoring, strategy use, self-evaluation, and self-reactions to learn effectively (Zimmerman & Kitsantas, 2005), and therefore is essential in the utilization and application of self-regulatory strategies. It has also been suggested that students' self-efficacy beliefs can impact perceptions of personal responsibility. For example, students with high self-efficacy have been found to believe that they are more responsible for academic outcomes than their teachers (Zimmerman & Kitsantas, 2005). Therefore, strategy use and motivational beliefs should be specifically assessed when attempting to measure and evaluate the SRL skills of students. Furthermore, SRL and self-efficacy are conceptualized as contextualized processes and therefore, these constructs should be measured within a specific context (Cleary & Chen, 2009).

Achievement and SRL

Research has demonstrated the relationship between these constructs and the academic achievement of students. Effects reported across studies examining self-regulation and academic

achievement are consistently positive and show long-term contributions of self-regulation to outcomes such as high school graduation and college completion (Duncan et al., 2007; McClelland, Piccinin, & Stallings, 2011; Vitaro, Brendgen, Larose, & Tremblay, 2005). Zimmerman and Martinez-Pons (1986) found evidence for 14 types of SRL strategies, demonstrating that students' use of these strategies was highly correlated with their achievement and with teachers' ratings of their self-regulation in a classroom setting. Furthermore, high achieving students reported significantly greater use for 13 of these strategy categories in comparison to the low achieving group. Students who struggle to effectively manage their time and problem-solve difficult situations, as well as those with a poor knowledge base of effective learning strategies, are usually the students who are at high-risk for academic difficulties (Schunk & Ertmer, 2000).

In addition to self-regulation, the importance of motivation processes (e.g., self-efficacy, perceived responsibility) increase as students transition from the elementary school setting into the less structured environment of middle schools. As students enter middle and high school, it is common for their motivation to decrease resulting in difficulty managing independent study time and the class requirements from several different teachers (Eccles et al., 1993; Zimmerman, 2002). Specifically, self-efficacy has been linked to academic achievement. It has been demonstrated that highly self-regulated learners approach educational tasks mindfully. They proactively set goals and create plans for attaining those goals, with self-efficacy influencing and guiding this process (Cleary & Zimmerman, 2004). Much of the literature on underachievement suggests that underachievers have low self-esteem, poor academic self-concepts, or low self-efficacy (Bricklin & Bricklin, 1967; Diaz, 1998; Dowdall & Colangelo, 1982). Students' self-efficacy beliefs regarding their academic performance have been hypothesized to impact their

perceptions of personal responsibility (Zimmerman, 1994). There is evidence that perceived responsibility, or a student's perception of how responsible he or she is for their academic success, is related to academic outcomes (Zimmerman & Kitsantas, 2005). Thus, the literature demonstrates a connection between SRL and motivation beliefs and levels of academic achievement. As SRL has been proposed as a cause of low achievement in general (Seigle & McCoach, 2005), this subject warrants further attention and investigation among students of all ability levels. The importance of examining SRL in high ability populations is underscored given that SRL behaviors are malleable and teachable (Cleary et al., 2008) and thus can serve as a potential vehicle for the reversal of underachievement.

Ability Grouping in Schools

In order to determine if a student is underachieving, it is important to provide an estimate of their ability. Within schools, ability level is often conceptualized as a student's academic track or level. This practice is commonly utilized under the assumption that instruction can be more efficiently developed and delivered when classrooms are grouped homogeneously (Archbald, Glutting, & Qian, 2009). It is often believed that high ability students are not at risk for academic failure. However, watching high ability students perform below their potential is a source of frustration for many teachers, parents, and school professionals (Siegle & McCoach, 2005).

While types of ability groups differ among schools and grade levels, one common ability group is that of gifted students. Aside from an interest in the patterns of SRL within the most advanced ability group of gifted students, the gifted population also offers a prime sample for investigation given the frequent identification and education of this ability group within schools. Much previous research has examined factors contributing to the high and low achievement of gifted students, partially due to the ability to identify low achievers given the gap that exists

between students' ability or intellectual skills and school performance (Preckel et al., 2006). Therefore, a focus on the gifted student population, and a review of the existing literature examining this population, can provide valuable information regarding the connection between SRL and achievement levels among students within a single high ability track.

Gifted students. Before further exploring differences between gifted high and low achievers and SRL within this population, it is first essential to understand giftedness as a construct and the implications for gifted education. According to the National Association for Gifted Children (NAGC) there are approximately three million academically gifted children in grades K-12 in the U.S. accounting for approximately six percent of the student population (2013). Although there is no single accepted definition of giftedness, the federal definition of giftedness from the Elementary and Secondary Education Act states:

> Students, children, or youth who give evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services and activities not ordinarily provided by the school in order to fully develop those capabilities (Stephens & Karnes, 2000, p.220).

To support the development of gifted and talented students in the United States, Congress reauthorized the Jacob K. Javits Gifted and Talented Students Education Act as Title V, Part D, Subpart 6 of the No Child Left Behind Act of 2001. This legislation reauthorizes the U.S. Department of Education to fund grants, provide leadership, and sponsor a national research center on the education of gifted and talented students.

While this act is indicative of federal support for gifted identification and programming, criterion used to identify gifted students varies both within states and across districts. For example, in the state of New Jersey, state regulations require that students be compared to their

chronological peers in the local school district (New Jersey [NJ] Department of Education, 2010). In addition, local school districts should use multiple measures to identify students, including but not limited to, achievement test scores, grades, student performance or products, intelligence testing, parent, student, or teacher recommendation, and other appropriate measures (NJ Department of Education, 2010). Similarly, while gifted programming is mandated within the state of New Jersey, there are presently no state level guidelines specifying the nature of gifted program criteria. Gifted instruction and programming is provided at the discretion of each school district (Stephens & Karnes, 2000), resulting in wide variability in the types of gifted programs offered to students educated in New Jersey. Therefore, while some gifted students may be educated in enrichment programs, others are placed in an accelerated track or receive an advanced curriculum in order to meet their specific needs. Due to this variability, it becomes essential to understand the unique identification and programming process for gifted students within a given district when working or conducting research with this population. Within the current study, giftedness will be conceptualized utilizing a multi-criteria identification approach, which is suggested through the Department of Education (2010).

High and low achievement in gifted populations. While high ability students are often assumed to be high achievers, approximately half of gifted children achieve significantly below their intellectual and creative potential in their personal, work-related, and academic lives (Morisano & Shore, 2010) and practitioners have identified the assessment of gifted underachievement as a major research problem within this area (Renzulli, Reid, & Gubbins, 1992). Therefore, further exploration of the identification and characteristics of gifted high and low achievers is a critical direction of future research. If factors influencing the high

achievement of gifted students, and students across ability levels, can be identified, schools can work to further assess for and develop these characteristics within their entire student population.

Many potential characteristics of high and low achievement within gifted populations have been identified, including a range of behavioral, cognitive, emotional, and environmental causes (Rayneri, Gerber, & Wiley, 2003). For example, research indicates that gifted high achievers less often live in urban areas, are more likely to be satisfied with class instruction, are more likely to pursue higher education (Colangelo, Kerr, Christensen, & Maxey, 1993), are less frequently absent and tardy, and differ in self-perceptions from their lower achieving peers (Figg, Rogers, McCormick, & Low, 2012). Four underlying causes of gifted underachievement have been proposed (Seigle & McCoach, 2005): (a) physical, cognitive, or emotional issues, (b) a disconnect between students and their school environments, (c) student's attitudes about themselves and their schooling, and (d) inadequate SRL and study skills (Seigle & McCoach, 2005). While all of these factors are important to consider in the achievement level of students, SRL will be the focus of the current study.

Giftedness and SRL

While SRL has been investigated in populations of high and low achievers, it has also been studied among students of various abilities, and specifically among gifted students. Gifted students have been shown to generate strategies at an earlier age and use higher levels of strategies than their non-gifted counterparts (Scruggs & Cohn, 1983; Scruggs & Mastropieri, 1985). Gifted students have also been shown to make better use of certain SRL strategies when compared to typical students (Zimmerman & Martinez-Pons, 1990). Furthermore, gifted students have been shown to be similar in self-regulated strategy use across age groups (Neber & Schommer-Aikins, 2002).

In addition to comparing SRL among gifted and non-gifted students, SRL has also been studied among groups of gifted high and low achievers. SRL has been self-identified as a factor contributing to achievement levels among gifted students (Baum et al., 1995). Gifted high and low achievers have been shown to significantly differ in terms of self-regulation and self-concept (Jovanović, Teovanović, Mentus, & Petrović, 2010; McCoach & Seigle, 2003), with gifted high achievers reporting significantly more self-regulated strategy use than their low achieving peers. Gifted achievers have also been shown to be more skilled in terms of metacognitive strategy use (Berkowitz & Cicchelli, 2004). It is particularly important to understand SRL among gifted students as this process is incorporated in many gifted education models (Zimmerman & Cleary, 2009). Thus students with poor self-regulatory abilities may be more likely to struggle within their gifted programs. This also suggests that high achieving gifted students are utilizing SRL strategies while low achieving gifted students, who are most likely low-level strategy users, would benefit from SRL strategy training and intervention (Risemberg & Zimmerman, 1992).

While the afore mentioned studies have shown that SRL strategy use differs among gifted students and general education peers, as well as among high and low achievers, SRL has not been widely studied across both ability and achievement levels. Cleary and Chen (2009) investigated grade level, achievement group, and math course type differences in self-regulation and motivation in a large sample of middle school students. Results indicated that self-regulation and motivation processes more consistently differentiated the achievement groups in advanced classes than in regular math courses (Cleary & Chen, 2009). As this study split ability groups into regular and advanced classes, future research should attempt to tease apart these ability groups, further investigating the self-regulatory differences among high and low achieving students within each particular group. As was previously mentioned, track placement continues

to be a common practice within secondary schools (Archbald et al., 2009), grouping students of similar ability together in order to provide more appropriate and efficient instruction. Therefore, this clustering of students could be utilized in order to investigate differences and similarities across ability groups, which will be done within the current study.

Purpose of Study

The current literature has demonstrated that self-regulatory strategy use has been correlated with academic achievement across ability levels. More specifically, SRL has been compared between gifted and general education high and low achievers, as well as among gifted students in comparison to their general education peers. The current study will attempt to expand on the existing literature and address some of the gaps within the current research base. To date, no study has investigated the similarities and differences in SRL across a population of high achieving or low achieving students in various ability groups, including gifted and general education levels. Addressing this issue is important because achievement groups within gifted and high ability populations are often overlooked within schools and may benefit from SRL instruction in order to increase their achievement. For example, if high achievers across ability groups use similar self-regulatory strategies this would indicate that, regardless of ability, SRL is linked to higher academic achievement. Similarly, prior research has not examined a comprehensive array of motivation and the potential relationship among specific motivation beliefs, such as self-efficacy and perceived responsibility. Examining these various types of motivation beliefs will help to clarify if changes in self-efficacy and perceived responsibility impact student use of SRL strategies, ultimately affecting students' academic achievement. In addition, there is a limited amount of research viewing SRL behaviors from a multi-source assessment framework, relying solely on student measures (e.g., self-report, interview) to assess

adaptive self-regulatory strategies within a specific academic context. Relying exclusively on one type of measure is problematic because students are often unreliable reporters of their behaviors (Cleary & Callan, 2014; Winne & Noel, 2002).

The current study will address the aforementioned gaps by directly comparing students of various ability groups within the general education population, including gifted students, to identify differences in SRL behaviors and motivation beliefs (i.e., self-efficacy, perceived responsibility). Teacher report measures will be used in order to gain a more comprehensive and unbiased assessment of student self-regulation. Further, given that recent research has shown that student self-reports of maladaptive regulatory behaviors are more predictive of achievement than student reports of adaptive SRL, measures that assess for both adaptive and maladaptive strategies, such as the Self-Regulation Strategy Inventory—Self-Report (SRSI-SR; Cleary, 2006), will be utilized. Finally, it is important to contextualize the assessment of SRL and motivation beliefs, because of the influence of social and classroom factors, such as type of course content and expectations, on these processes. It has been recognized within the literature that students may use certain regulatory skills in one context but not others (Cleary & Chen, 2009; Wolters & Pintrich, 1998). In order to contextualize the current study, students will be surveyed about their SRL behaviors and motivation beliefs as they specifically apply to their mathematics classes. Math was selected as the content area for the current study due to the increased interest in self-regulation interventions within mathematics and the growing literature base examining this area (Butler, Beckingham, & Lauscher, 2005; Cleary & Chen, 2008; Montague, 2007; Xin, Jitendra, & Deatline-Buchman, 2005).

In summation, the present study will examine SRL and motivation differences among students of various ability levels (i.e., gifted, advanced, average) and if the SRL and motivation

beliefs of students in similar achievement groups (e.g., high or low) are different across ability levels. Thus achievement level (i.e., high achieving, low achieving) and ability level (i.e., gifted, advanced, average) will be studied in relation to student SRL, as measured by both student self-report and teacher ratings. The main effects of each independent variable (i.e., ability level, achievement status) will be analyzed. More specifically this study will attempt to answer the following questions:

1) Are there statistically significant differences between high and low achievers in terms of self-regulated learning and motivation beliefs?
2) Are there statistically significant differences among ability groups (i.e., gifted, advanced, average) in terms of self-regulated learning and motivation beliefs?
3) Are there statistically significant differences in self-regulated learning and motivation beliefs among students of similar achievement levels (i.e., high or low) across the different types of ability groups (i.e., gifted, advanced, average)? More specifically, do the three ability groups differ when only high achieving (i.e., A- or higher) or low achieving (i.e., B or lower) students are examined?

Methods

Sample

Fifth and sixth grade students were recruited from Edgar Middle School in Metuchen, New Jersey in the spring of the 2013–2014 school year. These grades were selected because many students entering middle school experience declines in motivation and have difficulty managing increased expectations for independent study time, multiple demands from different teachers, and the social and emotional stressors that often accompany adolescence (Cleary, 2006; Eccles et al., 1993; Zimmerman, 2002).

Within the district, gifted programming at the middle school level is provided through "Accelerated" or "Unique Learner" courses in language arts and mathematics. To qualify for this programming, students are scored using a matrix that was developed by the district (see Appendix B). This matrix is not a standardized measure across all states or districts but has been adopted by Metuchen as the formal procedure for measuring potential student ability and is used to place students in ability tracks, including gifted mathematics programming. As most gifted identification requires a standardized measure of predicted achievement, this matrix is applicable for the identification of gifted students. It also uses a multimodal approach to identification. As a result, this matrix was used within the current study.

Students can earn points on this matrix based on their current math placement, most recent New Jersey Assessment of Skills and Knowledge (NJASK) math score, computation assessment results, mathematics writing score, Orleans-Hanna Algebra Prognosis Test, current Language Arts/ Literacy (LAL) cycles, teacher rating scale, and teacher recommendation. This multi-method assessment aligns with the recommendations for identification proposed by the NJ Department of Education (2010). The Computation Assessment is a teacher-created assessment

that reflects the mathematical knowledge appropriate for the grade level. It varies from grade level to grade level as to how many questions may be on this assessment. It is scored on a 100-point basis so the grades are in terms of percentages. The Math Writing Score reflects the student's work on three open-ended questions that are grade level appropriate. They are scored by a group of grade level teachers. The total number of points earned on this assessment is converted to a percentage. The Orleans-Hanna Algebra Prognosis Test (3rd edition) is a fifty-question test. Each section provides the student with a solved example of the type of questions being asked in that section. The Teacher Rating Scale is a district developed evaluation form. It is composed of two main categories: Engagement in Learning and Preparation/Participation. Teachers are asked to rate each student in each item in the category. Teachers determine ratings of Always, Sometimes, Rarely, or Never. These points are counted and multiplied by three for "Always", two for "Sometimes", one for "Rarely", and zero for "Never". The total number of points is then placed in the matrix.

The percentage of points on this matrix makes determinations for the track into which students are placed (e.g., Advanced, Average, Skills). According to the district, students need to attain 90% of the points on the Matrix to be placed into the Unique Learner (UL) or Accelerated class. Individualized Education Programs (IEP) are also considered to determine if placement in the Accelerated or Unique Learner programs is appropriate. All of the data is gathered and arranged in numerical sequence. Students who qualify based on these criteria are then administered the Gifted and Talented Rating Scale, which is based on The Scales for Rating the Behavior Characteristics of Superior Students (SRBCSS). The SRBCSS consists of approximately 14 subscales including domains such as learning, motivation, creativity, leadership, art, music, dramatics, planning, communication (precision and expression),

mathematics, reading, and science & technology (Renzulli et al., 2002). However, the scale used by the district is somewhat modified to emphasize skills in math for math placements and language arts for English/language arts placements. Students who meet gifted criteria for the district are the students who qualify for placement in the Unique Learner and Accelerated placements. According to the district, the UL mathematics placement is described as follows:

> The UL mathematics curriculum is designed for students who have demonstrated exceptional intellectual giftedness in mathematics through their performance on an array of assessments including NJASK4, district open-ended math assessments, computational skills assessment and teacher recommendation. This program provides a sequence of experiences that develop a comprehensive understanding of mathematical processes, which grows and expands over time, reaching a greater depth and higher levels of sophistication at a faster pace than the other ability groupings. The mathematics curriculum includes a variety of instructional activities and teaching methodologies that incorporate all learning styles. The program is currently being realigned with the Common Core Curriculum Standards and meets state testing requirements. By the end of the year (fifth grade) students are able to solve a multitude of mathematical problems using a variety of strategies that extend from the classroom to everyday experiences. Their talents also allow them to communicate mathematically through written, oral and visual forms of expressions in order to demonstrate reasoning abilities (Edgar Middle School, 2013).

Mathematics classes were chosen as this subject allowed access to all students in the fifth and sixth grade. In addition, as SRL is a contextualized process that should be measured in a specific context (Cleary & Chen, 2009), a specific subject, mathematics, was utilized. All students who were identified as meeting criteria to participate in the Unique Learner course

within the fifth grade and Accelerated class within the sixth grade were asked to participate in the study. In addition, students in the general education math classes were also asked to participate. According to the school, these general education levels of courses are labeled as High/Advanced, Average, and Skills. For the purposes of this study, the Average and Skills classes were grouped together.

Gifted and general education student populations were targeted. According to the most recent New Jersey School Report Card from the 2013 school year, there were approximately 694 students enrolled in Edgar Middle School. In addition, 50% of the students enrolled in the school were male (n = 347), while the ethnic makeup of the school includes 64.0% (n = 444) White/Caucasian, 21.5% Asian, 9.5% Hispanic, and 5.0% Black. Approximately 15.4% of students spoke a language other than English as the primary language within their homes and approximately 9.4% of students come from economically disadvantaged homes. According to the most recent NJ report card (2014), performance on the math section of the New Jersey Assessment of Skills and Knowledge (NJASK) were as follows: 45% of fifth graders scored in the Advanced Proficient range, 37% in the proficient range, and 18% in the Partially Proficient range. This is comparable to 39% of sixth graders in the Advanced Proficient range, 52% in the Proficient range, and 9% in the Partially Proficient range.

During September and October 2013, school administration at Edgar Middle School in Metuchen, NJ was contacted to discuss the scope and purposes of the study. The building principal provided a letter of intent on October 15, 2013, indicating the school's agreement to allow for data collection and the provision of other information. More specifically, Edgar Middle School administrators provided a list of students enrolled in the Unique Learner/Accelerated math classes and general education math classes, allowing access to all fifth and sixth grade

students based on their mathematics placement for the 2013-2014 school year. With the assistance of school administration, an invitation letter written by the school principal and parental consent form was provided to the homeroom teachers in sealed envelopes (see Appendix D). The teachers then distributed them to the students within their homeroom on April 22, 2014. Students were asked to return the consent forms to their homeroom teachers who placed the forms back inside the envelope and returned them to the main office. Two weeks after the initial consent letter was sent home, another round of consent forms was distributed. The consent form explained that although student participation or non-participation, nor the results of the surveys would negatively impact their education, students who participated were entered into a raffle to win a gift card. The students who returned a consent form were surveyed within their science classes. This was done to avoid confliction within students, which may arise if they were asked to answer questions about their math teacher while in that class. Other information, including final math grades, ethnicity, gender, NJASK math scores, and reduced lunch status were also provided by the school district at the time of survey administration. The math teachers of the students who participated in the study were also asked to participate in the research study. Consent forms were given to teachers at the same time the second round of student consent forms were distributed (see Appendix D).

Survey administration took place between June 2, 2014 and June 19, 2014 due to the schedule of classes. Study participants consisted of 135 students. This was comprised of 67 fifth grade and 68 sixth grade students. Table 1 summarizes the categorical variables of interest included in this study, with sample sizes and percentages of response reported for each category. With regard to respondent ethnicity, 63% of the sample was found to be white (non-Hispanic), with close to 29% being Asian/Pacific Islander, slightly over 5% being Hispanic or Latino, with

3% being black/African American. Next, close to 55% of respondents were female, with slightly over 45% being male.

Table 1

Demographic Characteristics of Student Sample

Measure	*N*	%
Ethnicity		
White (non-Hispanic)	85	63.0
Hispanic or Latino	7	5.3
Black or African American	4	3.0
Asian/Pacific Islander	39	28.9
Gender of Student		
Male	61	45.2
Female	74	54.8
Grade Level of Student		
5	67	49.6
6	68	50.4
Gifted/Gen Ed		
Gifted	78	57.8
Non-Gifted	57	42.2
Free or Reduced Lunch		
Free	4	3.0
Reduced	3	2.2

With respect to math class track, this was found to be Advanced/High in over 42% of cases, was found to be Accelerated/Unique Learner in slightly over 24% of cases, Average in close to 30% of cases, with Skills being indicated in close to 4% of cases. With respect to final math class grade, this was found to be an A in slightly over 28% of cases, A- in close to 24% of cases, B+ in 16.3% of cases, with an additional 16.3% having a grade of B, and with all remaining categories of response having percentages of approximately 5% or less. Next, with regard to the categories of free or reduced lunch, 3% of the sample received free lunch and slightly over 2% of the sample received reduced lunch.

In order to conduct the necessary analyses, the sample was split into both achievement and ability groups based on their final math grades and math class track. With regard to achievement group, this measure was calculated first by removing all respondents that had a B+ as their grade, and then dichotomizing the remaining respondents into a high achievement and low achievement group. These results indicated approximately 63% of respondents in the high achievement group, and close to 37% in the low achievement group. Finally, with regard to ability category, this was found to be slightly over 42% with regard to advanced students, with one third of the sample having average skills, and slightly over 24% being gifted.

It should be noted that final class grades at the end of the 2013-2014 school year for the students' mathematics classes were utilized in determining student achievement. Although previous studies have divided a sample in half to determine high and low achievers (McCoach & Siegle, 2003; Rubenstein, Seigle, Reis, McCoach, & Burton, 2012), underachievement in the current study aimed to group students closer to the bottom 1/3 achievers and high achievers as the top 1/3, which has been done in previous research (Butler & Marinov-Glassman, 1994; Mulryan, 1992). This split was not exact, given the amount of students in each letter grade group. It should be noted that this is not a definitive conceptualization of high and low achievement, but instead a way to find relative achievement groups within a sample. In this way, the participating students were split into a higher achieving and lower achieving group, based on where they should be performing according to testing and district placement criteria.

Nine mathematics teachers participated in the study by completing corresponding surveys for the students in their class who also participated. Teachers were selected based on their role as a mathematics teacher for the student participants. In total, teachers completed surveys for 102 of the participating students. For the teacher sample, 66.7% of participants were female. The

average age of the participating teachers was 36.9 years old, with the youngest participant being age 29 and the oldest age 53. Participants had been teaching between seven to 20 years, with the average being 12.3 years. Eight teachers provided information about their education, with five of the responding teachers reporting having had bachelor's degrees and three teachers having completed master's degrees.

Measures

Self-Regulation Strategy Inventory—Self-Report (SRSI-SR). The Self-Regulation Strategy Inventory—Self-Report (SRSI-SR) is a 28-item questionnaire based on a 5-point scale ranging from 1 (never) to 5 (always). The SRSI-SR was designed to assess the frequency with which students perceive their use of various self-regulation strategies in a specific academic subject (Cleary, 2006). Participants are asked to rate how often they perform each of the behaviors described when preparing for academic tests. Items for the SRSI-SR were developed based on Zimmerman and Martinez-Pons' (1988, 1990) model of strategic learning which consists of 10 general categories of self-regulation strategies (i.e., environmental structuring, goal-setting/planning, seeking social support, seeking information, self-evaluation, rehearsal, transformation, elaboration, reviewing records/monitoring; Cleary, 2006). A principal component analysis of the SRSI-SR yielded a three-factor structure: (a) Seeking and Learning Information, (b) Managing Environment/Behavior, and (c) Maladaptive Regulatory Behaviors (Cleary, 2006). Internal consistency for the overall SRSI-SR has been shown to be high (α = .92), with the subscales ranging from α = .72 to α = .88 (Cleary, 2006). This is consistent with the alpha value of .91 obtained with the current sample for this dissertation. A second principal component analysis indicated that the three subscales of the SRSI-SR converged onto one higher-order factor. Furthermore, the SRSI-SR has been shown to reliably differentiate high and

low achievers (Cleary, 2006). It is important to note that in the current study one factor of the SRSI-SR, maladaptive regulatory behaviors, was reverse coded so that items originally negatively worded would align with the positively worded items on the scale.

Self-Regulation Strategy Inventory—Teacher Report (SRSI-TRS). The Self-Regulation Strategy Inventory—Teacher Report (SRSI-TRS) is a 13-item teacher rating scale given to teachers of students who completed the self-report survey. The SRSI-TRS was developed to parallel with the SRSI-SR. This measure assesses teachers' perceptions of students' regulatory behaviors and engagement in specific classroom contexts (Cleary & Callan, 2014). All items used a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). Example items include, "The student keeps his or her class materials very organized." and "The student seeks help or attends extra help sessions." The SRSI-TRS has demonstrated adequate internal consistency (α = .96) and predictive validity with high school students in urban contexts (Cleary & Callan, 2014). The Chronbach's alpha for this scale in this study was .94.

Sources of Mathematics Self-Efficacy Scale (SMES). The Sources of Mathematics Self-Efficacy Scale (SMES) is a 7-item measure designed to assess how well students believe they are able to complete academic tasks and behaviors (Usher & Pajares, 2008). The items are rated on a 5-point Likert scale: 1 (not well at all), 2 (a little well), 3 (somewhat well), 4 (pretty well), and 5 (very well). This measure has exhibited strong content validity, internal consistency, and criterion validity with middle school children (Usher & Pajares, 2008). Items have been shown to have internal consistency ranging from α = .85 to α = .92 (Usher & Pajares, 2008). The Chronbach's alpha for this scale in the current study was .82.

Perceived Responsibility Scale (PRS). The Perceived Responsibility Scale (PRS) is a 20-item scale designed to indicate whether students perceive themselves or their teacher to be

more responsible for various learning tasks or academic performance outcomes (Zimmerman & Kitsantas, 2005). A reduced scale consisting of 10 items was used in the current study. The items are rated on a 7-point Likert scale: 1 (mainly the teacher), 2 (definitely more the teacher), 3 (slightly more the teacher), 4 (both equally), 5 (slightly more the student), 6 (definitely more the student), and 7 (mainly the student; Zimmerman & Kitsantas, 2005). The Cronbach reliability coefficient was .97 (Zimmerman & Kitsantas, 2005). This scale has been shown to correlate with other self-motivation beliefs, such as self-efficacy ($r = .71$, $p < .01$) and GPA ($r = .86$, $p < .01$), and has been shown to be a strong predictor of academic achievement (Zimmerman & Kitsantas, 2005). The internal consistency of this scale in the current study was poor ($\alpha = .56$).

Procedures

All student surveys were administered during the school day within the students' science class. Surveys were not administered during math classes in order to reduce bias or student anxiety, as the questions asked pertained to their math class or math teacher. Science classes were chosen due to the timing of these classes within the school day, allowing convenient access to the sample. Assent was obtained from students who had returned signed, written parental consent prior to administering the surveys. Students were read scripted directions that informed them that they could skip questions that they did not feel comfortable answering (see Appendix E). In addition, they were reassured of the confidentiality of their responses and the anonymity of their participation. The nature of the Likert scales was explained and a brief description of the study was provided before survey completion, explaining that the purpose is to understand the connection between self-regulation and academic achievement. After the survey was introduced, the surveys were handed out and completed by the students, which took approximately 20 to 30 minutes in each of the classrooms (see Appendix F). During this time, students who did not

consent or assent to take the survey were provided with activities that were not collected or used in the survey. Providing this alternative activity helped to ensure that the entire classroom was occupied during the survey administration. The survey administration was proctored and questions were answered as needed. Surveys were collected once they were completed, de-identified, stored in a secure location, and the data was entered and analyzed. Two students, one from the fifth and one from the sixth grades, were randomly chosen to win a raffle gift card worth 25 dollars. The gift cards were given to the building principal who presented them to the winners at the completion of data collection.

Teacher rating scales for each student who completed a survey were provided to the math teachers who consented to participate (see Appendix F). The teachers were provided with the rating scales on June 11, 2014. The surveys were placed in sealed envelopes along with instructions on how to complete the rating scales and the purpose of the study. Teachers were asked to complete the surveys within two weeks and to return them to the secretarial staff in the main office at Edgar Middle School. These measures were stored in a confidential location until they were collected. These rating scales were also de-identified, securely stored in a locked filing cabinet in a lab at the Graduate School of Applied and Professional Psychology, where only the researcher and advising faculty could access the data. The survey data was then entered into the database for analysis.

Although students and teachers initially wrote their names on the surveys, in order to protect participants' confidentiality, data of student participants was paired with student ID numbers. Data linked to ID numbers were entered into the data set. In addition, surveys will be locked in a file cabinet in the Graduate School of Applied and Professional Psychology at Rutgers University for three years, after which they will be destroyed. Only the researcher and

advising faculty had access to the collected data and the original protocols of this project. When statistical procedures were used all data was stored on a computer that could only be accessed with a private password. In addition, the subject's identity in the database was represented by a numeric code rather than the participant's name. After the data was analyzed, the link between the coded data and the identifying information of the individuals was destroyed.

Analyses

Data were entered using SPSS version 22. Descriptive statistics were first conducted, so as to describe the sample demographics and the research variables used in the analyses. The current study examines two independent variables: 1) achievement level, and 2) ability level. Achievement level is broken down into two groups: 1) high achievers, and 2) low achievers. Ability level, is determined by math course track, and broken down into three groups: 1) gifted (i.e., Unique Learner/Accelerated), 2) advanced, 3) average. The dependent variables are SRL (i.e., self-report and teacher report) and motivation beliefs (i.e., perceived responsibility and self efficacy). The study used a correlation analysis and a *t*-test to examine the relationship between SRL and motivation beliefs and academic achievement. A set of ANOVAs were used to examine if there were differences in SRL and motivation beliefs across ability levels, and furthermore if the nature of SRL and motivation beliefs was similar among students of the same achievement level across ability groups. However, based on the sample of consenting students, there were a low number of students in the high ability, low achieving group. This limited the ability to compare low achievers across ability groups. Therefore, the focus of the study shifted to making comparisons between achievement groups, among ability groups, and among high achieving students across ability groups in order to draw conclusions.

After collecting the data, analyses aimed to address several research questions (Table 2):

1) Are there statistically significant differences among high and low achievers in terms of self-regulated learning and motivation beliefs?

It was anticipated that high achieving students would demonstrate significantly higher SRL behaviors and motivation beliefs than their underachieving counterparts, due to the literature supporting the connection between self-regulation and academic achievement (McClelland & Cameron, 2011; Ruban & Reis, 2006; Zimmerman & Martinez-Pons, 1986).

2) Are there statistically significant differences among ability groups (i.e., gifted, advanced, average) in terms of self-regulated learning and motivation beliefs?

It was anticipated that students in the gifted ability group would demonstrate significantly higher SRL behaviors and motivation beliefs than students in general education ability groups, as this pattern has been previously demonstrated through the literature (Calero et al., 2007; Risemberg & Zimmerman, 1992; Scruggs & Cohn, 1983; Zimmerman & Martinez-Pons, 1990). However, it was uncertain if these differences would be present between gifted students and students in advanced general education placements, as this has not been examined in previous research.

3) Are there statistically significant differences in self-regulated learning and motivation beliefs among students of similar achievement levels (i.e., high or low) across the different types of ability groups (i.e., gifted, advanced, average)? More specifically, do the three ability groups differ when only high achieving (i.e., A- or higher) or low achieving (i.e., B or lower) students are examined?

It was anticipated that high achieving students across ability groups would demonstrate similar SRL strategies and motivation beliefs, in part, because SRL processes have been shown to be strongly related to achievement. In addition, there is also some data showing that achievement

groups can often be differentiated in terms of their SRL processes (Cleary & Chen, 2009; Zimmerman & Martinez-Pons, 1986). In order to address the aforementioned research questions a set of ANOVAs was used to examine both main effects. The dependent variables in these analyses consisted of scores from the Self-Regulation Strategy Inventory—Self-Report (SRSI-SR), Self-Regulation Strategy Inventory—Teacher Report (SRSI-TRS), Sources of Mathematics Self-Efficacy Scale, and Perceived Responsibility Scale.

Table 2

Research Questions and Analyses

Research question	Hypotheses	Measures	Statistical analyses
1) Are there statistically significant differences between high and low achievers in terms of self-regulated learning and motivation beliefs?	High achieving students will demonstrate significantly higher SRL behaviors and motivation beliefs than their underachieving counterparts.		Correlation Analysis; *t*-test
a. Are there statistically significant differences between high and low achievers in terms of adaptive and maladaptive self-regulated strategy use based on self-report measures?	High achieving students will demonstrate significantly higher adaptive and lower maladaptive SRL strategies than their underachieving counterparts.	SRSI-SR	Correlation Analysis; *t*-test
b. Are there statistically significant differences between high and low achievers in terms of adaptive self-regulated strategy use based on teacher report measures?	High achieving students will demonstrate significantly higher adaptive SRL strategies than their underachieving counterparts as reported by their teachers.	SRSI-TRS	Correlation Analysis; *t*-test
c. Are there statistically significant differences between high and low achievers in terms of motivation beliefs (i.e., self-efficacy and perceived responsibility)?	High achieving students will demonstrate significantly greater self-efficacy beliefs and greater personal responsibility for their academic performance than their underachieving counterparts.	SMES PRS	Correlation Analysis; *t*-test

Table 2 – Continued

Research Questions and Analyses

Research question	Hypotheses	Measures	Statistical analyses
2) Are there statistically significant differences among ability groups (i.e., gifted, advanced, average) in terms of self-regulated learning and motivation beliefs?	Students in the gifted ability group will demonstrate significantly higher SRL behaviors and motivation beliefs than students in general education ability groups.		ANOVA
a. Are there statistically significant differences among ability groups (i.e., gifted, advanced, average) in terms of adaptive and maladaptive self-regulated strategy use based on self-report measures?	High ability students will demonstrate significantly higher adaptive and lower maladaptive SRL strategies than their underachieving counterparts.	SRSI-SR	Tests of Multivariate Comparisons
b. Are there statistically significant differences among ability groups (i.e., gifted, advanced, average) in terms of adaptive self-regulated strategy use based on teacher report measures?	High ability students will demonstrate significantly higher adaptive SRL strategies than their underachieving counterparts as reported by their teachers.	SRSI-TRS	Tests of Multivariate Comparisons
c. Are there statistically significant differences among ability groups (i.e., gifted, advanced, average) in terms of motivation beliefs (i.e., self-efficacy and perceived responsibility)?	High ability students will demonstrate significantly greater self-efficacy beliefs and greater personal responsibility for their academic performance than their underachieving counterparts.	SMES PRS	Tests of Multivariate Comparisons
3) Do students of the same achievement level (i.e., high and low) vary across the different types of ability groups (i.e., gifted, advanced, average) in terms of self-regulated learning and motivation beliefs?	Students of similar achievement levels will demonstrate similar SRL strategies and motivation beliefs regardless of their ability group.	SRSI-SR SRSI-TRS SMES PRS	ANOVA; Tests of Multivariate Comparisons

Note. SMES = Sources of Mathematics Self-Efficacy Scale; PRS = The Perceived Responsibility Scale; SRSI-TRS = Self-Regulation Strategy Inventory-Teacher Rating Scale; SRSI-SR = Self-Regulation Strategy Inventory-Self Report Scale

Results

This chapter examines the results from the data analytic techniques performed. Initial screening of the data was conducted (e.g., missing data, outliers). Following this preliminary analysis, a variety of statistical procedures were conducted to examine the research questions. Correlations, *t*-tests, and analysis of variance (ANOVA) were conducted to examine the relationship between ability groupings (i.e., average, advanced, gifted), mathematics achievement, self-regulated learning, and motivation of middle school students.

Screening Procedures

Before conducting descriptive or inferential statistics, the frequency of missing data, the presence of outliers, and the linearity and normality of the data was examined. Regarding missing data, the prevalence of missing scores for each scale item was examined. All items had a low rate of missing values (i.e., between 0 to 2.2%). In order to determine if the data was missing at random, Little's MCAR test was calculated. The results of Little's MCAR were not statistically significant ($p = .716$) indicating that the missing data are most likely missing at random (Meyers, Gamst, & Guarino, 2006). Missing values were replaced using expectation-maximization (EM) imputation procedures in SPSS. For all continuous measures, the mean, standard deviation, and mean +/- three standard deviations were calculated in order to determine whether any substantial outliers were present. These analyses found no substantial problems with these data, and no cases were removed in the analyses conducted. Lastly, data screening procedures revealed minimal problems with the distribution of the dataset, with minimal skewness and kurtosis indicated among all of the measures.

Descriptive Analyses

A series of descriptive statistics were conducted on each of the continuous variables included in this study: three subscales of self-reported self-regulation (SRSI-SR), teacher rated self-regulation (SRSI-TRS), self-efficacy (SMES), and perceived responsibility (PRS; see Table 3). The three subscales from the SRSI-SR included Maladaptive Regulatory Behaviors, Managing Environment and Behavior, and Seeking and Learning Information. Means for measures of self-efficacy (SMES) and self-regulation (SRSI-SR subscales, SRSI-TRS) were based on ratings using a 5-point Likert scale, while means for the measure of perceived responsibility (PRS) were based on ratings using a 7-point Likert scale.

Table 3

Self-Regulation and Motivation Beliefs Descriptive Statistics

Measure	*M*	*SD*	Skewness	Kurtosis
Self-Efficacy (SMES)	3.998	0.675	-0.733	0.064
SRSI-SR: Maladaptive Regulatory Behaviors	4.183	0.653	-1.096	0.992
SRSI-SR: Managing Environment and Behavior	3.720	0.782	-0.613	-0.162
SRSI-SR: Seeking and Learning Information	3.678	0.830	-0.707	0.172
SRSI-TRS: Teacher Rating Scale	3.674	0.820	-0.603	0.141
Perceived Responsibility (PRS)	4.630	0.728	0.219	0.931

Note. SRSI-TRS: $n = 102$; SRSI-SR, PRS, SMES: $n = 135$. Self-efficacy mean and standard deviation are based on a 7 item, 5-point Likert scale; Maladaptive regulatory behaviors mean and standard deviation is based on a subscale composed of 8 items rated on a 5-point Likert scale; Managing environment and behavior mean and standard deviation is based on a subscale composed of 12 items rated on a 5-point Likert scale; Seeking and learning information mean and standard deviation is based on a subscale composed of 8 items rated on a 5-point Likert scale; Self-regulation teacher rating mean and standard deviation is based on a 13 item, 5-point Likert scale; Perceived responsibility mean and standard deviation are based on a 10 item, 7-point Likert scale.

Table 4 summarizes the correlations among all scale scores. Results indicated significant positive correlations between self-efficacy (SMES) and all other measures, including adaptive and maladaptive factors of self-regulated learning (SRSI-SR) and perceived responsibility (PRS).

This indicates that a relationship between many of the dependent variables is present, with scores in self-regulation and perceived responsibility increasing as self-efficacy increased.

Table 4

Correlation Matrix of Scale Scores

Measure	1	2	3	4	5	6	7
1. Self-Efficacy (SMES)	-						
2. SRSI-SR: Maladaptive Regulatory Behaviors[a]	0.648*	-					
3. SRSI-SR: Managing Environment and Behavior	0.627*	0.515*	-				
4. SRSI-SR: Seeking and Learning Information	0.445*	0.376*	0.701*	-			
5. SRSI-TRS: Teacher Rating Scale	0.307*	0.307*	0.178	0.161	-		
6. Perceived Responsibility (PRS)	0.243*	0.153	0.101	0.149	0.028	-	
7. Final Math Class Grade	0.328**	0.377**	0.081	0.032	0.643*	0.007	-

Note. $*p < 0.01$. $**p < 0.001$. $df = 133$. SRSI-TRS: $df = 100$.

[a] Items were reverse-coded. High scores on the Maladaptive Regulatory Behaviors scale reflect less maladaptive or negative behaviors.

Research Question 1: Are there statistically significant differences between high and low achievers in terms of self-regulated learning and motivation beliefs?

In order to answer the first research question, I wanted to examine the main effect of achievement on the dependent variables (e.g., SRL, perceived responsibility, self-efficacy) by conducting an independent-samples *t*-test. To do so, I elected to create two extreme achievement groups (i.e., high and low achievers). In order to create the achievement groups, students who received a B+ as their final math grade were removed from the analyses ($n = 22$). Although eliminating a group of students from the analyses would reduce the sample size, and thus could

reduce power, the removal of this group of students allowed for students in the high and low achieving groups to be further separated from one another. Students who had received an A- or higher were placed in the high achievement group and students who received a B or lower were placed in the low achievement group. As explained previously (see Methods), the achievement groups were relative to the sample. The sample was split as evenly as possible given the number of students who received each letter grade; however, this was somewhat limited given the low number of students who received grades of C and below. Independent-samples *t*-tests were then conducted across all dependent variables. Table 5 presents a series of descriptive statistics (i.e., mean, standard deviations) conducted on these data.

Table 5

Self-Regulation and Motivation Beliefs Means and Standard Deviations by Achievement Group

Measure	High achievement (n = 71)		Low achievement (n = 42)	
	M	*SD*	*M*	*SD*
Self-Efficacy (SMES)	4.180	0.634	3.751	0.590
SRSI-SR: Maladaptive Regulatory Behaviors	4.381	0.528	3.952	0.682
SRSI-SR: Managing Environment and Behavior	3.806	0.719	3.619	0.793
SRSI-SR: Seeking and Learning Information	3.747	0.789	3.604	0.933
SRSI-TRS: Teacher Rating Scale[a]	4.006	0.613	2.713	0.748
Perceived Responsibility (PRS)	4.681	0.736	4.619	0.749

Note. [a] SRSI-TRS: high achievement group (n = 63) low achievement group (n = 22)

Levene's test for the equality of variances was conducted for each of the *t*-tests. The results showed equality of variances across all variables with the exception of maladaptive regulatory behaviors (Levene's $F = 4.479$, $p = .037$). As a result, the data results associated with

equal variances not assumed, which takes into account the Cochran and Cox adjustment for the standard error of the estimate and the Satterthwaite adjustment for the degrees of freedom, were used for this variable (Meyers et al., 2006).

Given that six independent *t*-tests were to be conducted (i.e., a *t*-test for each dependent variable) I applied the Bonferroni correction to reduce the likelihood of committing a Type I error. The adjusted alpha level of .05/6 or .008 was used to determine statistical significance. As shown in Table 6, the independent *t*-test conducted with self-efficacy ($t(111) = 3.559$, $p = .001$) was found to achieve statistical significance, with the high achievement group ($M = 4.180$) exhibiting higher scores than the low achievement group ($M = 3.751$). Cohen's (1988) effect size ($d = 0.701$) was medium. Additionally, the independent-samples *t*-test conducted with the teacher ratings of student self-regulation (SRSI-TRS) was found to achieve statistical significance ($t(83) = 8.031$, $p < .001$). The results found the high achievement group ($M = 4.006$) to have significantly higher scores as compared with the low achievement group ($M = 2.713$). Cohen's (1988) effect size ($d = 1.890$) was large. The *t*-test conducted with maladaptive regulatory behaviors ($t(69.984) = 3.501$, $p = .001$) was also found to achieve statistical significance. The results found the high achievement group ($M = 4.381$) to have significantly higher scores as compared with the low achievement group ($M = 3.952$). Based on Cohen's (1988) guidelines, the effect size ($d = 0.703$) was medium. Collectively, these results indicate that the high achieving group reported being significantly more efficacious about their academic abilities and reported less frequent displays of maladaptive regulatory behaviors than the low achieving group. Consistent with these self-report findings, the teachers rated high achieving students as using self-regulatory strategies significantly more frequently than the low achieving group.

Table 6

Math Achievement: Independent-Samples t-Tests

Measure	Levene's test		*t*-Test for equality of means				
	F	*p*	*t*	*df*	*p*	Mean Diff.	*SED*
Self-Efficacy (SMES)	0.325	0.570	3.559**	111	0.001	0.428	0.120
SRSI-SR: Maladaptive Regulatory Behaviors	4.479*	0.037	3.501***	69.984	0.001	0.429	0.123
SRSI-SR: Managing Environment and Behavior	0.400	0.528	1.286	111	0.201	0.187	0.145
SRSI-SR: Seeking and Learning Information	1.275	0.261	0.866	111	0.389	0.142	0.164
SRSI-TRS: Teacher Rating Scale	0.964	0.329	8.031***	83	0.000	1.293	0.161
Perceived Responsibility (PRS)	0.155	0.695	0.432	111	0.667	0.062	0.144

*Note. *p < 0.05. **p < 0.01. ***p < 0.001.*

While a series of independent-samples *t*-tests were conducted to address the first research question, there was a potential concern about artificially creating high and low achievement groups because, in doing so, the total sample size used within the analyses was reduced. This could impact power to detect significant results. Therefore, as a post hoc procedure, I decided to examine the relationship between the dependent variables and achievement, as a continuous variable. Therefore, while different from the initial research question, which was interested in differences across extreme achievement groups, correlation analyses were also conducted between final math grade and all dependent variables (see Table 4). Please note that math grade was coded on a zero to 11 scale where 0 = D- and 11 = A+. In addition, items on the maladaptive regulatory behaviors subscale were reverse-coded and so high scores on scale reflect less maladaptive or negative behaviors. As shown, significant correlations were indicated between

final math class grade and self-efficacy ($r = .328$, $p < 0.001$), maladaptive regulatory behavior ($r = .377$, $p < 0.001$), and teacher rated self-regulation ($r(100) = .643$, $p < .001$). All of these correlations were found to be positive, with medium correlations conducted with self-efficacy and maladaptive regulatory behavior and a large correlation with teacher ratings of self-regulation (Cohen, 1988). These results are very similar to the results from the *t*-tests indicating that as student mathematics performance increased, they showed less maladaptive regulatory behaviors and enhanced self-efficacy, as well as greater adaptive regulatory behaviors in mathematics classrooms as reported by teachers.

Research Question 2: Are there statistically significant differences among ability groups (i.e., gifted, advanced, average) in terms of self-regulated learning and motivation beliefs?

To address the second research question a series of univariate ANOVAs were conducted to examine ability group differences (i.e., gifted, advanced, average) across the motivation and regulation variables. The gifted group was comprised of accelerated and unique learner students who were placed into gifted classrooms based on a matrix score which incorporates various assessments, teacher input, and a gifted rating scale (see Methods). Students who met all of the requirements for the gifted placement, other than scores on the gifted rating scale were placed into advanced classes. These students composed the advanced group utilized in the current study. All other students who did not meet criteria for gifted or advanced classes were placed in average or skills classes within the general education population. These students comprised the average group in the current study. If any of the ANOVA tests were found to be statistically significant, tests of multiple comparisons (e.g., Tukey) were to be used to compare individual pairs of means in order to identify specific group differences. Prior to running the analyses, means and standard

deviations for all scale scores across ability groups were calculated. These results are reported in Table 7.

Table 7

Scale Means and Standard Deviations by Ability Level

Measure	Average (n = 45)		Advanced (n = 57)		Gifted (n = 33)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Self-Efficacy (SMES)	3.867	0.644	3.980	0.629	4.210	0.757
SRSI-SR: Maladaptive Regulatory Behaviors	4.072	0.623	4.224	0.658	4.266	0.683
SRSI-SR: Managing Environment and Behavior	3.752	0.680	3.710	0.829	3.694	0.849
SRSI-SR: Seeking and Learning Information	3.653	0.811	3.641	0.869	3.776	0.802
SRSI-TRS: Teacher Rating Scale[a]	2.813	0.784	3.700	0.783	4.005	0.631
Perceived Responsibility (PRS)	4.640	0.674	4.594	0.736	4.679	0.801

Note. [a] SRSI-TRS: Gifted (n = 32), Advanced (n = 56), Average (n = 14).

Levene's test was used to evaluate the homogeneity of variance across each of the dependent measures, with the results showing no violations of this assumption. The one-way ANOVA results revealed no statistically significant group differences across any of the student self-reported dependent variables (i.e., SMES, SRSI-SR subscales, PRS; See Table 8). However, group differences were observed for the SRSI-TRS ($F(2, 99) = 12.747$, $p < .001$, $\eta^2 = .205$). To examine specific group differences, post-hoc tests of multiple comparisons were conducted. More specifically, results of Tukey's HSD indicated significant differences were found between the average category and the two remaining categories. Average respondents had a significantly lower mean ($M = 2.813$) as compared with both the advanced group ($M = 3.700$) as well as the

gifted group ($M = 4.005$). There was not a significant difference between the means of the gifted and advanced groups.

Table 8

ANOVA for Self-Regulated Learning and Motivation Beliefs by Ability Level

Measure	Source	*SS*	*df*	*MS*	*F*	*p*
Self-Efficacy (SMES)	Between Groups	2.272	2	1.136	2.552	.082
	Within Groups	58.756	132	.445		
	Total	61.029	134			
SRSI-SR: Maladaptive Regulatory Behaviors	Between Groups	.880	2	.440	1.032	.359
	Within Groups	56.294	132	.426		
	Total	57.174	134			
SRSI-SR: Managing Environment and Behavior	Between Groups	.073	2	.037	.059	.943
	Within Groups	81.894	132	.620		
	Total	81.967	134			
SRSI-SR: Seeking and Learning Information	Between Groups	.423	2	.211	.304	.738
	Within Groups	91.824	132	.696		
	Total	92.247	134			
SRSI-TRS: Teacher Rating Scale	Between Groups	13.921	2	6.960	12.747*	.000
	Within Groups	54.059	99	.546		
	Total	67.980	101			
Perceived Responsibility (PRS)	Between Groups	.156	2	.078	.145	.865
	Within Groups	70.841	132	.537		
	Total	70.997	134			

Note. $*p < 0.001$. SRSI-TRS: $n = 102$; SRSI-SR, PRS, SMES: $n = 135$. ANOVA = univariate analysis of variance

Research Question 3: Are there statistically significant differences in self-regulated learning and motivation beliefs among students of similar achievement levels (i.e., high or low) across the different types of ability groups (i.e., gifted, advanced, average)?

During the development of this study, I was interested in conducting a 2 x 3 ANOVA to address the third research question. The part of this analysis would have been to examine the interaction effect between achievement and giftedness. In other words, to determine whether ability group differences in self-regulation and motivation beliefs were consistent across levels of

achievement (i.e., high and low). However, after completing the data collection phase, it became apparent that there were a very small number of students who received final math grades of C or lower for most groups, with no low achievers for the gifted group. Given that the low achieving gifted student cell in the 2 x 3 matrix would have been zero, it was not possible to run a 2 x 3 ANOVA.

Because there was a sizable group of high achieving students available across ability groups, the analyses conducted for this study aimed to answer a modified research question: Are there statistically significant differences among high achieving students (i.e., students with an A- or higher) across different ability groups (i.e., gifted, advanced, average) in terms of self-regulated learning and motivation beliefs? Although this question was somewhat similar to Research Question 2, the analyses for the Research Question 3 only included high achieving students; that is, all non-high achieving students were eliminated from the analysis. In this way, both achievement and ability groupings were still being examined. An ANOVA was conducted using this high achieving sample across the ability groups of gifted, advanced, and average. Table 9 summarizes the descriptive statistics (i.e., mean, standard deviation) associated with the groups used in the analyses.

Table 9

Scale Means and Standard Deviations of High Achieving Students by Ability Level

Measure	Average (n = 10)		Advanced (n = 33)		Gifted (n = 28)		Total (n = 71)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Self-Efficacy (SMES)	3.900	0.886	4.082	0.603	4.395	0.512	4.180	0.634
SRSI-SR: Maladaptive Regulatory Behaviors	4.150	0.721	4.402	0.548	4.439	0.410	4.381	0.527
SRSI-SR: Managing Environment and Behavior	3.852	0.690	3.796	0.737	3.801	0.733	3.806	0.719
SRSI-SR: Seeking and Learning Information	3.763	0.523	3.698	0.846	3.798	0.817	3.747	0.789
SRSI-TRS: Teacher Rating Scale[a]	3.096	0.580	4.065	0.531	4.072	0.621	4.006	0.613
Perceived Responsibility (PRS)	4.720	0.637	4.617	0.694	4.743	0.830	4.681	0.736

Note. [a] SRSI-TRS: Average (n = 4), Advanced (n = 32), Gifted (n = 27), Total (n = 63).

Levene's test was again used to evaluate the homogeneity of variance across each of the dependent measures. Statistical significance was found for measures of self-efficacy (Levene's F = 3.402, p = .039) and maladaptive regulatory behaviors (Levene's F = 3.280, p = .044) indicating the equality of variance was violated. Table 10 presented below summarizes the results of the ANOVAs. Due to the significant Levene's statistic, the Welch statistic was calculated for self-efficacy (F(2, 22.768) = .3.047, p = .067) and maladaptive regulatory behaviors (F(2, 22.884) = .700, p = .507; Gamst & Meyers, 2008; Meyers, Gamst, & Guarino, 2009). These tests were not found to be significant. The results of the ANOVA indicated statistical significance with respect to teacher ratings of self-regulation (SRSI-TRS) (F(2, 60) = 5.365, p = .007, η^2 = .152). Post-hoc tests were also conducted for the SRSI-TRS variable using Tukey's HSD. Results of this test found significant differences between the average category and

both the advanced and the gifted categories. Specifically, the average category had a significantly lower mean ($M = 3.096$) than both the advanced ($M = 4.065$) and gifted categories ($M = 4.072$). There was not a significant difference between the means of the gifted and advanced groups.

Table 10

ANOVA for SRL and Motivation Beliefs by High Achieving Students Across Ability Level

Measure	Source	*SS*	*df*	*MS*	*F*	*p*
Self-Efficacy (SMES)[a]	Between Groups	2.392	2	1.196	3.047	.067
	Within Groups	25.775	68	.379		
	Total	28.167	70			
SRSI-SR: Maladaptive Regulatory Behaviors[a]	Between Groups	.641	2	.320	.700	.507
	Within Groups	18.839	68	.277		
	Total	19.480	70			
SRSI-SR: Managing Environment and Behavior	Between Groups	.025	2	.012	.023	.977
	Within Groups	36.148	68	.532		
	Total	36.173	70			
SRSI-SR: Seeking and Learning Information	Between Groups	.156	2	.078	.122	.885
	Within Groups	43.388	68	.638		
	Total	43.544	70			
SRSI-TRS: Teacher Rating Scale	Between Groups	3.538	2	1.769	5.365**	.007
	Within Groups	19.787	60	.330		
	Total	23.325	62			
Perceived Responsibility (PRS)	Between Groups	.256	2	.128	.231	.795
	Within Groups	37.664	68	.554		
	Total	37.920	70			

Note. *$p < 0.05$. **$p < 0.01$. SRSI-TRS: $n = 102$; SRSI-SR, PRS, SMES: $n = 135$. ANOVA = univariate analysis of variance.

[a] Welch's statistic was reported due to unequal variances as determined by Levene's test.

Discussion

The key purpose of this dissertation was to examine the relationships among self-regulated learning, motivation beliefs (i.e., perceived responsibility, self-efficacy), mathematics achievement, and ability groupings. To better understand these relationships, group differences in SRL and motivation across achievement (i.e., high achievers, low achievers) and ability groups (i.e., gifted, advanced, average) as determined by class track, were examined within a population of middle school students. This study was important for several reasons. First, it expanded upon the literature regarding gifted students and SRL. Prior research has comprehensively examined the relationship between SRL and academic achievement (McClelland & Cameron, 2011; Ruban & Reis, 2006; Zimmerman & Martinez-Pons, 1986), as well as the relationship between SRL and high ability students, such as gifted youth (McCoach & Seigle, 2003; VanBoxtel & Monks, 1992). However, the current dissertation attempted to further differentiate ability groups by examining SRL and motivation beliefs across groups of gifted, advanced, and average students. Second, this study included multiple measures of student SRL, using self-reports and teacher ratings, which provided a more comprehensive assessment of student self-regulation. Finally, because some research has shown that adaptive and maladaptive SRL processes may have different predictive influences on achievement, I elected to include measures to target both types of SRL behaviors.

In general, the results were mixed across the three research questions. Significant group differences were found between high and low achieving groups in terms of maladaptive regulatory behaviors and self-efficacy, and also in teacher reported adaptive SRL. There were also significant differences between ability groups, but only in regard to teacher reported SRL. In the following sections, I will discuss and interpret these observed findings relative to the

extant literature base. In addition, I will discuss a variety of limitations of this study and will offer several implications for future research and practice.

Achievement Group Differences in SRL and Motivation Beliefs

The first research question examined achievement group differences in SRL and motivation beliefs. Although prior research has demonstrated a clear relationship between academic achievement and SRL (McClelland & Cameron, 2011; Ruban & Reis, 2006; Zimmerman & Martinez-Pons, 1986), this research question was important to confirm prior findings and also to explore whether these findings held true when different types of SRL measures were employed. Similarly, self-efficacy and perceived responsibility have been connected to both SRL and to academic achievement (Lynch, 2010; Sadi & Uyar, 2013; Schunk & Ertmer, 2000; Zimmerman & Bandura, 1994). Again, the current analyses attempted to confirm prior relationships between achievement and these motivation beliefs. Further, as the research directly examining the relationship between perceived responsibility and achievement is limited, this analysis was important.

Adaptive and maladaptive self-regulated strategy use. To examine the relation between achievement and SRL, the sample was dichotomized into a high and low achieving group by removing the group of B+ students. While methodological procedure may have reduced power, it also allowed for a more definitive separation between the achievement groups, which was important given the conceptual interest in comparing high and low achievers. In terms of the group differences, results of the independent-samples *t*-test indicated that the high achieving group reported exhibiting significantly fewer maladaptive regulatory behaviors than the low achieving group. In addition, the high achievement group exhibited significantly higher adaptive regulation scores as compared with the low achievement group, but only when teacher ratings

were used. When students were asked to self-report their use of adaptive SRL strategies, no significant achievement group differences emerged.

In addition to the independent *t*-test, correlation analyses were also calculated to determine whether using the entire continuum of achievement led to similar results. In short, the correlation analyses revealed an identical pattern as the independent *t*-tests. No significant relationships between achievement and student self-reported adaptive SRL strategy use were observed. However, student reported maladaptive regulatory behaviors and teacher ratings of student SRL were significantly related to achievement. More specifically, students who earned high grades in mathematics were reported by their teachers to exhibit higher rates of adaptive SRL behaviors and self-reported less maladaptive regulatory behaviors when performing mathematics work on their own.

Collectively, these findings support the hypothesis and prior research showing that achievement and SRL are related and thus high achieving students tend to be more regulated (Cleary & Chen, 2009; McClelland & Cameron, 2011; Ruban & Reis, 2006; Yumusak, Sungur, & Cakiroglu, 2007; Zimmerman & Martinez-Pons, 1986). For example, one study examining tenth grade students' strategy use demonstrated that several SRL processes contributed significantly to the prediction of their achievement scores (Yumusak et al., 2007). Further, although research specifically examining maladaptive SRL is much more limited, the current study supports emerging trends indicating that high achieving students tend to exhibit less frequent maladaptive behaviors and strategies than low achieving students (Cleary, 2006; Cleary & Chen, 2009). For example, Cleary and Chen (2009) examined grade level, achievement group, and math-course-type differences in student self-regulation and motivation within a sample of

suburban middle school students. The study found that high achievers in the seventh grade utilized less maladaptive regulatory behaviors than their low achieving peers.

However, as previously mentioned, the results of the first research question were mixed within the current study. Group differences were noted for student self-reported measures of maladaptive SRL and teacher reports of adaptive SRL, but not for student self-reported adaptive SRL behaviors. It is unclear why the adaptive SRL processes as reported by students were not found to be significantly correlated with achievement or to reliably differentiate achievement groups (i.e., high and low achievers), particularly because prior research has demonstrated that high achieving students frequently use adaptive strategies, such as help seeking and time management, to help them in their learning (Karabenick & Berger, 2013; Zimmerman & Martinez-Pons, 1988). This finding may have been impacted by the nature of the sample of students used within the current study, which consisted mainly of higher achieving students. Given the limited number of low achievers, and the lack of students who received very low grades such as a D or an F, it is possible that all students viewed themselves as achievers and thus rated themselves more highly in terms of adaptive SRL strategies. This is in contrast to prior studies, which have used samples with a greater number of low achieving students or a wider range of achievement within the sample (Cleary, 2006; Cleary & Chen, 2009).

The hypothesis that high achieving students would report using greater adaptive SRL strategies than their low achieving peers was based on prior research. However, it is possible that differences between the current study and previous literature may explain the lack of significant findings in terms of self-reported adaptive SRL differences between achievement groups. For example, a number of the studies demonstrating differences in SRL and achievement, as indicated by self-report or interview, utilized an older population sample (Cleary, 2006; Cleary

& Callan, 2014; Ruban & Reis, 2006; Yumusak et al., 2007; Zimmerman & Martinez-Pons, 1986). Many of these studies examined self-regulation within a sample of high school or older middle school populations, while the current study utilized a slightly younger sample. Because young children may not be as accurate in their self-assessments as older students (Blatchford, 1997; Butler, 1990; Ross, 2006), it is possible that the self-reports of the current sample, which included fifth graders who are typically considered elementary school students, did not differentiate achievement groups in terms of high and low achievers as clearly.

When discussing the age of the current sample, it is also possible to consider that the regulatory demands placed on fifth and sixth grade students are less intensive than in higher grades. More specifically, these students may be required to use adaptive regulatory strategies less frequently than older students, as teachers may still be involved in supporting and assisting fifth and sixth graders with their learning. As students are not expected to be as self-regulated, they may not have as many opportunities to develop and practice the use of these skills. As a result, the use of regulatory behaviors in the classroom may be lessened for all students in these grades, and thus not be rated differently among groups of high and low achieving students. This is supported by prior research that has shown achievement groups of seventh grade students, but not sixth grade students, to significantly differ in terms of regulatory behaviors (Cleary & Chen, 2009).

Another possible explanation for the lack of significant findings between self-reported adaptive SRL and achievement is that most measures of SRL used in prior research, such as the Self-Regulated Learning Interview Schedule (SRLIS; Zimmerman & Martinez-Pons, 1986), Patterns of Adaptive Learning Survey (PALS; Midgley et al., 1997), Learning Strategies and Study Skills Survey (LSSS; Ruban & Reis, 1999), Self-Regulated Learning Strategies Scale

(Youlden & Chan, 1994), and the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich & DeGroot, 1990) do not include separate subscales for adaptive and maladaptive behaviors. In the current study, measures of both adaptive and maladaptive behaviors were intentionally used to examine achievement group differences to address the gap in the literature. Further, when conducting the analyses used to address this research question utilizing a composite of both the adaptive and maladaptive regulatory self-report measures, the overall composite scale for SRL demonstrated significant correlations with achievement and significant group differences between high and low achievers. If I had elected to report these findings, instead of separating the adaptive and maladaptive factors, the results would have more closely aligned with findings from studies that reported relationships between achievement and self-regulation without specifying the differences between adaptive and maladaptive SRL strategy use.

It is also important to consider why self-reported maladaptive regulatory behaviors differentiated achievement groups while self-reports of adaptive strategy use did not. Recent research has demonstrated similar findings. For example, results from a study conducted by Cleary and Callan (2014) also found that student reported maladaptive behaviors, but not their reported adaptive regulatory behaviors, were predictive of mathematics achievement; again, similar to the patterns of results observed in this dissertation. Chen, Cleary, and Liu (in press) also demonstrated that ratings of maladaptive regulatory behaviors reliably predicted students' achievement in their mathematics course. These findings demonstrate that there is emerging evidence that reports of maladaptive behaviors may be more robust predictors of achievement than adaptive self-reports. It is also possible that the sample used in the current study were more aware of their avoidance of maladaptive behaviors (e.g., I lose important dittos/worksheets that I

need to study) and less aware of their adaptive behaviors (e.g., I use my class notes to study), given the negative nature of the maladaptive survey items. Further, it is possible that both of the achievement groups within the current study utilized adaptive behaviors in a similar manner; thereby the differences in use of maladaptive strategies were a better indicator of achievement status within the current sample.

Although self-reported adaptive SRL strategies were not found to significantly differentiate achievement groups, teacher reports of adaptive SRL did differ between groups of high and low achievers. Prior research has shown teacher ratings of student self-regulation to be a significant predictor of mathematics achievement (Cleary & Callan, 2014). For example, Cleary and Callan (2014) found that teacher ratings emerged as the key SRL predictors of student mathematics achievement, which paralleled the findings in the dissertation. Further, this research has suggested that outside ratings of student SRL (e.g., teacher, parent) are often better predictors of achievement than student reported SRL (Chen et al., in press; Cleary & Callan, 2014), which aligns with research that has demonstrated that parents and teachers tend to be more accurate sources of students' externalizing behaviors than students (Gould & Shaffer, 1985; Kamphaus & Frick, 2002). Collectively, this research demonstrates the value of utilizing multiple sources of data to assess student SRL. While the differentiation in high and low achievers use of self-regulatory strategies as reported by teachers cannot suggest the accuracy of teacher ratings, it does demonstrate that teachers are aware of the regulatory strategies being used by their students and believe high achieving students are utilizing SRL strategies more frequently in the classroom than lower achieving peers. Implications of this finding suggest that teachers can play a vital role in identifying students who may benefit from self-regulatory

training and encouraging students to improve upon their regulatory behaviors, which can impact academic achievement.

It is also possible that an explanation of the differences in the relations between achievement and teacher versus self-reported ratings of adaptive self-regulation may be explained by differences in the nature of the rating scales. For example, the self-report measure used in this dissertation focused primarily on academic behaviors outside of the classroom or more internal processes (e.g., homework completion, study behaviors). In contrast, the teacher rating scale is more focused on regulatory behaviors occurring within the classroom setting that are more observable (e.g., asking questions, extra-help attendance). While all of these behaviors pertain to self-regulatory strategies, it is possible that they are measuring slightly different constructs. It is also possible that given the contextualized nature of regulatory behaviors, the fact that the scales assess behaviors occurring in different settings also impacts the similarities between findings using the two measures, as student regulatory behaviors may be differing between the home and school environments. Therefore, a more closely aligned teacher and student rating scale may have produced more similar results in terms of significant group differences.

Motivation beliefs. In addition to examining achievement group differences in student SRL, I also investigated group differences in student motivation beliefs (i.e., self-efficacy, perceived responsibility). In terms of self-efficacy, statistically significant group differences emerged with the high achievement group reporting higher ratings of self-efficacy than the low achieving student group. Additionally, correlations were significant between the students' final math class grade and self-efficacy. This relationship between self-efficacy and academic achievement is not surprising given the large volume of research showing similar results

(Pajares, 2002; Sadi & Uyar, 2013; Schunk & Ertmer, 2000). However, relatively few studies have examined achievement group differences in terms of students' perceived responsibility. Interestingly, results indicated no relationship between perceived responsibility and achievement. This finding was surprising, given that prior research has suggested that students who take responsibility for academic behaviors and understand what is expected of them can influence achievement through positive interactions with teachers and peers and enhance their learning process (Wentzel, 1991; Zimmerman & Kistansis, 2005). This lack of an observed relationship between perceived responsibility and achievement might be explained in several ways. The most likely explanation is the poor reliability of the scale (α = .56) in the current study. An abbreviated measure of perceived responsibility was used in this study and thus it appears that administering a longer form may have improved reliability given that the number of items on a measure impacts internal consistency (Meyers et al., 2006). Due to the low reliability of this measure, findings related to perceived responsibility within the current study do not appear to be valid.

It is also possible that the ratings were impacted by the age of the respondents. During the early middle school years, students shift from being assisted with regulatory behaviors by their teachers or parents to more independent regulation (Cleary & Chen, 2009). Other studies that have targeted students' perceptions of responsibility sampled students who were in later middle school years or older (Pajares, 2006; Zimmerman & Kistansis, 2005). Thus, it is possible that during this time of transition the delineation between the responsibilities of teachers and students may still be somewhat unclear to students. As a result, the concept of perceived responsibility may be new to students, impacting the way in which they completed these ratings. Further, despite the assurances of confidentiality provided in the introduction of the surveys before administration, as well as administering the surveys to students in their science classroom rather

than their mathematics classroom, students may have been concerned about the privacy of their answers, skewing the honesty with which they provided responses. As this scale specifically asked about the behaviors of teachers, whereas the other rating scales used in the current study focused on student behaviors, students may have been more uncomfortable with the nature of these questions. With limited research in this domain, it would be useful to account for these limitations and continue to examine the relationship between perceived responsibility and achievement to better understand the role of this construct in academic performance.

Ability Group Differences in SRL and Motivation Beliefs

The second research question examined ability group differences (i.e., gifted, advanced, average) in self-regulated learning and motivation beliefs (i.e., perceived responsibility, self-efficacy). Prior research has demonstrated a connection between high ability students, most commonly gifted students, and self-regulated learning. More specifically, research suggests that gifted students utilize self-regulated learning strategies more frequently than their general education peers (Calero et al., 2007; Risemberg & Zimmerman, 1992; Zimmerman & Martinez-Pons, 1990). However, the current study expanded on the type design in the gifted literature by examining gifted, advanced, and average student groups. To date, most of the gifted literature focuses primarily on comparing only gifted students and general education students. To establish these groups, general education students from the target school were divided into advanced and average groups based on class track. As previously discussed, this study also addressed this general question in a unique way because SRL and motivation beliefs were measured using both self-report and teacher report scales and both maladaptive and adaptive SRL strategies were targeted.

Adaptive and maladaptive self-regulated strategy use. In regard to differences between ability groups, ANOVA results revealed no statistically significant group differences across any of the self-reported self-regulation measures. However, statistically significant ability group differences emerged when teacher ratings of student SRL were used. More specifically, students in average class tracks exhibited significantly less frequent SRL behaviors than both the advanced class group and gifted class group. There were no significant differences between the gifted and advanced groups in terms of teacher reported student SRL.

The findings based on student self-reports, were different than anticipated, as it was believed the gifted and advanced groups would report more frequently using adaptive self-regulatory strategies and less frequently using maladaptive strategies than the average ability group. This hypothesis was based on prior research indicating that high ability students tend to be more self-regulated than their average ability peers. As the research examining self-regulation among students of differing ability groups is limited, gifted studies serve as the most applicable point of reference. For example, Zimmerman and Martinez-Pons (1990) used a structured interview with gifted and general education students in the fifth, eighth, and 11th grades about their self-regulated learning strategies. Results indicated that gifted students made better use of several SRL strategies than did regular students, such as organizing and transforming, self-consequating, seeking peer assistance, and reviewing notes. There were no strategies that general education students used significantly more than gifted students. In a separate study, a computerized task was used to measure self-regulation in gifted and average ability children (Calero et al., 2007). Results showed that gifted children had better self-regulatory abilities, determined by response patterns on the computerized program, than a comparable group of non-gifted children.

This literature supports the argument that gifted students tend to exhibit greater self-regulation than non-gifted peers, explaining the predicted hypothesis in the current dissertation. However, these studies along with other research examining regulatory differences among gifted students (Calero et al., 2007; Scruggs & Cohn, 1983; Scruggs & Mastropieri, 1985) have used procedures other than self-report measures (e.g., structured interviews, computerized tasks). While self-report questionnaires have traditionally been the most widely used SRL measure (Cleary & Callan, 2014), and have also been used in studies examining gifted achievement levels (Figg et al., 2012; McCoach & Siegle, 2003), it is possible that group ability differences in SRL did not emerge because self-report measures were used in the current study. Interestingly, the fact that teacher ratings of student SRL did reliably differentiate achievement groups is consistent with prior research. Further, given the closer alignment of findings between teacher report measures and the results of prior literature, the importance of teacher ratings is again highlighted as an additional source of information regarding students' learning behaviors.

The small number of students within each ability track group should also be discussed as a potential factor impacting the results. When sample sizes are small, the resulting power of a statistical test to detect differences is lessened. A power analysis indicated that the number of students included in the current study were enough to only detect a large effect, not a medium or small effect. In this study, a large effect was found for the TRS variable ($\eta^2 = .205$), which is perhaps why this difference emerged as statistically significant. Finally, because many of the observed effect sizes were small to trivial, even if power were increased through a larger sample size, it does not seem likely that significant differences between groups in terms of self-reported SRL would have been found.

The significant difference observed between average and both gifted and advanced class groups in teacher rated self-regulation more closely aligns with the predicted hypotheses regarding ability group differences. As previously discussed, teacher ratings are gaining attention as an important tool to assess student SRL. In addition, given the amount of time and direct interaction teachers have with students, they potentially possess unique and accurate information about student SRL processes (Cleary & Callan, 2014). As was discussed previously, inconsistent findings between the teacher and self-reported ratings of self-regulation may be explained given the dissimilar nature of the rating scales, which asks the rater about different behaviors and contexts. Therefore, these differences in rating scales may explain the varied findings between teacher and self-report measures in regard to both the first and second research question.

It is important to note that differences were not found between teacher ratings of SRL for the advanced and gifted groups. While prior research has indicated that gifted students differ from general education students (Calero et al., 2007; Risemberg & Zimmerman, 1992; Zimmerman & Martinez-Pons, 1990) and from their low achieving counterparts (Berkowitz & Cicchelli, 2004; Jovanović et al., 2010; McCoach & Siegle, 2003) in terms of SRL, very few studies have attempted to differentiate several types of ability groups (i.e., gifted, advanced, average). The lack of significance between the advanced and gifted students suggests that these two groups are highly similar to one another in terms of their SRL strategy use. This finding makes sense as both the gifted and advanced courses are more rigorous than the average courses, and thus both groups of students may need similar skills to successfully perform in these accelerated tracks. Further, given the demands of these classes, it is possible that gifted and advanced students are expected to use regulatory skills more frequently than their average peers in order to meet the requirements of their classes. Thus, as a result of being expected to be more

self-regulated in their learning, they utilize SRL strategies more frequently and have greater opportunities to practice and develop these skills. This aligns with results from prior research demonstrating that self-regulatory strategy use and motivation processes were more closely related to student achievement in more intensive academic settings than in regular math courses (Cleary & Chen, 2009).

It is also important to consider that the lack of significant differences among these groups could have been impacted by the way giftedness was defined in the current study in comparison to how it has been defined in prior research. For example, many previous studies have used intelligence testing as a way to identify ability groups (Figg et al., 2012; McCoach & Siegel, 2003; Peterson & Colangelo, 1996; Rubenstein et al., 2012). These studies utilized scores on measures such as the Wechsler Intelligence Scale for Children or Otis-Lennon School Ability Test to place students into ability groupings. While the current study followed an identification procedure supported through the giftedness literature to identify this, and other, ability groupings, it is possible that these groups less closely aligned with the groups of gifted students used in previous studies. Therefore, it is possible teachers were not truly differentiating between gifted and advanced students and the high ability groups were more similar with one another, or more closely aligned with achievement groupings than prior studies.

Motivation beliefs. When examining motivation belief differences across ability groups, ANOVA results revealed no statistically significant group differences for self-efficacy or perceived responsibility. Again, this finding did not align with the initial hypotheses that were developed based on prior research. For example, prior research with gifted students showed that gifted students displayed significantly higher verbal efficacy and mathematical efficacy when compared to non-gifted peers (Zimmerman & Martinez-Pons, 1990). This finding has been

supported through additional research demonstrating that gifted students have reported higher mathematics self-efficacy and self-efficacy for regulated learning (Ewers & Wood, 1993; Pajares, 1996). In terms of perceived responsibility, minimal research examining this construct among students of various ability levels exists, making it difficult to compare results to prior literature. However, given the relationship between perceived responsibility, SRL, and self-efficacy, it was believed high ability students would assume more responsibility for academic tasks than students in the average group. As was previously mentioned, the findings related to the perceived responsibility scale should not be interpreted given the low reliability of the measure within the current study.

It is also possible that these hypotheses were not confirmed because the current study differed in several ways from prior research. For example, many of the studies examining self-efficacy of students among differing ability groups have targeted older student populations, with students in high school or late middle school comprising their sample (McCoach & Del Siegle, 2003; Pajares, 1996; Zimmerman & Martinez-Pons, 1990). In a study comparing gifted and non-gifted students, Zimmerman and Martinez-Pons (1990) indicated that student's self-efficacy increased with age, with 11th grade students reporting greater self-efficacy than eighth graders, and eighth graders demonstrating greater self-efficacy than fifth graders. The current study sample consisted of fifth and sixth grade students. Therefore, it is possible that self-efficacy beliefs may increase or become more differentiated among students with age, and thus differences in self-efficacy found among various ability groups in prior research do not align with the current results.

Differences in SRL and Motivation Beliefs Among High Achievement Ability Groups

The third research question sought to examine differences in student SRL and motivation beliefs across both achievement and ability groups. As was discussed previously (see Results), the first two research questions examined the main effects of achievement (Research Question 1) and ability group (Research Question 2), respectively, while the third question addressed the interaction between achievement and ability groups across the motivation and SRL variables. However, the lack of availability of low achieving students in the high ability group (i.e., gifted) made it impossible to examine the interaction between achievement and ability; that is to compare differences between high and low achievement groups across ability levels. Based on prior conversation with school administrators, it was believed that a population of low achieving, high ability students existed. Unfortunately, once final class grades were assigned it became evident that class grades on the lower end of the spectrum were not assigned for this population. Because the low achieving, high ability group was unavailable, I modified the focus of the final research question to pertain specifically to ability group differences within a sample of high achieving students. Thus, the third research question was similar to the second research question because it examined ability group (i.e., gifted, advanced, average) differences in SRL and motivation beliefs; however, it was different because the analyses only included students who were high achieving.

Adaptive and maladaptive self-regulated strategy use. Results of the analyses conducted for the third research question were identical to the findings observed for the second research question. That is, significant group differences were found for teacher ratings of self-regulation, with scores differing between students in the average category and students in both

the advanced and gifted group. There were no significant differences in student self-reported adaptive or maladaptive self-regulatory strategy use.

As was discussed in the second research question, high achieving students in the gifted and advanced track classes did not differ significantly in terms of teacher rated self-regulation. This finding makes sense in light of prior research that demonstrated that SRL and motivation processes more consistently differentiated the achievement groups in advanced ability classes than in regular math courses (Cleary & Chen, 2009). The findings also support the premise that, even among a homogenous group of students, such as high achieving students, ability groups still differ in terms of teacher reported adaptive self-regulation. This suggests that regardless of achievement level, average students exhibit significantly less SRL strategies during mathematics instruction than their high ability peers. Thus, even though high achieving students in regular education classes perform well in school, they may still benefit from SRL training or assessments, particularly in situations when they are expected to work independently or learn new skills or concepts. These students should not be overlooked due to their high achievement status. More specifically, the demands of school shift and evolve throughout development. Even after graduation from high school or college, young adults must learn many important skills informally, either for careers or for personal interest, by observing others and practicing independently (Zimmerman, 2002). Thus, even though students may be achieving at a high level in middle school (e.g., fifth and sixth grade) it does not mean that they will sustain that level of performance when academic expectations and self-directed assignments are increased. As we know that SRL is not a skill students either possess or lack, but instead must be selectively used and applied to each new learning task, students can continue to practice and improve upon these skills and strategies (Zimmerman, 2002). Therefore, allowing high achieving average students to

continue to enhance their regulatory skills will allow them to be successful in new contexts and in situations with more challenging expectations and will help them to remain competitive with high ability students who may be utilizing regulatory strategies more frequently.

Motivation beliefs. Results of the ANOVA used to answer the third research question were identical to findings from the second research question, and did not indicate significant differences between groups in terms of self-efficacy or perceived responsibility. While the findings align with the initial hypothesis that students of the same achievement group would not significantly differ in terms of motivation beliefs, given the unavailability of low achieving gifted students, it was not possible to draw conclusions about an interaction between ability and achievement across motivation belief variables.

Limitations and Areas for Future Research

There are several limitations in this study that warrant discussion. Firstly, recruiting participants from a single school within a single geographic location limits the ability to generalize findings to other adolescent populations. More specifically, the sample primarily consisted of students who identified as Caucasian/White. Furthermore, the sample may not represent students from low socioeconomic status as only 5.2% of the sample received reduced or free lunch. Therefore this population may not represent more broad populations or those of ethnic or economic minority groups.

In addition, the sample used within the study greatly impacted the findings of the study. While 135 students consented to participate in the study, the number of participants in each ability group was varied and somewhat limited. Furthermore, as the sample was split into groups to identify achievement levels, a larger sample would have increased the number of students within these comparison groups, and especially within the group of gifted low achievers. It is

unclear why this group of students was not more accessible. Based on conversations with school administrators, it was believed that there were a relatively large number of high ability students who were not achieving to their potential. However, once the data was collected it was clear that high ability students within the study sample did not receive grades below a B+. In fact, the final math grades of all students in the fifth and sixth grade were obtained to determine if this group of students was present in the school. The final math class grades demonstrated a limited amount of low achieving students in both the gifted and advanced class tracks. While students in average and skills tracks received a wider range of grades, the majority of students received a B- or higher.

Although speculative, there are a few reasons why grades may have been distributed in this way. It is possible that the grades assigned to students within the school are more greatly skewed toward the higher end of the spectrum, with lower grades being given less frequently. According to the school's most recent state report card for 2013-2014, the school's academic performance is high when compared to schools across the state. Thus it is possible that most of the students who participated were higher achieving students, and while there were some students who achieved relatively lower or did not place into advanced or gifted classes, these students are still academically successful.

The omission of low achieving students within the gifted population prevented me from examining for potential interaction effects between achievement and ability groups. This is unfortunate because this dissertation initially intended to examine group differences across achievement and ability levels as an interaction, investigating patterns of SRL and motivation beliefs in high and low achievers, regardless of ability status. As prior studies have not compared the self-regulation of high and low achievers of both gifted and other differentiated ability levels,

it is unclear if all achievers and underachievers use similar patterns of SRL regardless of their ability level or if ability continues to differentiate students in terms of their regulatory behaviors. Therefore, this line of inquiry would add to the existent literature by examining patterns of SRL and motivation beliefs. For example, if all underachieving students, regardless of ability, demonstrate more limited SRL than their high achieving peers, it would suggest the importance of SRL in allowing students to achieve to their full potential and suggest the need for identification and intervention for all underachieving students.

The identification procedures utilized within the current study may also be limiting in terms of defining and distinguishing between ability and achievement groups. The procedures used in the current study are indicative of how ability and achievement are measured and conceptualized within real world school settings. This type of identification was the only feasible means of identifying the needed groups, specifically gifted students, within the school and the only readily accessible information from the participating district. In terms of identifying ability groups, the multi-criterion approach utilized within the district and the current study is supported through the gifted literature. However, using traditional intelligence testing would allow for a more definitive conceptualization of ability groups. For example, researchers should select students of various ability levels based on factors such as IQ. In terms of achievement level identification, groups should be determined by student's academic performance, using measures like achievement testing or cumulative GPA, whereas the current study used final class grades to differentiate achievement groups. Defining groups in this way would provide a clearer distinction between ability and achievement. This would allow for more definitive conclusions to be drawn from the results.

It is also essential for future research to ensure that the population of both high and low achievers is present within each ability group in order to be able to draw more accurate conclusions about the SRL strategies being utilized across groups, and further explore the research questions and hypotheses posed within the current study. While gifted students served as an ideal population to explore in more detail, given the common identification practices as an "ability group" within schools, as well as the extensive research on this population and SRL, continuing to expand research into other ability levels will provide more nuanced information regarding the relationship between a student's ability and their use of self-regulated learning strategies and behaviors. While the ability group differences found in the current study were interpreted and potential implications of these findings were discussed, it would be beneficial for future studies to replicate the differences found in ability groups through teacher report measures to conclude if the pattern demonstrated is accurate.

The low reliability of the Perceived Responsibility Scale (PRS) is another limitation of the current study. It is highly probable that the low internal consistency reliability was due to the shortened form of the scale that was administered. This issue suggests that the scale may not have produced a consistent measurement within the current sample. Therefore, it is probable that the ratings of perceived responsibility used within the current study are not valid, and thus should not be interpreted or used to draw conclusions regarding the relationship of perceived responsibility to academic achievement or ability levels of students. However, given the theoretical value of this construct and similar processes (e.g., attributions, perceived control) to the motivation and achievement of students, it should continue to be investigated. The longer version of this scale should be utilized in future research to guard against potential issues with reliability of the measure. In addition, as this scale was originally developed for and used with

populations of high school students (Zimmerman & Kistansis, 2005), the current study served as a downward extension of the measure, assessing younger children. Therefore, the appropriateness of the scale for use with young student populations should be explored, and if necessary adapted, to better assess middle school students before being used in future research.

Furthermore, the SRSI-SR and SRSI-TRS both target student SRL. However, these measures use questions pertaining to different contexts and behaviors. For example, the self-report form asks students to think about behaviors related to homework and studying, while the teacher report form asks teachers about student SRL behavior in the classroom. This is an important point given that prior research has shown that students demonstrate different self-regulatory behaviors in different contexts (Cleary & Chen, 2009; Hadwin, Winnie, Stockley, Nesbit, & Woszczyna, 2001; Wolters & Pintrich, 1998). Therefore, future research should aim to more closely align the questions and contexts that are included on the SRSI-SR and SRSI-TRS as this will allow for more accurate interpretations regarding whether student self-reports or teacher ratings are most predictive of student performance.

Finally, although the inclusion of teacher reports was a strength of the current study because it allowed for a more comprehensive view of student's regulatory strategy use, it is possible that some teachers provided biased responses; that is, they gave higher ratings to students who were performing better in the class. While this latter concern is minimal compared to the benefits of including a multi-source assessment approach to student SRL, it may be valuable for future research to include other forms of self-regulation assessment, such as systematic observations, personal diaries, and microanalytic assessment protocols (Cleary et al., 2008; Perry, 1998; Schmitz & Wiese, 2006). Utilizing a multi-dimensional assessment approach can help ascertain whether teacher ratings and student questionnaires are more accurate and to

resolve other discrepancies noted between these two forms of assessment (Cleary & Callan, 2014). Given the support for using multi-source data to corroborate self-reports (Chen et al., in press; Cleary & Callan, 2014; Sattler, 2008), it is essential that future research continue to use various sources in evaluating and examining student self-regulation and motivation beliefs.

Implications for Practice

The findings from this dissertation also hold implications for the practice of school psychologists and other school personnel. As the study did not investigate causal links, however, the implications discussed should be interpreted with caution. Primarily, this study suggests the usefulness of teachers in assessing student SRL, especially in young student populations. The findings of ability and achievement group differences in SRL were shown to differ between teacher and student report. This finding may have been impacted by the age of the students utilized in the current study (i.e., fifth and sixth graders), which are typically considered elementary, or early middle school grades. Many of the student reported differences in self-regulation and motivation beliefs found in the prior literature, which were used to support hypotheses made within the current study, sampled an older student population (Berkowitz & Cicchelli, 2004; Boxtel & Monks, 1992; Cleary, 2006; Colangelo et al., 1993; Hoffman & Spatariu, 2008; McCoach & Del Siegle, 2003; Pajares, 1996; Sadi & Uyar, 2013; Wolters & Pintrich, 1998; Zimmerman & Kitsantas, 2005; Zimmerman & Martinez-Pons, 1986). In addition, some of the processes examined within the study, such as self-efficacy, have been shown to improve with age (Zimmerman & Kistansis, 2005). Further, prior literature on self-assessment as a broader topic, has suggested that young children may over-estimate their abilities during self-assessment and that self-teacher agreement increased with age or with student instruction in how to specifically assess their work or skills (Ross, 2006). While these results do

not speak to the accuracy of these types of assessment (i.e., self-report, teacher report), the use of teacher ratings may prove as a better predictor of student outcomes. Therefore, it is suggested that teachers continue to be utilized as a source for SRL and motivation belief assessment.

Findings from the current study also showed that self-efficacy differentiates high and low achievers. While these findings do not imply that higher self-efficacy causes higher achievement, it has been suggested that classroom teachers should attempt to increase student self-efficacy through their instructional practices (Schunk, 1991; Schunk & Zimmerman, 2007). More specifically, studies have suggested that teaching students to use strategies through modeling raises both self-efficacy and achievement (Pajares & Miller, 1994; Randhawa, Beamer, & Lundberg, 1993; Schunk, 2003; Schunk & Gunn, 1985; Schunk & Zimmerman, 2007). Therefore, it is suggested that classroom teachers continue to utilize techniques that would support the self-efficacy of students such as teaching the use of specific strategies, providing specific and accurate feedback, remaining aware of student attributions, and modeling the correct completion of academic tasks (Schunk, 1991). Further, school psychologists should assess students' beliefs about their academic capabilities as important predictors of academic performance (Pajares, 1996).

Given the group differences between high and low achievers in terms of self-reported maladaptive SRL and teacher reported adaptive SRL, the benefit of SRL assessment and instruction for low achievers is supported. This claim is consistent with previous research that has demonstrated the connection between SRL and achievement, even among the high ability group of gifted students (Abu-Hamour & Al-Hmouz, 2013; Berkowitz & Cicchelli, 2004; Jovanović et al., 2010; McCoach & Siegle, 2003; VanBoxtel & Monks, 1992). Given these findings, school psychologists should continue to identify low achieving students within their

school community and consider SRL assessment as a way to identify students who may benefit from strategy instruction to improve their academic performance.

Further, the current study also suggests that high achieving, average students may use SRL strategies less frequently than their high ability peers, as reported by their teachers. While these students are high achieving for their ability level, this suggests that there may be further opportunity for average students to advance their self-regulatory skills and thus potentially improve their academic performance. This would be important because as students progress through middle school and high school they face increased expectations for academic productivity, more intensive and teacher-directed instruction, and are often called upon to complete more comprehensive assignments requiring self-directed behaviors outside of school (Cleary & Chen, 2008). Self-regulatory strategies continue to assist individuals even after high school when learning skills needed for college, careers, or personal interests (Zimmerman, 2002). However, further investigation and replication of the differences in SRL among specific ability groups, including various groups within the general education population, is needed to better understand and confirm these relationships and the implications of such findings.

Conclusion

The current study expanded upon the existing literature base by investigating SRL behaviors and motivation beliefs in relation to both achievement (i.e., high and low) and ability (i.e., gifted, advanced, average) in a sample of middle school students (i.e., fifth and sixth graders). Results indicated that high achievers reported using less maladaptive regulatory strategies and higher self-efficacy beliefs than their low achieving peers. Teacher reports also indicated significant adaptive SRL differences between achievement groups. Teachers also rated gifted and advanced students as using SRL strategies more frequently than their average peers.

This same finding was true in a sample of high achieving students. Findings from the current study support the relationship between SRL and academic achievement. In addition, results highlight the role of teacher ratings in the assessment of student SRL and motivation beliefs. Future research is needed to confirm the patterns found in ability group differences and to continue to explore SRL in differentiated ability and achievement groups. Through the continued research and use of SRL within the school setting, all students can be taught to achieve to the best of their abilities.

References

Ablard, K. E., & Lipschultz, R. E. (1998). Self-regulated learning in high-achieving students: Relations to advanced reasoning, achievement goals, and gender. *Journal of Educational Psychology*, *90*(1), 94.

Abu-Hamour, B., Al Hmouz, H. (2013). A study of gifted high, moderate, and low achievers in their personal characteristics and attitudes toward school and teachers. *International Journal of Special Education, 28*(3), 5-15.

Archbald, D., Glutting, J., & Qian, X. (2009). Getting into honors or not: an analysis of the relative influence of grades, test scores, and race on track placement in a comprehensive high school. *American Secondary Education*, *37*(2), 65-81.

Bandura, A. (1995). Experience of personal and collective efficacy in changing societies. In A. Bandura (Ed.), *Self-efficacy in changing societies*. New York: Cambridge University Press.

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

Baum, S. M., Renzulli, J. S., & Hebert, T. P. (1995). Reversing underachievement: Creative productivity as a systematic intervention. *Gifted Child Quarterly*, *39*, 224-235.

Berkowitz, E., & Cicchelli, T. (2004). Metacognitive strategy use in reading of gifted high achieving and gifted underachieving middle school students in New York City. *Education and Urban Society*, *37*(1), 37-57.

Blatchford, P. (1997). Students' self-assessment of academic attainment: Accuracy and stability from 7 to 16 years and influence of domain and social comparison group. *Educational Psychology, 17*(3), 345-360.

Bouffard-Bouchard, T., Parent, S., & Larivee, S. (1993). Self-regulation on a concept-formation task among average and gifted students. *Journal of Experimental Child Psychology, 56,* 115-134.

Bricklin, B., & Bricklin, P. M. (1967). *Bright child, poor grades: The psychology of underachievement*. New York: Delacorte Press.

Butler, D. L. (1998). The strategic content learning approach to promoting self-regulated learning: A report of three studies. *Journal of Educational Psychology*, *90*(4), 682.

Butler, R. (1990). The effects of mastery and competitive conditions on self-assessment at different ages. *Child Development, 61*, 201-210.

Butler, D. L., Beckingham, B., & Lauscher, H. J. N. (2005). Promoting strategic learning by eighth-grade students struggling in mathematics: A report of three case studies. *Learning Disabilities Research and Practice, 20*(3), 156-174.

Butler, R., & Marinov-Glassman, D. (1994). The effects of educational placement and grade level on the self-perceptions of low achievers and students with learning disabilities. *Journal of Learning Disabilities*, *27*(5), 325-334.

Calero, M. D., García-Martín, M. B., Jiménez, M. I., Kazen, M., & Araque, A. (2007). Self-regulation advantage for high-IQ children: Findings from a research study. *Learning and Individual Differences*, *17*(4), 328-343.

Carman, C. A. (2013). Comparing apples and oranges: Fifteen years of definitions of giftedness in research. *Journal of Advanced Academics, 24*(1), 52-70.

Chen, P. P., Cleary, T. J., & Lui, A. M. (in press). Examining Parents' Ratings of Middle-School Students' Academic Self-Regulation Using Principal Axis Factoring Analysis. *School Psychology Quarterly.* Advance online publication.

Cleary, T. J. (2006). The development and validation of the self-regulation strategy inventory-self-report. *Journal of School Psychology*, *44*(4), 307-322.

Cleary, T. J. (2011). Professional development needs and practices among educators and school psychologists. *New Directions for Teaching and Learning*, *2011*(126), 77-87.

Cleary, T. J., & Callan, G. L. (2014). Student self-regulated learning in an urban high school: Predictive validity and relations between teacher ratings and student self-reports. *Journal of Psychoeducational Assessment*, *32*, 295-305.

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*(5), 291-314.

Cleary, T. J., & Platten, P. (2013). Examining the Correspondence between Self-Regulated Learning and Academic Achievement: A Case Study Analysis. *Education Research International*, *2013*.

Cleary, T. J., Platten, P., & Nelson, A. (2008). Effectiveness of the self-regulation empowerment program with urban high school students. *Journal of Advanced Academics*, *20*(1), 70-107.

Cleary, T. J., & Zimmerman, B. J. (2004). Self-regulation empowerment program: A school-based program to enhance self-regulated and self-motivated cycles of student learning. *Psychology in the Schools*, *41*(5), 537-550.

Cochran, W. G., & Cox, G. M. (1957). *Experimental Designs*. New York: John Wiley & Sons.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Colangelo, N., Kerr, B., Christensen, P., & Maxey, J. (1993). A comparison of gifted underachievers and gifted high achievers. *Gifted Child Quarterly*, *37*(4), 155-160.

Dembo, M. H., & Eaton, M. J. (2000). Self-regulation of academic learning in middle-level schools. *The Elementary School Journal*, *100,* 473-490.

Diaz, E. I. (1998). Perceived factors influencing the academic underachievement of talented students of Puerto Rican descent. *Gifted Child Quarterly*, *42*(2), 105-122.

Dowdall, C.B., & Colangelo, N. (1982). Underachieving gifted students: Review and implications. *Gifted Child Quarterly*, *26*, 179-184.

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

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

Eccles, J. S., Wigfield, A., Midgley, C., Reuman, D., Iver, D. M., & Feldlaufer, H. (1993). Negative effects of traditional middle schools on students' motivation. *The Elementary School Journal*, *93*(5), 553-574.

Edgar Middle School (2013). *Courses of Study,* Retrieved from http://www.metuchenschools.org

Emerick, L. J. (1992). Academic underachievement among the gifted: Students' perceptions of factors that reverse the pattern. *Gifted Child Quarterly*, *36*(3), 140-146.

Ewers, C. A., & Wood, N. L. (1993). Sex and ability differences in children's math self-efficacy and prediction accuracy. *Learning and Individual Differences, 5,* 259-267.

Fan, X., Miller, B. C., Park, K. E., Winward, B. W., Christensen, M., Grotevant, H. D., & Tai, R. H. (2006). An exploratory study about inaccuracy and invalidity in adolescent self-report surveys. *Field Methods*, *18*(3), 223-244.

Figg, S. D., Rogers, K. B., McCormick, J., & Low, R. (2012). Differentiating low performance of the gifted learner achieving, underachieving, and selective consuming students. *Journal of Advanced Academics*, *23*(1), 53-71.

Firmin, M. W., Proemmel, E., & Chi-en, H. (2005). A comparison of parent and teacher ratings of children's behaviors. *Educational Research Quarterly*, *29*(2), 18-28.

Gamst, G., Meyers, L. S., & Guarino, A.J. (2008). *Analysis of variance designs: A conceptual and computational approach with SPSS and SAS*. New York: Cambridge University Press.

Gould, M. S., & Shaffer, D. (1985). Correspondence of adolescent and parental reports in a child psychiatry clinic. Paper presented at the meeting of the American Academy of Child Psychiatry. San Antonio, TX.

Graham, S., Harris, K. R., & Mason, L. (2005). Improving the writing performance, knowledge, and self-efficacy of struggling young writers: The effects of self-regulated strategy development. *Contemporary Educational Psychology*, *30*(2), 207-241.

Hadwin, A. F., Winne, P. H., Stockley, D. B., Nesbit, J. C., & Woszczyna, C. (2001). Context moderates students' self-reports about how they study. *Journal of Educational Psychology, 93*, 477-487.

Hallahan, D., Kauffman, J. & Pullen, P. (2012). *Exceptional learners: An introduction to special education*. Boston: Allyn & Bacon.

Hampton, N. Z., & Mason, E. (2003). Learning disabilities, gender, sources of efficacy, self-efficacy beliefs, and academic achievement in high school students. *Journal of School Psychology*, *41*(2), 101-112.

Harris, K. R., & Graham, S. (2011). "An adjective is a word hanging down from a noun": Learning to write and students with learning disabilities. *Annals of dyslexia*, 1-15.

Hoffman, B., & Spatariu, A. (2008). The influence of self-efficacy and metacognitive prompting on math problem-solving efficiency. *Contemporary Educational Psychology*, *33*(4), 875-893.

Jovanović, V., Teovanović, P., Mentus, T., & Petrović, M. (2010). The gifted underachiever in school: A student who has a problem or a 'rebel' making problems? *Psihologija*, *43*(3), 263-279.

Kamphaus, R. W., & Frick, P. J. (2002). *Clinical assessment of child and adolescent personality and behavior*. Boston, MA: Pearson.

Karabenick, S. A., & Berger, J. L. (2013). Help seeking as a self-regulated learning strategy. In H. Bembenutty, T. Cleary, & A. Kitsantas (Eds.), *Applications of self-regulated learning across diverse disciplines: A tribute to Barry J. Zimmerman*. Charlotte, NC: Information Age Publishing.

Lynch, D.J. (2010). Motivational beliefs and learning strategies as predictors of academic performance in college physics. *College Student Journal*, *44*(4), 920-927.

McCall, R. B. (1994). Academic underachievers. *Current Directions in Psychological Science*, *3*(1), 15-19.

McCall, R. B., Evahn, C., & Kratzer, L. (1992). *High school underachievers: What do they achieve as adults?* Sage Publications, Inc.

McClelland, M. M., Acock, A. C., & Morrison, F. J. (2006). The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school. *Early Childhood Research Quarterly*, *21*, 471–490.

McClelland, M. M., & Cameron, C. E. (2011). Self-regulation and academic achievement in elementary school children. In R. M. Lerner, J. V. Lerner, E. P. Bowers, S. Lewin-Bizan, S. Gestsdottir, & J. B. Urban (Eds.), Thriving in childhood and adolescence: The role of self-regulation processes. *New Directions for Child and Adolescent Development*, *133*, 29-44.

McClelland, M. M., Piccinin, A., & Stallings, M. C. (2011). Relations between preschool attention and sociability and later achievement outcomes. Manuscript submitted for publication.

McCoach, D. B., & Siegle, D. (2003). The structure and function of academic self-concept in gifted and general education students. *Roeper Review*, *25*(2), 61-65.

McCoach, D. B., & Siegle, D. (2003). Factors that differentiate underachieving gifted students from high-achieving gifted students. *Gifted Child Quarterly*, *47*(2), 144-154.

Malpass, J. R., O'Neil, H.F., Hocevar, D. (1999). Self-regulation, goal orientation, self-efficacy, worry, and high-stakes math achievement for mathematically gifted high school students. *Roeper Review*, *21*(4), 281-289.

Meyers, L. S., Gamst, G., & Guarino, A. J. (2006). *Applied multivariate research: Design and interpretation*. Sage.

Meyers, L.S., Gamst, G., & Guarino, A.J. (2009). *Data analysis using SAS Enterprise Guide*. Cambridge: Cambridge University Press.

Midgley, C., Maehr, M. L., Hicks, L., Roeser, R., Urdan, T., Anderman, E., Kaplan, A., Arunkumar, R., & Middleton, M. (1997). *Manual for the patterns of adaptive learning survey (PALS)*. Ann Arbor, MI: University of Michigan.

Montague, M. (2007). Self-regulation and mathematics instruction. *Learning Disabilities Research & Practice*, *22*, 75-83.

Morisano, D., & Shore, B. M. (2010). Can personal goal setting tap the potential of the gifted underachiever? *Roeper Review*, *32*(4), 249-258.

Mulryan, C. M. (1992). Student passivity during cooperative small groups in mathematics. *The Journal of Educational Research*, *85*(5), 261-273.

National Association for Gifted Children (2013). Retrieved from http://www.nagc.org/index2.aspx?id=548

National Center for Education Statistics (2013). U.S. Department of Education, Institute of Education Sciences. Retrieved from http://nces.ed.gov/

Neber, H., & Schommer-Aikins, M. (2002). Self-regulated science learning with highly gifted students: The role of cognitive, motivational, epistemological, and environmental variables. *High Ability Studies*, *13*(1), 59-74.

New Jersey Department of Education (2010). Retrieved from http://www.state.nj.us/education/

New Jersey School Report Card (2014). Retrieved from http://www.state.nj.us/education/

Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, *66*(4), 543-578.

Pajares, F. (1996). Self-efficacy beliefs and mathematical problem-solving of gifted students. *Contemporary Educational Psychology, 21,* 325-344.

Pajares, F. (2002). Gender and perceived self-efficacy in self-regulated learning. *Theory Into Practice*, *41*(2), 116-125.

Pajares, F., & Miller, M. D. (1994). Role of self-efficacy and self-concept beliefs in mathematical problem solving: A path analysis. *Journal of Educational Psychology*, *86*(2), 193.

Pajares, F., & Urdan, T. C. (Eds.). (2006). *Self-efficacy beliefs of adolescents*. IAP.

Perry, N. E. (1998). Young children's self-regulated learning and the contexts that promote it. *Journal of Educational Psychology, 90,* 715-729.

Peterson, J. S. (2000). A follow-up study of one group of achievers and underachievers four years after high school graduation. *Roeper Review*, *22*(4), 217-224.

Peterson, J. S. (2001). Successful adults who were once adolescent underachievers. *Gifted Child Quarterly*, *45*(4), 236-250.

Peterson, J. S. (2002). An argument for proactive attention to affective concerns of gifted adolescents. *Prufrock Journal*, *14*(2), 62-70.

Peterson, J. S., & Colangelo, N. (1996). Gifted achievers and underachievers: A comparison of patterns found in school files. *Journal of Counseling & Development*, *74*(4), 399-407.

Pfeiffer, S. I. (2001). Professional psychology and the gifted: Emerging practice opportunities. *Professional Psychology: Research and Practice, 32*, 175-180.

Pintrich, P. R., Anderman, E. M., & Klobukar, C. (1994). Intraindividual differences in motivation and cognition in students with and without learning disabilities. *Journal of Learning Disabilities, 27,* 360-370.

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

Plewis, I. (1991). Underachievement: a case of conceptual confusion. *British Educational Research Journal*, *17*(4), 377-385.

Preckel, F., Holling, H., & Vock, M. (2006). Academic underachievement: Relationship with cognitive motivation, achievement motivation, and conscientiousness. *Psychology in the Schools, 43,* 401-411.

Randhawa, B. S., Beamer, J. E., & Lundberg, I. (1993). Role of mathematics self-efficacy in the structural model of mathematics achievement. *Journal of Educational Psychology*, *85*(1), 41.

Rayneri, L. J., Gerber, B. L., & Wiley, L. P. (2003). Gifted achievers and gifted underachievers: The impact of learning style preferences in the classroom. *Prufrock Journal*, *14*(4), 197-204.

Reis, S. M., & McCoach, D. B. (2000). The underachievement of gifted students: What do we know and where do we go? *Gifted Child Quarterly*, *44*(3), 152-170.

Reis, S. M., & Renzulli, J. S. (2010). Is there still a need for gifted education? An examination of current research. *Learning and Individual Differences*, *20*(4), 308-317.

Renzulli, J. S., & Reis, S. M. (1997). *The schoolwide enrichment model: A how-to guide for educational excellence.* (2nd ed.). Mansfield Center, CT: Creative Learning Press.

Renzulli, J. S., Reid, B. D., & Gubbins, E. J. (1991). Setting an agenda: Research priorities for the gifted and talented through the year 2000. Storrs: The National Research Center on the Gifted and Talented, University of Connecticut.

Renzulli, J. S., Smith, L. H., White, A. J., Callahan, C. M. Hartman, R. K., & Westberg, K. W. (2002). *Scales for rating the behavioral characteristics of superior students. Revised edition.* Mansfield Center, CT: Creative Learning Press, Inc.

Rimm, S. (1995). *Why bright kids get poor grades and what you can do about it.* New York: Crown Trade Paperbacks.

Risemberg, R., & Zimmerman, B. J. (1992). Self-regulated learning in gifted students. *Roeper Review*, *15*(2), 98-101.

Robertson, S. G., Pfeiffer, S. I., & Taylor, N. (2011). Serving the gifted: A national survey of school psychologists. *Psychology in the Schools*, *48*(8), 786-799.

Ross, J. A. (2006). The reliability, validity, and utility of self-assessment. *Practical Assessment, Research, and Evaluation, 11*(10).

Ruban, L. M., McCoach, D. B., McGuire, J. M., & Reis, S. M. (2003). The differential impact of academic self-regulatory methods on academic achievement among university students with and without learning disabilities. *Journal of Learning Disabilities*, *36*(3), 270-286.

Ruban, L. M., & Reis, S. M. (1999). Learning strategies and study skills survey. Unpublished manuscript, University of Connecticut, Storrs.

Ruban, L., & Reis, S. M. (2006). Patterns of self-regulatory strategy use among low-achieving and high-achieving university students. *Roeper Review*, *28*(3), 148-156.

Rubenstein, L. D., Siegle, D., Reis, S. M., Mccoach, D. B., & Burton, M. G. (2012). A Complex quest: The development and research of underachievement interventions for gifted students. *Psychology in the Schools*, *49*(7), 678-694.

Sadi, O., & Uyar, M. (2013). The relationship between self-efficacy, self-regulated learning, self-regulated learning strategies and achievement: a path model. *Journal of Baltic Science Education*, *12*(1), 21-33.

Satterthwaite, F. W. (1946). An approximate distribution of estimates of variance components. *Biometrics Bulletin*, 2, 110-114.

Sattler, J. M. (2008). *Assessment of children: Cognitive foundations*. La Mesa, CA: Jerome M. Sattler Publisher.

Schmitz, B., & Wiese, B. S. (2006). New perspectives for the evaluation of training sessions in self-regulated learning: Time series analyses of diary data. *Contemporary Educational Psychology, 31*, 64-96.

Schunk, D. H. (1991). Goal setting and self-evaluation: A social cognitive perspective on self-regulation, In M. Maehr, & P. R. Pintrich (Eds.), *Advances in motivation and achievement, 7,* 85-113. Greenwich, CT: JAI.

Schunk, D. H. (1996). Goal and self-evaluative influences during children's cognitive skill learning. *American Educational Research Journal, 33*, 359-382.

Schunk, D. H. (2003). Self-efficacy for reading and writing: Influence of modeling, goal setting, and self-evaluation. *Reading & Writing Quarterly*, *19*(2), 159-172.

Schunk, D. H., & Ertmer, P. (2000). Self-regulation and academic learning: Self-efficacy enhancing interventions. In Boekaerts, M., Pintrich, P. R., and Zeidner, M. (Eds.), *Handbook of self-regulation,* 631-649. Academic Press, San Diego, CA.

Schunk, D. H. & Gunn, T. P. (1985). Modeled importance of task strategies and achievement beliefs: Effects on self-efficacy and skill development. *Journal of Early Adolescence, 5*, 247-258.

Schunk, D. H., & Zimmerman, B. J. (Eds.). (1994). *Self-regulation of learning and performance: Issues and educational applications*. Hillsdale, NJ: Erlbaum, Inc

Schunk, D. H., & Zimmerman, B. J. (Eds.). (1998). *Self-regulated learning: From teaching to self-reflective practice*. New York: Guilford.

Schunk, D. H., & Zimmerman, B. J. (2007). Influencing children's self-efficacy and self-regulation of reading and writing through modeling. *Reading & Writing Quarterly*, *23*(1), 7-25.

Scruggs. T. E., & Cohn, S. J. (1983). Learning characteristics of verbally gifted students. *Gifted Child Quarterly*, *27*(4), 169-172.

Scruggs, T. E., & Mastropieri. M. A. (1985). Spontaneous verbal elaboration in gifted and non-gifted youths. *Journal for the Education of the Gifted*, *9*(1), 1-10

Seely, K. (1994). Review of the book Reaching the gifted underachiever: Program strategy and design. *Gifted Child Quarterly, 38*, 154-155.

Seeley, K. R. (1984). Giftedness and juvenile delinquency in perspective. *Journal for the Education of the Gifted, 8,* 59-72.

Siegle, D., & McCoach, D. B. (2002). Promoting a positive achievement attitude with gifted and talented students. In M. Neihart, S. M. Reis, N. M. Robinson, & S. Moon (Eds.), *The social and emotional development of gifted children: What do we know?* Waco, TX: Prufrock.

Siegle, D., & McCoach, D. B. (2005). Making a difference: Motivating gifted students who are not achieving. *Teaching Exceptional Children*, *38*(1), 22-27.

Stephens, K., & Karnes, F. A. (2000). State definitions for the gifted and talented revisited. *Exceptional Children*. *66*(2), 219-238.

Sungur, S., & Yerdelen, S. (2011). Examination of the self-regulated learning processes for low and high achievers in biology. *New Educational Review, 24*(2), 207-215.

Thompson, L. A., & Oehlert, J. (2010). The etiology of giftedness. *Learning and Individual Differences*, *20*(4), 298-307.

Usher, E. L., & Pajares, F. (2006). Sources of academic and self-regulatory efficacy beliefs of entering middle school students. *Contemporary Educational Psychology*, *31*(2), 125-141.

Usher, E. L., & Pajares, F. (2009). Sources of self-efficacy in mathematics: A validation study. *Contemporary Educational Psychology*, *34*(1), 89-101.

Van Boxtel, H. W., & Mönks, F. J. (1992). General, social, and academic self-concepts of gifted adolescents. *Journal of Youth and Adolescence*, *21*(2), 169-186.

Vitaro, F., Brendgen, M., Larose, S., & Tremblay, R. E. (2005). Kindergarten disruptive behaviors, protective factors, and educational achievement by early adulthood. *Journal of Educational Psychology*, *97*, 617-629.

Weiner, B. (1986). *An attributional theory of motivation and emotion*. New York: Springer-Verlag.

Wentzel, K. R. (1991). Social competence at school: Relations between social responsibility and academic achievement. *Review of Educational Research*, *61*, 1-24.

Weiner, I.B. (1992). *Psychological disturbance in adolescence* (2nd ed.). New York: John Wiley and Sons.

Winne, P. H., & Jamieson-Noel, D. (2002). Exploring students' calibration of self reports about study tactics and achievement. *Contemporary Educational Psychology*, *27*(4), 551-572.

Winner, E. (2000). The origins and ends of giftedness. *American Psychologist*, *55*(1), 159.

Wolters, C. A. (2003). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. *Educational Psychologist*, *38*(4), 189-205.

Wolters, C. A., & Pintrich, P. R. (1998). Contextual differences in student motivation and self-regulated learning in mathematics, English, and social studies classrooms. *Instructional Science*, *26*(1-2), 27-47.

Wong, B., Harris, K. R., Graham, S., & Butler, D. L. (2003). Cognitive strategies instruction research in learning disabilities. In H. L. Swanson, K. R. Harris & S. Graham (Eds.), *Handbook of learning disabilities* (383-402). New York: Guilford Press.

Xin, Y. P., Jitendra, A. K., & Deatline-Buchman, A. (2005). Effects of mathematical word Problem-Solving instruction on middle school students with learning problems. *The Journal of Special Education*, *39*(3), 181-192.

Xitao, F., Miller, B. C., Kyung-Eun, P., Winward, B. W., Christensen, M., Grotevant, H. D., & Tai, R. H. (2006). An exploratory study about inaccuracy and invalidity in adolescent self-report surveys. *Field Methods*, *18*(3), 223-244.

Youlden, A., & Chan, L. (1994). Motivation, self-regulated learning and academic achievement in Year 7 and Year 9 students. Paper presented at the AARE Annual Conference, Newcastle, Australia, November.

Young, S., Gudjonsson, G., Misch, P., Collins, P., Carter, P., Redfern, J., & Goodwin, E. (2010). Prevalence of ADHD symptoms among youth in a secure facility: The consistency and accuracy of self-and informant-report ratings. *The Journal of Forensic Psychiatry & Psychology*, *21*(2), 238-246.

Yumusak, N., Sungur, S., & Cakiroglu, J. (2007). Turkish high school students' biology achievement in relation to academic self-regulation. *Educational Research and Evaluation*, *13*(1), 53-69.

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*(3), 329.

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist*, *25*(1), 3-17.

Zimmerman, B. J. (1994). Dimensions of academic self-regulation: A conceptual framework for education. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-regulation of learning and performance: Issues and educational applications,* (3–21). Hillsdale, NJ: Erlbaum, Inc.

Zimmerman, B. J. (2000). Self-efficacy: An essential motive to learn. *Contemporary Educational Psychology*, *25*(1), 82-91.

Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. *Theory Into Practice*, *41*(2), 64-70.

Zimmerman, B. J., & Bandura, A. (1994). Impact of self-regulatory influences on writing course attainment. *American Educational Research Journal*, *31*(4), 845-862.

Zimmerman, B. J., & Cleary, T. J. (2009). Motives to self-regulate learning. *Handbook of Motivation at School*, 247.

Zimmerman, B. J., & Kitsantas, A. (2005). Homework practices and academic achievement: The mediating role of self-efficacy and perceived responsibility beliefs. *Contemporary Educational Psychology*, *30*(4), 397-417.

Zimmerman, B. J., & Martinez-Pons, M. (1988). Construct validation of a strategy model of student self-regulated learning. *Journal of Educational Psychology*, *80*(3), 284.

Zimmerman, B. J., & Martinez-Pons, M. (1990). Student differences in self-regulated learning: Relating grade, sex, and giftedness to self-efficacy and strategy use. *Journal of Educational Psychology*, *82*(1), 51.

Zimmerman, B. J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing student use of self-regulated learning strategies. *American Educational Research Journal*, *23*(4), 614-628.

Zimmerman, B., & Schunk, D. (2011). *Handbook of self-regulation of learning and performance*. New York: Routledge.

Zuffianò, A., Alessandri, G., Gerbino, M., Kanacri, B. P. L., Di Giunta, L., Milioni, M., & Caprara, G. V. (2012). Academic achievement: The unique contribution of self-efficacy beliefs in self-regulated learning beyond intelligence, personality traits, and self-esteem. *Learning and Individual Differences*, *23*, 158-163.

Appendix A

Literature Review

Through a review of the literature, this chapter will aim to introduce and defend the need to study self-regulation within the context of academic achievement across ability levels. Background information will be provided in order to introduce the various domains of interest, including self-regulated learning, motivation beliefs, levels of academic achievement, and ability groups including giftedness. The relationship between self-regulated strategy use and academic achievement among students of various ability levels will be demonstrated through a review of existing research, supporting the rationale for the completion of the current study.

Theoretical Principles and Support of Self-Regulated Learning (SRL)

Definition of SRL. SRL is a construct that has been widely discussed and studied within the literature. Self-regulation refers to "self-generated thoughts, feelings and actions that are planned and cyclically adapted to the attainment of personal goals" (Schunk & Zimmerman, 1994; Zimmerman, 2000). It involves a process through which learners proactively direct their behavior to achieve goals. Self-regulated learners rely on affective, cognitive, motivational, and behavioral feedback to alter or adapt their strategies and behaviors when having difficulty attaining their goals (Zimmerman, 1989). Further, to complete tasks, self-regulated learners engage in self-observation, or the monitoring of one's activities, self-judgment, or the evaluation of how well their performance compares to a standard, and self-reactions, or their reactions to performance outcomes (Eccles & Wigfield, 2002). A feature of SRL is the systematic use of metacognitive, motivational, and behavioral strategies (Eccles & Wigfield, 2002; Zimmerman, 1990). These strategies are "directed at the acquisition of information or skills that involve agency, purpose, and instrumentality perceptions by learners" (Zimmerman, 1990, p.5). Self-

regulated students monitor the effectiveness of their strategies. They then use this feedback to make changes in their behaviors or perceptions. They also utilize feedback to change the type or frequency of the learning strategies they are utilizing (Zimmerman, 1990).

SRL is important within the school environment in part because a major goal of education is helping students develop learning skills (Zimmerman, 2002). All learners use regulatory processes to some degree. However, self-regulated learners are more aware of the relationship between the deliberate and planned use of their strategies and progress made toward achieving their academic goals (Zimmerman, 1990). To summarize, self-regulated learners have unique and important characteristics. They use a variety of self-regulated strategies, believe they can perform efficaciously, and set a number of varied goals for themselves (Eccles & Wigfield, 2002). More specifically, they set specific proximal goals for themselves, adopt powerful strategies for attaining their goals, monitor their performance for signs of progress, restructure their physical and social context to make it compatible with their goals, manage their time use efficiently, self-evaluate their methods, attributing causation to results, and adapt their performance for future methods. A student's level of learning has been found to vary based on the presence or absence of these key self-regulatory processes (Zimmerman, 2002).

Social cognitive theorists have proposed that self-regulated learners control their academic behaviors and beliefs in three cyclical phases: forethought, performance control, and self-reflection (Zimmerman, 2000). Each phase of this cyclical process influences the next stage, with feedback from previous attempts and outcomes influencing future learning efforts (Zimmerman, 2000). The forethought stage refers to processes that precede efforts to act (Cleary & Zimmerman, 2004). This phase of the cycle involves the beliefs, attitudes, and processes that a student uses prior to engaging in an academic task or learning attempt. Processes such as goal

setting and strategic planning are utilized during the forethought phase. Goal setting has been defined as an individual's decisions regarding specific outcomes of learning or performance. Strategic planning involves the selection or creation of a strategy to optimize one's performance during learning attempts (Cleary & Zimmerman, 2004). In addition, motivational beliefs such as self-efficacy, goal orientation, intrinsic interest, and outcome expectations are important in this phase of the cycle (Cleary & Zimmerman, 2004). Self-efficacy is defined as a person's beliefs about performing actions at a specific standard of performance (Cleary & Zimmerman, 2004).

These forethought processes influence the processes occurring within the performance control phase, such as self-control and self-observation. Self-control processes help guide learning or performance (Cleary & Zimmerman, 2004). Self-observation has been defined as an individual's systematic monitoring of his or her own performance (Cleary & Zimmerman, 2004). During this phase of the cycle, students actively engage in specific learning activities in order to optimize their learning and make progress toward goal attainment. Some sub-processes of self-control include self-instruction, imagery, attention focusing, and task strategies. It is during this phase that students will implement a strategic plan using various task strategies. Self-regulated learning strategies are actions and processes directed at acquiring information or skill that involve agency and purpose by learners. They include methods such as organizing or transforming information, seeking information, rehearsing, or using memory aids (Zimmerman, 1989). It is believed that an increased knowledge base of learning strategies and ability to apply these strategies to academic related tasks in a self-regulated manner can lead to academic success, while use of ineffective strategies can lead to academic difficulties (Cleary & Zimmerman, 2004). It is during the performance control stage that self-regulated learners

implement their plans and monitor the progress of their success toward a goal (Cleary & Zimmerman, 2004).

These processes impact the self-reflection phase, which is comprised of processes occurring after learning or performance (Cleary & Zimmerman, 2004). In this final phase of the cyclical feedback loop, students reflect on the information they gathered during performance in order to evaluate their performance and adjust their approach prior to future attempts to learn. Self-judgments and self-reactions are two broad categories of the self-reflection phase. Self-judgment incorporates self-evaluation, which is the comparison of one's performance to a chosen benchmark in order to judge success, and causal attributions, which are the learner's perceptions of the cause of the outcome (Weiner, 1986). Self-reactions refer to a learner's levels of satisfaction and adaptive inferences (Zimmerman, 2000). Through this SRL cyclical process, a learner is able to create a plan for reaching goals, enact that plan, monitor success, and make adjustments accordingly.

The link between SRL and motivation beliefs. Recent research on student academic performance has stressed the importance of motivational components in classroom learning (Wolters & Pintrich, 1998). As was demonstrated through previously reviewed research (Reis & McCoach, 2000; Risemberg & Zimmerman, 1992; Zimmerman & Martinez-Pons, 1990), self-efficacy is one motivation belief that plays a critical role in SRL and self-regulatory strategy use. Bandura defined self-efficacy as "an individual's confidence in their ability to organize and execute a given course of action to solve a problem or accomplish a task" (Eccles & Wigfield, 2002, p.110). Furthermore, Bandura viewed self-efficacy as a multi-dimensional construct that varies in strength, specificity, and difficulty (Eccles & Wigfield, 2002). According to Bandura (1995), efficacy expectations are hypothesized to be acquired and altered in four ways including

past performance accomplishment, exposure to and identification with efficacious models, access to support from others, and emotional experiences during task performance (Hampton & Mason, 2003). Self-efficacy has been regarded as a key motivational process due to its validity in predicting students' involvement in activities, effort, and persistence (Bandura, 1997; Pajares, 1996; Zimmerman, 1989). It has been demonstrated that highly self-regulated learners approach educational tasks mindfully. They proactively set goals and create plans for attaining those goals, with self-efficacy influencing and guiding this process (Cleary & Zimmerman, 2004). The more capable people believe themselves to be, the higher the goals they set and the more committed they are to the fulfillment of their goals (Zimmerman, 2000). Although self-efficacy beliefs are a domain-specific construct, the context in which self-efficacy is studied varies depending on the goals of the research (Pajares, 1996).

Furthermore, students' self-efficacy beliefs regarding their academic performance have been hypothesized to impact their perceptions of personal responsibility for learning (Zimmerman, 1994). Self-efficacious students tend to view themselves as proactive agents within their learning experiences (Bandura, 1997). Therefore, it is believed that students with high self-efficacy would hold themselves, or students in general, as more responsible for academic outcomes than teachers.

SRL and Academic Achievement

A large body of research supports the concept that SRL predicts school success (McClelland & Cameron, 2011). Effects reported across studies examining self-regulation and academic achievement are consistently positive and many studies show long-term contributions of self-regulation to outcomes such as high school graduation and college completion (Duncan et al., 2007; McClelland et al., 2011; Vitaro et al., 2005). SRL has been shown to impact academic

achievement from an early age. For example, McClelland, Acock, and Morrison (2006) demonstrated that skills such as self-regulation and social competence in kindergarten significantly predicted higher reading and mathematics achievement between kindergarten and sixth grade. In addition, students showed growth in literacy and mathematics from kindergarten to second grade after controlling for prior achievement levels, child IQ, and a host of background variables such as age, ethnicity, and parent education level (McClelland et al., 2006). This indicates that SRL and academic achievement are closely connected.

To elaborate upon the connection between SRL and academic achievement, self-regulated strategy use has been studied among groups of high and low achievers. For example, high achieving university students have reported using more advanced, deep processing strategies, while low achieving university students resorted to the use of simpler surface processing strategies (Ruban & Reis, 2006). More specifically, high achievers reported using strategies related to condensing and reorganizing notes and using various mnemonic devices or visual cues (Ruban & Reis, 2006). This aligns with the idea that many high achievers are deep processors of material. Low achievers primarily reviewed notes, created flashcards, and engaged in rote memorization of the material (Ruban & Reis, 2006). This finding supports the idea that low achievers tend to engage in simple or low-level strategies.

Another study investigated the contribution of motivational beliefs, cognitive strategy use, and metacognitive strategy use to Turkish high school students' achievement in biology (Yumusak et al., 2007). Tenth grade students were administered the Motivated Strategies for Learning Questionnaire (MSLQ) and a Biology Achievement Test that was developed by the researchers. Results of multiple linear regression analyses showed several SRL processes, including extrinsic goal orientation, task value, rehearsal strategy use, organization strategy use,

management of time and study environment, and peer learning contributed significantly to the prediction of achievement scores (Yumusak et al., 2007).

While this connection between achievement and SRL appears clear, some studies have indicated that the relationship between achievement and SRL is more complex. For example, one study asked 222 seventh grade students to describe their use of SRL strategies and rate their achievement goals. These goals were categorized as either mastery goals, which focus on the understanding of academic material, or performance goals, focusing on academic outcomes (Ablard & Lipschultz, 1998). All students were identified as high achievers, performing at or above the 97th percentile on an achievement test. While these high achieving students reported frequent use of strategies such as organizing and transforming, reviewing notes, and seeking assistance from adults, results indicated that the students ranged widely in the types of SRL strategies they employed. Therefore, types of self-regulated strategies used may differ among high achieving students. Furthermore, the study indicated that mastery goal orientation and gender were significantly related to SRL (Ablard & Lipschultz, 1998).

Zimmerman and Martinez-Pons (1986) interviewed high school high and low achievers regarding their SRL strategy use. The SRL strategies examined through a structured interview measure included self-evaluation, organizing and transforming, goal-setting and planning, seeking information, keeping records and monitoring, environmental structuring, self-consequences, rehearsing and memorizing, seeking peer, teacher, or adult assistance, and reviewing tests, notes, and texts (Zimmerman & Martinez-Pons, 1986). Students were grouped as high and low achievers determined by test scores, grade point average prior to entering high school, and teachers and counselors recommendations (Zimmerman & Martinez-Pons, 1986). Results of the study indicated that students' categorization as high or low achievers was predicted

with 93% accuracy using their SRL reports. SRL measures were determined to be the best predictor of standardized achievement test scores when compared to students' gender and socioeconomic status. In addition, the high achieving students reported significantly greater use of 13 out of 14 categories of SRL strategies, when compared to the low achieving students (Zimmerman & Martinez-Pons, 1986).

Together these studies indicate that high achieving students use self-regulatory strategies more often than their low achieving counterparts. Similarly, they use deeper and more advanced self-regulatory strategies. Although the type of strategies used among high achievers has been shown to vary, self-regulatory strategy use can predict academic achievement, indicating that the two are closely related. Therefore, the literature supports a connection between SRL and academic achievement.

Another way of studying the relationship between SRL and academic achievement is by monitoring the improvement of academic skills following instruction in self-regulatory skills. It is logical that as self-regulated strategy use is found to differ among high and low achieving students, teaching such strategies may help increase academic achievement. This premise depends on the understanding that SRL is not a personal trait that students either possess or lack. Instead, SRL is a process comprised of the selective use of specific processes that must be personally adapted to each learning task (Zimmerman, 2002). A student's level of learning has been found to vary based on the presence or absence of these key self-regulatory processes (Schunk & Zimmerman, 1998). Therefore, self-regulatory processes are teachable and can lead to increases in students' motivation and achievement (Schunk & Zimmerman, 1998). To support this suggestion, there is a large body of research demonstrating that students who have been trained in SRL processes such as goal setting, self-monitoring, and self-reflection processes

increase their levels of motivation and academic achievement (Butler, 1998; Cleary & Platten, 2013; Cleary et al., 2008; Graham, Harris, & Mason, 2005; Ruban, McCoach, McGuire, & Reis, 2003; Schunk, 1996).

For example, Schunk (1996) demonstrated that fourth grade students working toward mastery goals, instead of performance goals, while using self-evaluation made improvements in self-efficacy, skill, motivation, and task orientation. Furthermore, Cleary and Platten (2013) examined the relationship between students' SRL and motivation in a sample of ninth grade students. These students were in honors classes and were showing poor engagement and receiving low exam grades. Results showed that students who attended self-regulatory training intervention sessions on a regular basis and practiced SRL strategies exhibited substantial improvement in these domains (Cleary & Platten, 2013). Similarly, high school students receiving pull out self-regulatory strategy training were also shown to improve their biology test scores, frequency of SRL strategy usage, and level of confidence regarding abilities to learn materials and regulate their behaviors (Cleary et al., 2008).

Teaching of self-regulatory strategies has also been studied among students with learning disabilities. For example, Ruban et al. (2003) studied participants between the ages of 19 and 48 years. Post-intervention, there were improvements observed in task performance, metacognitive knowledge about self-regulated processes, and positive perceptions of task-specific self-efficacy (Ruban et al., 2003). In addition, participants who received the intervention were actively involved in developing personalized and focused strategies, generalized these strategies across contexts, and adapted strategic approaches to fit with various tasks (Ruban et al., 2003).

Self-Regulated Strategy Development (SRSD) is an academic intervention based in both academic and self-regulatory strategy instruction. It is an approach that adds the element of self-

regulation to strategy instruction, as it teaches students to monitor, evaluate, and revise their work, which in turn reinforces self-regulation skills and independent learning. SRSD has been used in several academic areas including math and reading (Wong, Harris, Graham, & Butler, 2003), but has been most extensively studied with writing across a variety of genres including personal narratives, story writing, expository essays, report writing, persuasive essays, and state writing tests (Harris & Graham, 2011). For example, SRSD has been shown to improve third graders writing strategies and knowledge for planning and composing stories and persuasive essays after receiving instruction (Graham et al., 2005).

Together these studies suggest that students who have academic difficulties can benefit from and improve their academic performance by receiving direct instruction in self-regulation techniques and applying these learned skills within their academic work. These studies also support the idea that self-regulation is a malleable ability, which can be taught and improved in students. In addition, these findings further confirm the relationship between SRL and academic achievement.

Motivation beliefs and academic achievement. Effective self-regulatory practices have been shown to result in stronger self-efficacy and achievement in various academic areas (Pajares, 2002). To illustrate this point, self-efficacy beliefs have been studied among high and low achievers. Research has demonstrated positive correlations between self-efficacy for learning and use of effective learning strategies (Schunk & Ertmer, 2000). Positive correlations have also been established between final course grades and self-efficacy (Lynch, 2010). Siegle and McCoach (2002) suggested that students who underachieve may adopt one of three problematic beliefs: “They do not believe they have the skills to do well and are afraid to try and fail; they do not see the work they are being asked to do as meaningful; or they believe the “deck

is stacked against them" and that any effort they put forth will be thwarted" (p.383). All of these beliefs appear to be connected to the concept of self-efficacy.

Sunger and Yerdelen (2011) examined the motivational and cognitive-behavioral components of SRL among high school biology students. Using the Motivated Strategies for Learning Questionnaire (MSLQ), 252 high school students were surveyed regarding their self-regulatory strategy use (Sunger & Yerdelen, 2011). Results indicated that there were significant differences between high and low achievers in certain motivational processes such as intrinsic goal orientation, extrinsic goal orientation, self-efficacy, and test anxiety. In addition, there were significant differences in cognitive-behavioral processes such as meta-cognitive self-regulation, effort regulation, and help seeking. High achievers rated their self-efficacy and task interest higher than low achievers. The low achieving students appeared to use cognitive and behavioral strategies more often than high achievers (Sunger & Yerdelen, 2011). However, regardless of achievement level, students with higher levels of intrinsic goal orientation, task value beliefs, control of learning beliefs, and self-efficacy used cognitive strategies such as rehearsal, elaboration, organization, critical thinking, meta-cognitive self-regulation, time and environment structuring, peer learning, and help-seeking at higher levels (Sunger & Yerdelen, 2011).

In a similar study, relationships among self-efficacy for learning and performance, cognitive SRL strategies, metacognitive SRL strategies, time and study management strategies, and biology achievement were investigated among a sample of high schools students (Sadi & Uyar, 2013). Results revealed that self-efficacy for learning and performance predicted students' biology achievement. Furthermore, metacognitive SRL strategies were shown to have the strongest predictive power on biology achievement (Sadi & Uyar, 2013).

Zimmerman and Bandura (1994) studied academic achievement in writing, regulation of writing, academic goals, self-standards, and course achievement, in relation to self-efficacy beliefs among a sample of college freshman. Results from path analyses indicated that perceptions of self-efficacy for writing influenced both academic self-efficacy and personal standards for quality of writing. More specifically, high personal standards and academic self-efficacy in turn led to the adoption of goals for writing skill mastery. Perceived academic self-efficacy influenced writing grade attainments both directly and through its impact on personal goal setting (Zimmerman & Bandura, 1994).

Another study examined the contribution of self-efficacy beliefs and SRL in predicting the academic achievement of 170 eighth grade students (Zuffianò et al., 2013). The effects of previous academic achievement, gender, socioeconomic status, intelligence, personality traits, and self-esteem were also considered in the analyses. Results from a hierarchical regression analysis supported the unique contribution of self-efficacy for SRL on academic achievement at the end of the school year (Zuffianò et al., 2013). More specifically, the beliefs students held about their capacities to regulate learning was one of the most important predictors of success at school, after previous academic achievement (Zuffianò et al., 2013).

As stated previously, self-efficacy is believed to influence students' academic perceived responsibility. Research has supported the connection between perceived responsibility and academic achievement. For example, Zimmerman and Kitsantas (2005) investigated the role of students' homework practices in their self-efficacy beliefs. More specifically, the use of specific learning processes such as organizing, memorizing, concentrating, and monitoring, in addition to perceptions of academic responsibility, and academic achievement were examined. One hundred and seventy-nine female students were administered a homework survey, self-efficacy for

learning scale, and perceived responsibility for learning scale (Zimmerman & Kitsantas, 2005). Path analyses revealed evidence of significant paths from homework experiences to self-efficacy for learning beliefs and perception of student responsibility for academic outcomes, and from these two academic beliefs to academic GPA at the end of the school year (Zimmerman & Kitsantas, 2005).

These studies indicate that in addition to studying the role of self-regulatory strategy use in understanding the academic achievement of students, it is also essential to consider students' motivation beliefs, such as self-efficacy and perceived responsibility. These motivation beliefs can impact a student's use of SRL techniques, thus influencing their ability to succeed within the classroom. Given these implications, and the demonstrated impact of SRL intervention on the improvement of student achievement (Cleary et al., 2008; Cleary & Zimmerman, 2004), the use of SRL to reverse the underachievement of students is of continued interest. Such intervention with underachieving students is essential as there are many important implications and consequences of student underperformance across the developmental spectrum.

Academic Underachievement

Definition of underachievement. Academic underachievement continues to be a critical problem within schools. While there is not a universally accepted definition of underachievement, proposed definitions have generally reflected three themes. The first is a discrepancy between potential and performance or ability and achievement. The second is a discrepancy between predicted achievement and actual achievement. The third is a failure to develop or utilize latent potential (Reis & McCoach, 2000). While attempts to define underachievement remain vague and controversial, it is suggested that a system of defining, identifying, and reversing underachievement should include students whose classroom

performance falls below their test performance (Reis & McCoach, 2000). Reis and McCoach (2000) state, “Underachievers are students who exhibit a severe discrepancy between expected achievement (as measured by standardized tests, assessments, etc.) and actual achievement (as measured by grades and teacher evaluations)” (p.163). Conceptually, an academic underachiever is a student who performs more poorly, typically as measured by grade average, than one would predict on the basis of his or her mental or educational ability, often measured by IQ, aptitude, or educational achievement tests (McCall, 1994). Some researchers believe that underachievement is not different from low achievement (McCall, 1994). Within the research, there has been debate about how best to define the terms ability and achievement, let alone underachievement and its causes (Morisano & Shore, 2010).

Some researchers believe underachievement is not a valuable term. For example, Seely (1994) stated, “Underachievement is a complex phenomenon which is value-laden and ambiguous as a generic term to describe student behavior” (p. 155). In previous research, underachievement has been conceptualized in terms of low grades, low effort on extracurricular tasks, lack of life goals, or avoidance of challenging tasks (Morisano & Shore, 2010). In contrast to the definition that focuses on the presence of a discrepancy, other research has argued that using groups to make relative comparisons to operationalize underachievement is a less ambiguous method for conceptualizing low achievement. Therefore, due to the ambiguity of the way to define underachievement, and the many factors that can ultimately contribute to low achievement, it is important to conceptualize underachievement as a relative construct and not an absolute concept (Plewis, 1991). Thus, for the purposes of this study, relative comparisons between students will be used to determine achievement groups of high and low achieving students.

Impact of underachievement. While consequences of underachievement can impact society as a whole, underachievement also has the potential to impede an individual's life pursuit of self-actualization (McCall et al., 1992). Although academic skill is not the only form of achievement, it can influence college success and occupational achievements (McCall et al., 1992). The negative consequences of underachievement were demonstrated through a longitudinal study. Underachievers were compared with students who received low grades that matched their ability level, in addition to students who were tested at the same ability level but who performed better in school (McCall et al., 1992). Results of the study indicated that 13 years after high school, the educational and occupational status of the high school underachievers was similar to peers with the same grades in high school, rather than students with the same abilities. They also found that underachievers were less likely to complete college and remain in their jobs, than their higher achieving counterparts (McCall et al., 1992). Despite these ramifications, students in the general education population who are not identified as in need of special education services often do not receive remediation for their underachievement (McCall, 1994).

Underachievement tends to appear in middle school and often continues into high school (Peterson & Colangelo, 1996). This is not surprising as the transition to middle school represents the beginning of a general deterioration in academic performance, motivation, self-perceptions of ability, and relationships with peers and teachers (Dembo & Eaton, 2000). During the middle school years, students are expected to develop a stronger sense of self and social support network, in addition to balancing increasing social, academic, and personal demands. Similarly, this time period is often accompanied by a shift in academic orientation, which becomes less supportive and mastery oriented and more performance-focused. In addition, there are often increased academic expectations, more independent instruction, and an emphasis on high-stakes

outcomes (Cleary & Chen, 2009). As a result, it is during this time that factors contributing to the achievement level of students should be identified and remediated thereby providing all students the opportunity to achieve to their full potential.

Ability Grouping in Schools

In order to determine if a student is underachieving, it is important to provide an estimate of their ability. However, conceptualizations of ability levels have varied within the literature. Achievement and ability are often difficult to separate within the school setting, as the constructs have much in common and overlap greatly in the academic domain. However, within schools, ability level is often conceptualized as a student's academic track or level. Track placement based on academic qualifications continues to be a common practice within secondary schools (Archbald et al., 2009). This practice is commonly utilized under the assumption that instruction can be more efficiently developed and delivered when classrooms are grouped homogeneously (Archbald et al., 2009). It is often believed that high ability students are not at risk for academic failure. However, watching high ability students perform below their potential is a source of frustration for many teachers, parents, and school professionals (Siegle & McCoach, 2005).

Regardless of the track into which a student is placed, they have the potential to achieve higher or lower than anticipated based on their ability. While types of ability groups differ between schools and grade levels, one commonly identified and educated group is that of gifted students. This population is of particular interest as levels of academic achievement, and factors that may contribute to achievement, have been widely studied within this ability group. Before discussing this population in more depth, it is important to first have a clear understanding of giftedness as a construct, as well as the programming and identification of gifted students in education.

Defining giftedness. Gifted children are often advanced in their level of skills and interests. For example, they may begin to read fluently, play a musical instrument, or complete complex math problems before their peers (Winner, 2000). Yet psychologists know much more about deviance at the negative end of the spectrum, focusing more research on disabilities and learning problems in comparison to giftedness (Winner, 2000). Giftedness can be conceptualized in a variety of ways. However, the traditional concept of giftedness originated with American psychologist Lewis Terman, who was the first to use the term "gifted." Terman defined giftedness as the top one percent level in general intelligence ability as measured by the Stanford-Binet Intelligence Scale or a comparable instrument (Stephens & Karnes, 2000). Most genetic studies of giftedness have used standardized measures of cognitive ability with an index of general cognitive ability, or g, as the most common indicator of giftedness (Thompson & Oehlert, 2010). However, many current researchers feel this is too narrow of a definition and conceptualization of giftedness.

Overtime, the concept of giftedness has moved away from this definitive definition. Along with others, the theories of intelligence introduced by Robert Sternberg, Howard Gardner, and Joseph Renzulli have contributed to a more inclusive perception of giftedness. Sternberg's triarchic theory of intellectual giftedness focuses on three major dimensions including information processing through internal representation of objects and symbols, information processing through past experiences, and adaptation to real-world environments (Stephen & Karnes, 2000). Gardner's theory of multiple intelligences began with seven specific intelligences (i.e., linguistic, logical-mathematical, musical, interpersonal, intrapersonal, spatial, and bodily-kinesthetic). However, this theory has been expanded to include other forms of intelligence (i.e., naturalistic, emotional). This theory is grounded in the belief that talent can exist across many

areas and domains, and is not restricted to academic areas (Stephen & Karnes, 2000). Renzulli was one of the earliest theorists to propose a research-based multifaceted conception of giftedness (Reis & Renzulli, 2010). The theory of his three-ring conception supports the idea that "gifted behaviors" result from the interaction among distinct intrapersonal characteristics, including above average ability, high levels of task commitment, and high levels of creativity. Renzulli further argued that individuals who manifest or are capable of developing an interaction among the three clusters require a wide variety of educational opportunities and services that are not ordinarily provided through regular instructional programs (Reis & Renzulli, 2010; Renzulli & Reis, 1997). The growth of theories of intelligence such as these has shifted the conceptions of intelligence and giftedness to be less rigid and more encompassing of varied abilities and talents.

Researchers and scholars in psychology and education have not yet agreed upon a uniform definition of "gifted." Pfeiffer (2001) reported that experts in the field indicate a lack of consensus on how to conceptualize and define the gifted and talented and problems with the identification process as two important assessment issues in this area of research (Robertson, Pfeiffer, & Taylor, 2011). One of the most crucial problems in gifted identification develops from confusion in the field regarding what giftedness is and the way in which it should be defined. Furthermore, lack of a definition has resulted in researchers often using different operationalized definitions when selecting a sample of gifted individuals for use in their studies. Carman (2013) analyzed 104 empirical articles from 38 journals analyzing differences between gifted and non-gifted students in order to determine the most common methods of identifying this population in research. Results showed a lack of consensus as to what qualifies a person to be defined as gifted within empirical studies. This lack of consensus leads to lower generalizability of giftedness research and a challenge for researchers in the field to compare the

results of their studies (Carman, 2013).

Despite this variability in the way giftedness is conceptualized and defined, it has been suggested that giftedness is the result of both innate ability and experiences that together develop high ability (Thompson & Oehlert, 2010). This conclusion is empirically supported by the behavioral genetics literature on the etiology of individual differences in general cognitive ability. Despite this consensus, the underlying complexity of how genes and environment affect the development of giftedness will continue to challenge researchers for some time to come (Thompson & Oehlert, 2010).

Similar to the debate over a definitive conceptualization of giftedness within academia, schools have also struggled to identify gifted students and appropriately educate this population of students. In 1994, with the release of the U.S. Department of Education report, a definition used in the Jacob K. Javits Gifted and Talented Students Education Act was presented as the federal definition for gifted and talented students:

> Students, children, or youth who give evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services and activities not ordinarily provided by the school in order to fully develop those capabilities (Stephens & Karnes, 2000, p.220).

In addition to this federal definition, giftedness has also been defined at the state level. As of 1990, New Jersey defined giftedness as:

> A pupil who has demonstrated or is capable of exceptional performance, accelerated comprehension and assimilation of content, exceptional capacity for abstract, and creative and divergent thinking in academic or out-of-school activities, and who requires a differentiated educational program beyond that normally provided by the school district

(Stephens & Karnes, 2000, p.231).

Despite the lack of a uniform definition within education, the importance of developing gifted potential within schools and providing them with appropriate educational experiences has not diminished. The number of identified gifted students remains high. As of 2006, there were 97,260 gifted and talented students in public elementary and secondary schools in the state of New Jersey, which accounts for 7.0% of the population (National Center for Education Statistics, 2013). In the United States 3,236,990 students have been identified as gifted and talented, accounting for 6.7% of enrolled students in the country (National Center for Education Statistics, 2013). Therefore, a large portion of students being educated in the country and state rely upon effective and appropriate gifted education.

The need for appropriate education for these students has been recognized and emphasized. For example, the U.S. Commission on National Security for the 21st Century (2001) suggested that in the interest of national security, the United States should focus on increasing its ability to produce scientists, mathematicians, and engineers (Robertson et al., 2011). It was also suggested that there are not enough trained U.S. citizens to fill needed technical positions within the country and that the number of special visas issued to individuals from other countries hired to fill science and technology related job positions increases annually (Robertson et al., 2011). Focusing education efforts on students with high abilities may be one way to address these growing concerns.

Gifted identification in education. The way in which gifted students are identified varies by state and district. While the Department of Education suggests that students with the potential for high performance to be identified through achievement and/or ability in a number of areas including general intellectual ability, specific academic aptitude, creative or productive thinking,

leadership ability, and/or visual and performing arts (Robertson et al., 2011), there continues to be much inconsistency in the way gifted students are identified. State regulations in New Jersey require that students be compared to their chronological peers in the local school district. Local school districts must use multiple measures to identify students, including but not limited to, achievement test scores, grades, student performance or products, intelligence testing, parent, student, or teacher recommendation, and other appropriate measures (NJ Department of Education, 2010), which is consistent with the way in which students in the current study have been identified. In addition, local school districts should ensure that the identification methodology is developmentally appropriate, nondiscriminatory, and related to the programs and services they can provide (e.g., using math achievement to identify students for a math program; NJ Department of Education, 2010). Even with this criterion, identification processes remain vague and varied, with each district interpreting and identifying students differently.

Gifted programming in education. The federal government is not involved in funding a national program for gifted education, and therefore states are left to define giftedness and cover the cost of gifted programming (Robertson et al., 2011). There are presently no guidelines for gifted education at the state level in New Jersey and so the determination of gifted programming is at the discretion of each school district. Acceleration and enrichment have been the two most widely used types of accommodations provided to gifted students (Hallahan, Kaufman, & Pullen, 2012). Acceleration places gifted students ahead of their peers, commonly seen in honors programs, while enrichment provides additional experiences to students without placing them in a higher grade, seen in pull-out programs provided to students in addition to their regular curriculum (Hallahan et al., 2012).

Due to the wide variability in gifted identification and programming procedures, it becomes essential for educators, school professionals, and researchers to understand the unique identification and programming process for gifted students within a given district before working with this population. In order to align with suggestions made by the Department of Education (2010), the current study will utilize a multi-criteria identification approach to conceptualize gifted students. This will be accomplished by using the identification methods already established within the school district in which the study is being conducted to identify gifted student participants. More specifically, gifted students will be defined as those students receiving gifted programming within the school. Furthermore, similar multi-modal criteria are used to place students within the other general education ability tracks within the school, informing both identification and programming decisions for these groups. Therefore, the current study will also conceptualize students of other ability groups (e.g., advanced, average) accordingly.

Why is this important for practicing school psychologists? Although many school psychologists believe that they are mainly responsible for the identification and education of students who are eligible for special education and related services, school psychologists can also be responsible for assisting with the identification and development of interventions and appropriate educational programming for gifted students, as well as those in general education classes. As a result, school psychologists can be key players in helping to resolve the various identification and assessment issues surrounding gifted education and programming currently taking place throughout education systems. In addition, they should be aware of and take advantage of their unique position and knowledge base, which makes them ideal advocates for students of all ability levels (Robertson et al., 2011).

Despite variability with the identification and education of gifted students, research has examined the use of self-regulatory strategies among this group. Just as the literature examining differences between high and low achieving groups of students has provided insight into the relationship between SRL and academic achievement, it is valuable to review this information in order to understand the connection between SRL and high ability student populations.

SRL and Motivation Beliefs among Gifted Students

SRL differences between gifted and general education students. Gifted students in particular have been shown to differ from their general education peers in terms of self-regulatory behaviors. To determine differences in academic strategy use, Scruggs and Cohn (1983) presented 29 gifted subjects with a list of random word pairs to study memory strategy use. Subjects studied these words and were tested for recall of the second word in each pair. Their reported strategies for this task were coded according to a seven-level strategy scale (Scruggs & Cohn, 1983). Based on correlations between strategy score and number of words answered correctly, a strong relationship between level of strategy use and performance was indicated. Furthermore, the pattern of responses and strategy use for the gifted children was found to be similar to the strategies used by a group of college students. The implications of this study are that gifted students can generate strategies at an earlier age than their average counterparts (Scruggs & Cohn, 1983).

In a similar study, Scruggs and Mastropieri (1985) presented lists of paired-associated words to gifted and non-gifted adolescents, who were instructed to study them any way they wanted. The subjects were then tested, being presented with the first word of each pair and then asking them to write the corresponding word (Scruggs & Mastropieri, 1985). After the test, subjects reported the strategies they used to complete the task. The investigators coded them as

either lower level rote strategies or higher level semantic strategies (Scruggs & Mastropieri, 1985). Results showed that gifted subjects reported higher levels of strategy use and recalled more paired words than did non-gifted subjects. Moreover, gifted subjects who used higher-level strategies scored better than gifted subjects who used lower level strategies (Scruggs & Mastropieri, 1985).

Zimmerman and Martinez-Pons (1990) examined SRL strategy use in order to identify differences among students depending on gifted status, gender, and age. Fifth, eighth, and 11th grade students from gifted and traditional schools in New York City were interviewed to identify 14 classes of SRL strategies and assess for strategy use aligning with these categories (Zimmerman & Martinez-Pons, 1990). High school students' ratings of academic efficacy exceeded middle school students' academic efficacy, which surpassed the efficacy of elementary school children (Zimmerman & Martinez-Pons, 1990). Boys were also found to have significantly greater verbal self-efficacy than girls (Zimmerman & Martinez-Pons, 1990). Student's giftedness was associated with high levels of academic efficacy. Furthermore, results indicated that gifted students made better use of certain SRL strategies than did regular students (Zimmerman & Martinez-Pons, 1990). More specifically, when examining use of each strategy, four of the 14 strategies differentiated the gifted students from their peers. These strategies included organizing and transforming, self-consequating, seeking peer assistance, and reviewing notes. In addition, gifted fifth grade students reported using significantly more adult assistance than did their general education counterparts. There were no strategies that general education students used significantly more frequently than gifted students.

One study employed a computerized task, The Self-Regulation and Concentration Test for Children, to compare self-regulation efficiency between elementary students with high IQ and

those of average intellectual ability (Calero et al., 2007). Results of this study indicated that children with high IQ had better self-regulatory abilities than their average ability peers, as they displayed better response frequency and variance of response time. In addition, the study indicated that these self-regulation efficiency skills are related to working memory and self-motivation, constructs also linked to academic success (Calero et al., 2007).

Gifted students have been shown to be similar in self-regulated strategy use across age groups. For example, SRL was studied among highly gifted elementary and high school students in the context of science classes (Neber & Schommer-Aikins, 2002). Self-report measures were utilized to assess self-regulatory strategy use in science. In addition, a number of environmental factors, such as perceived possibility for student investigations in the science environment, and individual beliefs, such as motivation beliefs and goal orientation, were examined (Neber & Schommer-Aikins, 2002). Results indicated that gifted high school students displayed higher levels of test anxiety and work avoidance than did the gifted elementary students (Neber & Schommer-Aikins, 2002). Gifted girls' science-related motivational beliefs were less positive than those of their male counterparts. Furthermore, level of investigation in the science classroom was found to determine self-regulatory strategy use (Neber & Schommer-Aikins, 2002). However, there were no significant differences in self-regulatory strategies between gifted elementary students and gifted high school students (Neber & Schommer-Aikins, 2002).

The combined outcome of these studies indicate that gifted students utilize more self-regulatory strategies and learning strategies that are more cognitively advanced than their general education peers. In addition, they carry out these strategies more effectively than their general education peers (Risemberg & Zimmerman, 1992). They may also begin using academic strategies earlier than their peers and this ability to use self-regulatory strategies may remain

stable over time. Gifted students also demonstrate other aspects of learning styles, which are characteristic of self-regulators, such as higher levels of perceived efficacy. Despite these findings, it is important to remember that not all gifted students are alike in terms of SRL abilities. For example, some students fail to set appropriate goals, or choose ineffective strategies, or neglect to monitor or evaluate their progress (Risemberg & Zimmerman, 1992).

While this research demonstrates the differences in SRL between gifted students and their general education counterparts, gifted high and low achievers have also been studied within the literature, providing information about differences between high and low achieving groups within a single, specific ability group. Given the current study's goal of examining SRL and motivation beliefs among achievement and ability groups, it is helpful to examine the way these groups have been identified, differ, and use SRL strategies and behaviors.

High and Low Achievement in Gifted Student Populations

Gifted high and low achievers have been widely studied within the literature, and therefore it is helpful to consider how this group has been selected in previous research (Table A1). There are a variety of definitions, criteria, and approaches that are used to determine what students should be considered gifted on one hand, and underachieving or high achieving on the other hand. Similarly, there are varied opinions of what defines gifted high and low achievers. While some researchers use the criteria provided by the school district from which they are determining their sample, others administer various assessments or use cutoff scores to conceptualize these groups of students. Some research has emphasized a discrepancy in order to conceptualize achievement groups, while others have used relative comparisons. In spite of facing a number of barriers, research in this area needs to continue in order to best help gifted students achieve their true academic potential. Due to the variability in the identification of this group, the current

study will use the multi-source criterion outlined by the school district to identify gifted students and the comparison of student grades to others students in order to determine achievement groups, as was previously discussed. By doing so, the groups of gifted high and low achieving students can be identified. Before discussing factors identified in the literature as contributing to levels of gifted achievement, it is essential to identify common characteristics of gifted high and low achievers and differences between gifted achievers and underachievers, exploring the existing literature on this population.

Table A1

Gifted Identification in Current Research

Study	Giftedness criteria	High achievement criteria	Underachievement criteria	Grade of sample
Colangelo, Kerr, Christensen, & Maxey, 1993	Composite score ≥95th percentile on the American College Testing Program (ACT)	Grade-point average of ≥3.75, on a 4.00 scale	Grade-point average of ≤2.25, on a 4.00 scale	High School
Rubenstein, Seigle, Reis, McCoach, & Burton, 2012	Classroom teachers' nominations; IQ score ≥120 or a standardized achievement score in the 90th percentile	N/A	Grades in bottom half of the class; C average or below in language arts and/or mathematics; Recommendations by classroom teacher and/or counselor	Middle School
Figg, Rogers, McCormick, & Low, 2012	Otis–Lennon School Ability Tests (OLSAT) score ≥130	General Achievement Test (GAT) ≥85th percentile; academic ranking in top 15% for the grade	GAT ≤85th percentile; academic ranking below the top 15% for the grade	8th – 10th grade
McCoach & Siegle, 2003	IQ or achievement score ≥ 92nd percentile.	Top 10% of class or ≥ 3.75 GPA	Bottom half of class or ≤2.5 GPA	High School
Rayneri, Gerber, & Wiley, 2003	District Criteria, not specified	≥ 90 GPA on a 100 point scale	≤ 85 GPA on a 100 point scale	Middle school
Peterson & Colangelo, 1996	Two of the following: WISC score ≥ 130; OLSAT score ≥ 132; Stanford Achievement Test (SAT) composite score ≥ 95th percentile, SAT subtest score ≥98th percentile	≥ 3.35 GPA on a 4.00 scale	< 3.35 GPA on a 4.00 scale	High School
Berkowitz & Cicchelli, 2004	New York State English Language Arts test (ELA) score ≥ 660	Language arts grade ≥95	Language arts grade ≤ 85	8th grade

Differences between gifted high and low achievers. It is important to explore differences between gifted high and low achievers as this can provide insight into the factors that impact high achievement, and thus should be promoted within low achieving populations. Just as the definitions of giftedness and achievement remain ambiguous, it has been equally difficult to determine common characteristics contributing to gifted achievement. The research in this area is often inconclusive and at times contradictory. For example, low self-concept is a characteristic commonly described as an attribute of the underachieving gifted student. However, several studies have found that underachievers do not exhibit lower self-concepts than their achieving counterparts (Reis & McCoach, 2000).

Despite this difficulty, attempts to determine common characteristics or differences between gifted high and low achievers have been made throughout the literature. Some proposed characteristics and differences appear to be fixed personal traits or environmental factors. For example, Emerick (1992) and Peterson (2000, 2001, 2002) examined gifted students who overcame underachieving patterns. Emerick identified several factors that helped students achieve, including outside interests, parents' approval, more challenging and interesting classes, and caring teachers. In contrast, underachievers, or those who were unable to overcome their underachievement, surveyed by Peterson (2001) were found to indicate more negative influences, such as having under-involved adults in their lives, gaining unwelcome attention, and being misunderstood by adults. The reversal in achievement patterns came from developmental changes, such as maturity and moving away from home after high school (Peterson, 2001).

Furthermore, Colangelo et al. (1993) found that gifted low achievers were more frequently male then female, more often lived in urban areas, and were more likely to attend high schools with over 200 students. Peterson and Colangelo (1996) examined school files of gifted achievers

and underachievers, determined by GPA. Results indicated that most underachievers could be considered chronic underachievers, with onset occurring most frequently in middle school years. Underachievers were found to be absent and tardy more frequently than achieving students and also demonstrated a significant difference in mean American College Testing (ACT) percentile rank (Peterson & Colangelo, 1996).

In addition to these differences, Seigle and McCoach (2005) proposed four additional underlying causes of low gifted achievement. These causes were: (1) physical, cognitive, or emotional issues, (2) disconnect between students and their school environment, (3) student's attitudes about themselves and their schooling, and (4) lack of self-regulation and study skills. These four categories were suggested as potential barriers to academic success (Seigle & McCoach, 2005). In terms of identified cognitive issues, gifted underachievers have been shown to lack insight and goal directed behavior. Emotional issues such as withdrawal, pessimism, anxiety, impulsivity, aggression, hostility, depression, social orientation, dependency, immaturity, fear of failure, fear of success, antisocial or rebellious tendencies, poor coping skills, lack of outside interests, differences in creativity, and an external locus of control have also been demonstrated through research (Reis & McCoach, 2000).

Some research has supported the premise that there is often a disconnect between underachieving gifted students and their schooling, or that gifted low achievers have a negative attitude toward their schooling. For example, gifted achievers were found more likely to be satisfied with school class instruction and with overall guidance services. They were also more likely to aspire to a higher educational degree and less likely to choose public institutions of higher education than low achievers (Colangelo et al., 1993).

Gifted underachievers also have negative attitudes toward themselves. They are more

likely to have low self-esteem, be self-critical or perfectionistic, and rejecting of unchallenging work (Reis & McCoach, 2000). When surveyed, gifted underachievers claimed less of a need for help with their educational plans, and demonstrated significantly greater beliefs than high achievers regarding the need to improve their study skills (Colangelo et al., 1993). One study sampled gifted middle school students, dividing underachieving students as those who had a GPA below 85 out of 100 points. The Learning Style Inventory was administered to the students (Rayneri et al., 2003). Results indicated that the low achieving group considered themselves to be less persistent than their achieving peers. In addition, they showed a stronger need for tactile learning and to be motivated by their teachers (Rayneri et al., 2003).

Figg et al. (2012) administered the School Attitude Assessment Survey–Revised (SAAS-R) and the Thinking Style Inventory (TSI) to a group of high and low achieving gifted learners in order to assess academic self-perception and thinking style preferences (Figg et al., 2012). The criteria used to determine these groups included results on the General Achievement Test (GAT), and student ranking within their grade. A multivariate analysis demonstrated a statistically significant difference in academic self-perception between the achievers and underachievers (Figg et al., 2012). One factor of the SAAS-R, motivation/self-regulation, was found to be statistically significant (Figg et al., 2012).

This difference in self-regulation is consistent with results from a multiple case study, in which 17 gifted students, ranging in age from eight to 13, identified a variety of factors contributing to achievement. While the study's major finding was that almost all the students made gains in achievement, attitude, or behavior following an intervention in creative productivity, the factors identified as contributing to low achievement included emotional issues, social and behavioral problems, the lack of an appropriate curriculum, and self-regulation

difficulties (Baum et al., 1995).

SRL Differences Between Gifted High and Low Achievers

In order to connect the afore mentioned concepts of achievement, ability level, and SRL, it is important to consider self-regulatory strategy use, in addition to other factors related to self-regulation, and their connection to gifted achievement status. VanBoxtel and Monks (1992) studied high and low achieving gifted adolescents. The study compared two groups of gifted achievers, both with above average intelligence and a high GPA. One of these groups also had above average creativity scores. Gifted underachievers had above average intelligence, but performed significantly below their expected GPA. The control group had average scores on intelligence and creativity measures, and was in the middle of the class in terms of GPA. Results indicated that the group of achievers demonstrated a higher academic self-concept, lower test anxiety scores, and higher scores in motivation when compared to the low achieving group (VanBoxtel & Monks, 1992).

Another study investigated a sample of high school students in Belgrade (Jovanović et al., 2010). The subjects were classified into groups of gifted underachievers, gifted achievers, and others based on the results of a battery of ability testing and school achievement data. The results indicated that these groups significantly differed on the dimensions of attitudes towards school, including academic self-perception, attitudes toward teachers, assessment goals, motivation, self-concept, and self-regulation (Jovanović et al., 2010).

A sample of 56 gifted high school underachievers and 122 gifted high school achievers were surveyed in order to learn about their general academic self-perceptions, attitudes toward school, attitudes toward teachers, motivation and self-regulation, and goal valuation (McCoach & Siegle, 2003). Results indicated that the greatest mean difference between gifted high and low

achievers was in the area of motivation and self-regulation, with gifted achievers scoring higher on ratings of self-regulation (McCoach & Siegle, 2003). In addition, a combination of motivation and self-regulation, in addition to goal valuation, allowed the researchers to correctly classify over 81% of the sample as either gifted high achievers or gifted underachievers (McCoach & Siegle, 2003). Previous research supported the motivation and self-regulation factor as one of the best predictors of academic achievement, explaining 19% the variance in self-reported GPA (McCoach & Siegle, 2003).

Lastly, high achieving and low achieving gifted New York City adolescent students were compared in their use of metacognitive reading strategies (Berkowitz & Cicchelli, 2004). Gifted students in this sample were identified using district criteria and achievement was determined by class grades. Data was collected using the Metacognitive Awareness of Reading Strategies Inventory, think-aloud protocols, and interviews (Berkowitz & Cicchelli, 2004). Both the gifted high achievers and low achievers indicated knowledge of metacognitive reading strategies. However, as a group the gifted high achievers used a wider variety of strategies and applied them more often than did the gifted low achievers (Berkowitz & Cicchelli, 2004). The greatest difference between the achievement groups was found for monitoring (Berkowitz & Cicchelli, 2004). Complimentary to the previous sections demonstrating the connections between SRL, ability, and achievement, these studies indicate that SRL and related processes are connected to the academic achievement of gifted students.

SRL has been studied among students of various ability levels. In a study similar to the current study, Cleary and Chen (2009) investigated grade level, achievement group, and math course type differences in SRL and motivation in a large sample of middle school students. Mathematics courses were combined into one of two broad course categories, advanced and

regular. Achievement groups were determined by course grade. Results of the study indicated that seventh graders exhibited a more maladaptive self-regulation and motivation profile than did sixth graders. However, seventh grade achievement groups were more clearly distinguished in terms of both self-regulation and motivation than were achievement groups in sixth grade. The pattern of achievement group differences also varied depending on math course type. For example, SRL and motivation processes more consistently differentiated the achievement groups in advanced ability classes than in regular math courses. This finding suggests that the relationship between SRL strategy use and math achievement was stronger within the advanced ability classes. Another key finding of this study was that the primary motivational predictor of students' use of SRL strategies during math learning was shown to be task interest (Cleary & Chen, 2009).

Motivation beliefs and gifted achievement. Research has demonstrated that high ability students have stronger self-efficacy and are often more accurate in their self-perceptions than their typically achieving peers (Pajares, 1996). Research with various age groups has shown higher math and verbal self-efficacy among gifted students (Bouffard-Bouchard, Parent, & Larivee, 1993; Ewers & Wood, 1993; Pajares, 1996; Zimmerman & Martinez-Pons, 1990). Furthermore, gifted students have been found to exceed average students in their accuracy of predicted abilities (Ewers & Wood, 1993; Pajares, 1996). This relationship has been demonstrated through research discussed within other sections of this literature review (Pajares, 1996; Zimmerman & Martinez-Pons, 1990).

Perhaps most applicable to the current study, the effects of gender, self-efficacy, learning goal orientation, self-regulation, and worry on high-stakes mathematics achievement were examined among a sample of mathematically gifted high school students (Malpass, O'Neil, &

Hocevar, 1999). Using a structural equation-modeling framework, analyses showed that self-efficacy was positively related to math achievement, moderately and positively related to self-regulation, and highly and negatively related to worry within a gifted population (Malpass et al., 1999).

Purpose of Study

The literature has demonstrated that self-regulation is clearly connected with achievement, showing that SRL skills predict academic achievement and that high achievers use more advanced regulatory strategies more regularly than their low achieving counterparts. Gifted students have been shown to more effectively utilize SRL strategies and gifted high achievers have been shown to differ from gifted low achievers in terms of SRL strategy use. Self-efficacy has been demonstrated to impact SRL strategy use and contributes to academic achievement. However, there are several gaps in the existing literature.

Firstly, there is a paucity of research examining SRL and motivation differences across ability and achievement groups, comparing gifted high and low achieving students to high and low achieving students in other ability groups as determined by academic track placement. Research in this area would help to determine if students of varying achievement status across ability group use similar patterns of SRL strategies within an academic context. Similarly, there is a limited amount of research examining the relationship between specific motivation beliefs, such as self-efficacy and perceived responsibility, among these groups of students. This is especially true for studies examining perceived responsibility among high ability student populations. As was demonstrated through the literature, these motivational processes play an important role in the use of SRL strategies and thus impact academic achievement. Therefore,

understanding their relationship with SRL use among high and low achieving students can help inform intervention.

In addition, there is a limited amount of research examining SRL behaviors from a multi-source assessment framework. Self-report questionnaires are the most common type of SRL assessment. These measures typically involve asking students to rate their regulatory behaviors, cognitions, and beliefs retrospectively, frequently using a Likert scale (Cleary & Callan, 2014). There are many benefits of using self-report measures, such as the ease of administration. Furthermore, self-administered questionnaires are likely to provide anonymity and privacy, encouraging more honest responses from participants. They are also less likely to cause socially desirable responses than other formats, such as interviewing (Fan et al., 2006).

However, these measures also have some limitations. When adolescents are completing surveys in a classroom setting or around peers, there may be an elevated likelihood that some respondents will answer survey questions inaccurately, impacting the validity of results (Fan et al., 2006). Common sources of error within self-reports include biased sampling of information from the environment, biased and incomplete searching for information in memory, and using schemas to reconstruct memories, which may lead to the insertion or deletion of information (Winne & Jamieson-Noel, 2002). In addition, an individual's cognitive representations can be imperfect, and therefore so can students' accounts of their behaviors and strategies. For example, when students' self-reports regarding their study tactics and achievement were calibrated with their actual use of tactics and academic achievement, results indicated that students were slightly positively biased, or overconfident, about their achievement. They were moderately positively biased about their use of study tactics (Winne & Jamieson-Noel, 2002). As many of the studies investigating SRL and gifted achievement have relied solely on

self-report measures (McCoach & Siegle, 2003; Neber & Schommer-Aikins, 2002; Scruggs & Mastropieri, 1985; VanBoxtel & Monks, 1992), it is necessary to consider ways to account for these limitations integrating other forms of measurement into the assessment, such as teacher ratings. Gathering information from various sources is one beneficial way to collect more complete and accurate data on student SRL behaviors.

Further, most SRL self-report measures, which include the Self-Regulated Learning Interview Schedule (SRLIS; Zimmerman & Martinez-Pons, 1986), Patterns of Adaptive Learning Survey (PALS; Midgley et al., 1997), Learning Strategies and Study Skills Survey (LSSS; Ruban & Reis, 1999), Self-Regulated Learning Strategies Scale (Youlden & Chan, 1994), and the Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich & DeGroot, 1990), target students' use of adaptive self-regulatory strategies, but not their maladaptive self-regulated strategies. This is problematic because adaptive and maladaptive SRL are not simply opposites. In addition to their use of adaptive strategies, self-regulated learners also attempt to minimize their use of negative or maladaptive behaviors, such as avoiding help, self-handicapping, or procrastinating (Cleary & Callan, 2014). Maladaptive motivational behaviors, such as poor effort and persistence, tend to be common among middle school students as these patterns become more likely when students evaluate their sense of competency based on peer performance and experience a decreased sense of autonomy (Cleary & Chen, 2009). In sum, maladaptive SRL behaviors have not been thoroughly assessed within various ability or achievement levels, which is necessary to gather a more complete understanding of student regulation among these groups.

Lastly, there is a limited amount of research viewing differences in SRL and motivation beliefs within a specific academic context. Many of the studies have measured SRL as a global

set of skills or processes, or have failed to specify a context about which students should be thinking when discussing their SRL behaviors (Ablard & Lipshultz, 1998; Jovanović et al., 2010; McCoach & Siegle, 2003; Ruban et al., 2003; VanBoxtel & Monks, 1992). However, SRL and motivation beliefs are conceptualized as contextualized processes. Therefore, these constructs should be measured within a specific context (Cleary & Chen, 2009). This has been determined in part because of the influence of social and classroom factors, such as type of course content and expectations, on students' strategies and behaviors. It has been recognized within the literature that students may use certain regulatory skills in one context but not others (Cleary & Chen, 2009). Wolters and Pintrich (1998) supported the study of self-regulated strategy use and self-efficacy beliefs in specific environments by investigating contextual differences in motivation and SRL in three different subject areas including math, English, and social studies. Results from this study provided evidence that the motivational aspects of SRL are context specific (Wolters & Pintrich, 1998). For example, students reported higher levels of cognitive strategy use in social studies than in English or mathematics, and higher levels in English than in mathematics (Wolters & Pintrich, 1998). This supports the idea of contextualizing assessments of SRL and motivation beliefs.

The current study will account for these gaps in several ways. Firstly, gifted students will be directly compared to students of other ability groups (i.e., gifted, advanced, average) within the general education population to compare differences in SRL behaviors and motivation beliefs (i.e., self-efficacy, perceived responsibility). Given the tracking process which places students into these ability groups, and the fact that the students are not receiving special education services, it is believed students should be capable of high achievement within their relative ability class. This will inform patterns of SRL behaviors across ability and achievement groups,

suggesting SRL as a potential mechanism of low or underachievement and as a way to intervene with all low achieving students. Furthermore, as it is anticipated that motivation beliefs will be related to the use of SRL behaviors, examining the relationship between SRL, self-efficacy, and perceived responsibility may demonstrate the usefulness of these constructs within interventions in order to help students increase their academic achievement.

In order to account for limitations in self-report measures, teacher report measures will be used in order to gain a more comprehensive and unbiased assessment of student self-regulation. In the field of school psychology, there has been an emphasis on the use of multi-dimensional assessment approaches when evaluating student abilities and needs. Aligning with this practice, it is important to attempt to gather SRL data from multiple sources, such as student reports, observations, and teacher ratings, in order to converge assessment data and develop the most appropriate hypotheses (Sattler, 2008). Because teachers spend a large amount of time with students in their classrooms and have many opportunities to observe student actions and learning behaviors, they are in a unique position to gather information about student SRL processes (Cleary & Callan, 2014). Furthermore, as teachers interact with a range of children, they possess a unique basis of comparison for evaluating students (Firmin, Proemmel, & Hwan, 2005). When assessing other types of externalizing behaviors, such as attention deficit hyperactivity disorder (ADHD), accuracy of various informant groups has been investigated. This was accomplished by comparing the self, parent, and teacher Conners' rating scales with results from a psychiatric assessment. Overall, teachers were found to be the most valid responders (Young et al., 2010). Therefore, teacher reports will be utilized as an additional source of data in assessing student SRL behaviors.

The current study will also assess for both adaptive and maladaptive strategies using the

Self-Regulation Strategy Inventory—Self-Report (SRSI-SR; Cleary, 2006). This scale measures the absence or presence of negative regulatory behaviors (Cleary, 2006). This measure includes questions about both positive and negative SRL behaviors, allowing for a more comprehensive assessment of these various SRL domains.

In order to contextualize the current study, students will be surveyed about their SRL behaviors and motivation beliefs as they specifically apply to their mathematics classes. Mathematics was chosen for several reasons. Firstly, the area of mathematics has received special attention in SRL and self-efficacy research given its foundational status in academic curriculum, as well as the demonstrated importance of mathematics self-efficacy beliefs in students' pursuit of math-related activities, majors, and careers (Pajares, 1996). A number of the studies previously discussed contextualized their studies within mathematics (Cleary & Chen, 2009; Malpass et al., 1999). This increased interest has also been shown through research on self-regulation interventions within mathematics (Butler et al., 2005; Cleary & Chen, 2008; Montague, 2007; Xin et al., 2005). Furthermore, Pajares (1996) found that self-efficacy of gifted middle school students made an independent contribution to the prediction of mathematical problem-solving, after controlling for the effects of math anxiety, cognitive ability, mathematics GPA, self-efficacy for self-regulated learning, and gender (Pajares, 1996). Based on the results from path analyses, gifted students reported higher math self-efficacy and self-efficacy for SRL, as well as lower math anxiety than did regular education students (Pajares, 1996). Secondly, a variety of factors such as self-efficacy and SRL skills are ideal for successful mathematic problem solving connecting SRL behaviors with academic achievement in this subject (Hoffman & Spatariu, 2008). Hoffman and Spatariu (2008) studied undergraduate students' self-efficacy for mental multiplication. Once participants were randomly assigned to either a control group or

an intervention group, who received metacognitive prompting, they received a series of multiplication problems (Hoffman & Spatariu, 2008). Problem-solving accuracy, response time, and efficiency were measured. Regression analyses indicated that self-efficacy and metacognitive prompting increased mathematics problem-solving performance and efficiency (Hoffman & Spatariu, 2008). Lastly, mathematics was a practical choice for the context of the current study, as this core class was offered for all general education students across ability tracks, allowing the researcher easy access to all groups of students.

Appendix B

Matrix of Mathematics Criteria

Student Name: _____ Teacher: _____

School: _____ Date Completed: _____

MATRIX OF MATHEMATICS CRITERIA
GRADE 4 TO 5
2011-2012

CATEGORY	STUDENT SCORE	POSSIBLE SCORE	WEIGHT	WEIGHTED SCORE
CURRENT MATH PLACEMENT		**Multiply possible score by weight in next box** UL/HIGH (3) AVERAGE(2) LOW AVERAGE/BSI (1)	ALL A's (10) A's and B's (8) ALL B's (6) B's and C's (4) ALL C's (2)	
MOST RECENT NJASK MATH SCORE		260-300 230-259 200-229 < 200	4 3 2 1	
COMPUTATION ASSESSMENT RESULTS		90% or Higher of Total Pts. 80%-90% of Total Pts. 70%-80% of Total Pts. 60%-70% of Total Pts. Below 60% of Total Pts.	10 8 6 4 2	
MATHEMATICS WRITING SCORE		90% or Higher of Total Pts. 80%-90% of Total Pts. 70%-80% of Total Pts. 60%-70% of Total Pts. Below 60% of Total Pts.	10 8 6 4 2	
TOMAGS		120 and Higher 111-120 110-90 70-89 Below 70	10 8 6 4 2	
CURRENT LAL GRADES CYCLES 1 & 2		ALL A's A's & B's ALL B's B's & C's ALL C's	5 4 3 2 1	
TEACHER RATING SCALE: MATH		35-39 31-34 27-30 24-26 <24	5 4 3 2 1	
TEACHER RECOMMENDATION	UL HIGH AVERAGE SKILLS	RECOMMENDED RECOMMENDED WITH RESERVATION		

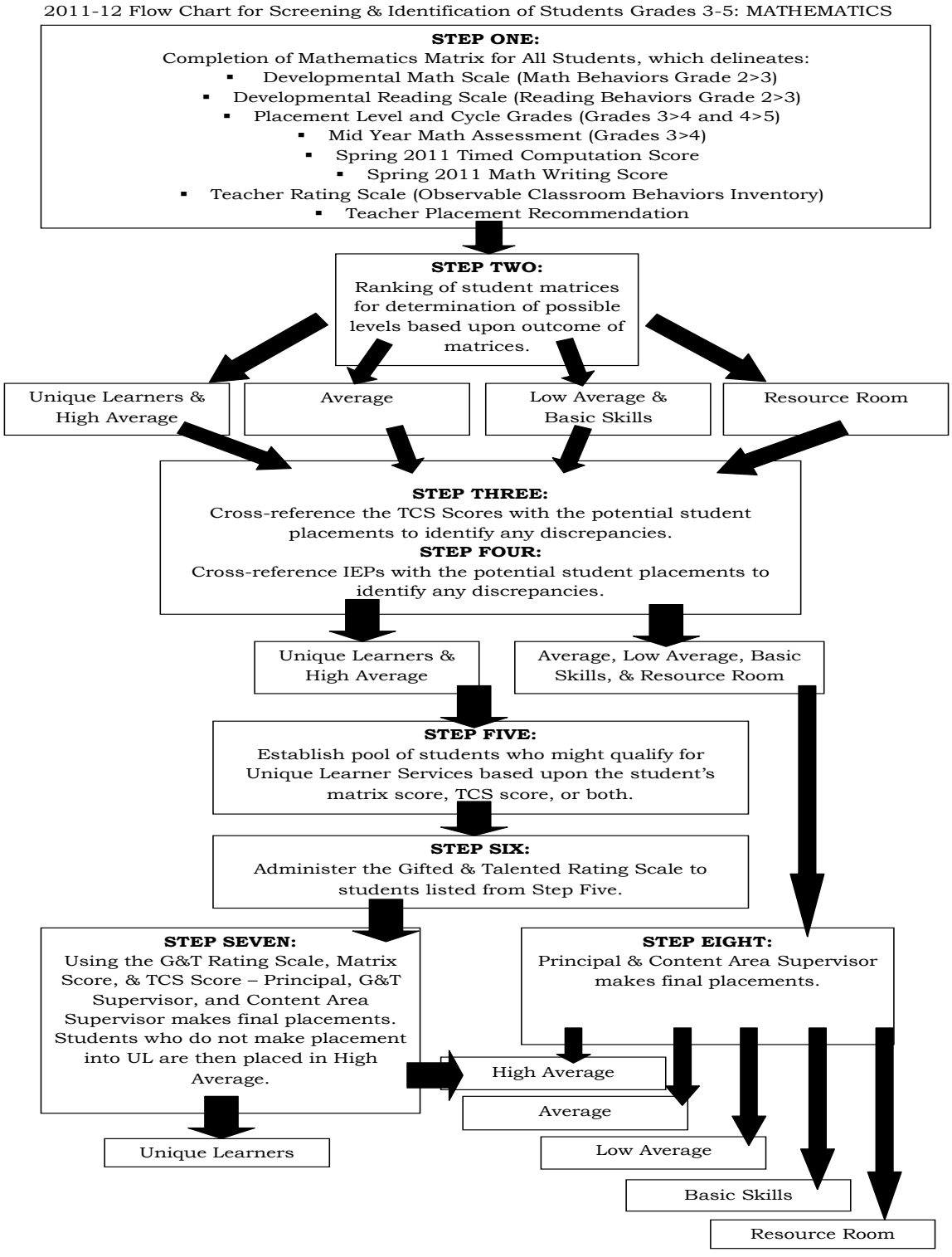
Math Placement Levels:

LEVEL	DESCRIPTOR	MATRIX SCORE RANGE
High Average	Independent learners who possess strong mathematic and critical thinking skills and are fluent readers.	
Average	Learners who are strengthening their mathematic and critical thinking skills and building fluency in their reading.	
Low Average	Learners who are strengthening their math and critical thinking skills and building fluency in their reading skills but need to have the pace of instruction modified according to their needs.	
Skills	Learners who are in need of additional support to build both their math and critical thinking skills and their reading fluency/comprehension.	

Comments:

Appendix C

Screening and Identification Flowchart



Appendix D

Consent Forms Letter

Edgar Middle School
49 Brunswick Avenue
Metuchen, NJ 08840

"Learning in a Caring Community"

Kathryn A. Glutz
Principal

Robert M. Knoth
Assistant Principal

April 21, 2014

Dear Parents of Fifth and Sixth Grade Students:

Edgar Middle School has been asked to participate in a doctoral dissertation study on self-regulating behaviors to determine if successful students utilize these strategies differently than less successful students. Attached please find a Parental Consent form from doctoral candidate Jaclyn Hogrebe from the Graduate School of Applied Research and Professional Psychology at Rutgers University. The consent form provides details of her research study.

The survey will be conducted in school and will take approximately 20 minutes to complete. The results will be valuable to us as a school community. Thank you in advance for your attention and support of this research study. Please have your child return the consent form as soon as possible.

Sincerely,

Kathryn A. Glutz

Principal

Parental Consent Form
Research Survey
Jaclyn Hogrebe
Rutgers University

Dear Parents,

My name is Jaclyn Hogrebe and I am a doctoral candidate in the Graduate School of Applied and Professional Psychology at Rutgers University. I am working with Edgar Middle School to better understand the things that help middle school students succeed. I am writing this letter to ask your permission to have your child participate in a survey research study.

The title of this research project is "Self-regulatory strategy use across ability levels." Children who participate will be given a survey that asks them about their beliefs, attitudes, and feelings about school and how they learn. We will also ask students to write their name, gender, and birth date on the survey. The survey will take about 20-30 minutes to complete, and will be given as part of a class activity during the school day. All students in the 5th and 6th grades who are currently in advanced or general education mathematics classes at Edgar Middle School are being asked to participate. This survey will be administered to your child during a single class period in the Spring of the 2013-2014 school year.

There are no known risks to your child for participating in this study. In addition, your child has the right to stop filling out the survey for whatever reason. If he/she elects to not participate his/her grades will not be affected in any way. However, by participating, your child's name will be entered into a drawing to receive a $25 gift card. Two of these gift cards will be awarded upon completion of the study.

This research study is confidential. This means that the research records that include information about your child, such as standardized test grades, school attendance, gender, and ethnicity will be private. In addition, I will keep this information confidential by restricting its access and keeping it in a highly secure location at Rutgers University. The research team, which includes myself and Dr. Timothy Cleary who is an associate professor in the Graduate School of Applied and Professional Psychology at Rutgers University, as well as the Institutional Review Board at Rutgers University, are the only parties that will be allowed to see the data, except as may be required by law. Your child's name will be removed from a dataset and replaced with a private ID# after all data has been collected. If a report of this study is published, or the results are presented at a professional conference, the identity of your child will not be revealed and only group results will be presented.

If you have any questions about the research, you may contact me at:
Graduate School of Applied and Professional Psychology
152 Frelinghuysen Road Piscataway, NJ 08854-8020
Tel: (732) 221-7514; Email: jhogrebe@gmail.com

If you have any questions about your child's rights as a research subject, you may contact the IRB Administrator at:
Rutgers University Institutional Review Board for the Protection of Human SubjectsOffice of Research and Sponsored Programs
3 Rutgers Plaza, New Brunswick, NJ 08901-8559
Tel: 848 932 4058; Email: humansubjects@orsp.rutgers.edu

Your child's participation in this study is completely voluntary. If you decide to withdraw your child from this study, you may do so at any time without penalty in any way. If your child is withdrawn from the study before data collection is completed his or her data will be removed from the data set and destroyed. Your support is greatly appreciated.

Sincerely,
Jaclyn Hogrebe
Doctoral Candidate
Rutgers University
jhogrebe@gmail.com

****

_____ has my permission to participate in the research study, "Self-regulatory strategy use across
(student name) ability levels", which will be conducted by Jaclyn Hogrebe. I understand that my child will be given a survey to complete one time during the 2013-2014 school year.

Signature of Parent or Guardian _____ Date _____

Teacher Consent Form
Research Survey
Jaclyn Hogrebe
Rutgers University

Dear Teacher,

My name is Jaclyn Hogrebe and I am a doctoral candidate student in the Graduate School of Applied and Professional Psychology at Rutgers University. As you may have heard, I am working with Edgar Middle School to better understand the things that help middle school students succeed. I am asking permission for your participation in this survey research study.

The title of this research project is "Self-regulatory strategy use across ability levels." Teachers who participate will be given a short survey questionnaire that targets teacher perceptions of student behaviors that occur within classroom. We are asking that all teachers who participate will complete a survey for each student who is enrolled in their courses and who was given permission to participate by their parents. In addition, we will ask teachers about their age, gender, ethnicity, years of teaching experience, and highest earned degree. The survey is only 13 items long and thus should take less than a minute per student. We will be administering this teacher survey to parallel the student survey that will be administered during one testing session this school year.

There are no known risks for participating in this study. We will be reviewing the general survey results with teachers and administrators at the end of the study. Although you will not benefit directly from participation, it is our hope that the data generated in this study may lead to increased understanding of the factors that influence children's academic success in middle school. Participation in this study is voluntary. You may choose not to participate, and you may withdraw at any time during the study without any penalty. If you withdraw from the study before data collection is complete your data will be removed from the data set and destroyed.

This research is confidential. This means that although the research records will include background information about you, such as you gender, age, etc., this information will be kept strictly confidential by restricting its access and keeping it in a highly secure location at Rutgers University. The research team, which includes myself and Dr. Timothy Cleary who is an associate professor in the Graduate School of Applied and Professional Psychology at Rutgers University, as well as the Institutional Review Board at Rutgers University, are the only parties that will be allowed to see the data, except as may be required by law. School administrators in Metuchen Boro school district will not have any access to your surveys. Furthermore, after all data is entered into a database, your name will be removed and replaced with a private ID#. If a report of this study is published, or the results are presented at a professional conference, participants' identities will not be revealed and only results in aggregate form will be used.

If you have any questions about the research, you may contact me at:
Graduate School of Applied and Professional Psychology
152 Frelinghuysen Road Piscataway, NJ 08854-8020
Tel: (732) 221-7514; Email: jhogrebe@gmail.com

If you have any questions about your rights as a research subject, you may contact the IRB Administrator at: Rutgers University Institutional Review Board for the Protection of Human Subjects- Office of Research and Sponsored Programs
3 Rutgers Plaza, New Brunswick, NJ 08901-8559
Tel: 848 932 4058; Email: humansubjects@orsp.rutgers.edu

Your support is greatly appreciated.
Sincerely,
Jaclyn Hogrebe
Doctoral Candidate
Rutgers University
jhogrebe@gmail.com

****

I, _____, agree to participate in the research study, "Self-regulatory strategy use across ability levels", that will be conducted by Jaclyn Hogrebe.

Signature of participant _____ Date _____

Appendix E

Script for Verbal Assent

"My name is Jaclyn Hogrebe and I am a graduate student at Rutgers University. I am working with my professor, Dr. Tim Cleary, on a research project at your school to help us understand how middle school students think and feel about school. We are asking all 5th and 6th grade student to complete a survey to help us better understand how you learn in school as well as how confident you are or how interesting school can be. Some questions will be about school in general, whereas others will be specifically about math class. The survey will take about 20 to 25 minutes to complete. For some of you, I have received permission from your parents to do this survey. I have a list of students who have turned in this permission slip. I will give you the surveys in a few minutes. Even though I have your parents' permission to do this survey, this is voluntary so you can decide to not complete it if you wish. If you do not wish to complete the survey then just raise your hand after I give it to you and let me know. If I do not give you a survey then that means I do not have permission to give it you. I have developed some materials on study tips that you can read while your classmates complete the survey. Everyone, whether you take the survey or not, will receive these study tip sheets after they survey is finished."

"For those who are completing the survey, it is important to realize that everything that you write on the survey will be private and will not be shared with any of your teachers. The only people who will look at the surveys will be Dr. Cleary and myself. You may also skip any questions that you are not comfortable with. You can also decide to stop participating at any time without any penalty to you. Just let me know if there is a problem by raising your hand. If you decide to not participate, that is fine. Your grades will not be affected in any way. However, if you do decide to complete the survey, your name will be entered into a drawing to win one of two $25 gift card that will be given out next year. Do you have any questions?"

"The packet has many short surveys and each survey has a rating system. Each survey will ask you to focus on school in general or math. Be sure to look at the top of each page. For example, on one of the surveys I will be asking you about how well you can do some things. For example, the first question reads HOW WELL CAN YOU FINISH YOUR HOMEWORK ON TIME? Remember you are focusing only on math class for these questions. There is a range of how well you think you did. At the left of the scale is saying you really don't do this well whereas rating towards the right hand side indicate that you feel more confident about doing something. So if you feel that you can't do these things well you would mark either NOT WELL AT ALL or A LITTLE WELL. The second question indicates HOW WELL CAN YOU STUDY FOR MATH WHEN THERE ARE MORE INTERESTING THINGS TO DO? If you think you can do a good job of keep studying even though you may want to do other things then would mark PRETTY WELL or VERY WELL. On the next scale, there are many statements that we want you to mark. For this scale, again, focus only on math class. If you read the top part it says to rate all of the statements in terms of HOW OFTEN you do these things. Again, there is a range going from ALMOST NEVER TO ALMOST ALWAYS. You pick the category that best reflects how often you do something."

"Does anyone have any questions? Please start with the first scale and go through each one. If you have trouble reading something or if a question confuses, please let me know. I am here to help you."

Appendix F

Survey Measures

Student's NAME:
_____

Math Teacher's NAME:
_____

Period: _____

Student Background Information

Please answer the following questions.

What grade are you in?
☐ 5th
☐ 6th

Please specify your ethnicity.
☐ White (non-hispanic)
☐ Hispanic or Latino
☐ Black or African American
☐ Native American
☐ Asian/Pacific Islander
☐ Other: _____

What is your gender?
☐ Female
☐ Male
☐ (Other options? Prefer not to say?)

Do you receive free or reduced price school lunch?
☐ Yes
☐ No

How WELL CAN YOU do the following things? Think only about your CURRENT MATH class or when you do MATH at home this year.

Use the following 5-point answer scale:

1 Not well at all	2 A little well	3 Somewhat well	4 Pretty well	5 Very well
○	○	○	○	○

How well CAN you…	1 Not well at all	2 A little well	3 Somewhat well	4 Pretty well	5 Very well
1. finish your math homework on time?	○	○	○	○	○
2. study for math when there are more interesting things to do?	○	○	○	○	○
3. concentrate when doing math work?	○	○	○	○	○
4. participate in math class discussions?	○	○	○	○	○
5. remember information presented in math class?	○	○	○	○	○
6. arrange a place to study math at home where you won't get distracted?	○	○	○	○	○
7. motivate yourself to do your math work?	○	○	○	○	○

How OFTEN do you do the following things when do your math work or studying for MATH?

Use the following 5-point answer scale:

1 Almost never	2 Not very often	3 Somewhat often	4 Pretty often	5 Almost always
○	○	○	○	○

How often do you do these things when doing MATH?	1 Almost never	2 Not very often	3 Somewhat often	4 Pretty often	5 Almost always
1. I tell myself to keep trying hard when I get confused.	○	○	○	○	○
2. I give up or quit when I do not understand something.	○	○	○	○	○
3. I try to study in a quiet place.	○	○	○	○	○
4. I ask my math teacher about the topics that will be on upcoming tests.	○	○	○	○	○
5. I use my class notes to study.	○	○	○	○	○
6. I study hard even when there are more fun things to do at home.	○	○	○	○	○
7. I quiz myself to see how much I am learning during studying.	○	○	○	○	○
8. I lose important dittos/worksheets that I need to study.	○	○	○	○	○
9. I make a schedule to help me organize my study time.	○	○	○	○	○
10. I use binders or folders to organize my study materials.	○	○	○	○	○
11. I think about the types of questions that might be on a math test.	○	○	○	○	○

12. I try to see how my notes from math class relate to things I already know.		○	○	○	○
13. I try to identify the format of upcoming math tests (e.g., multiple-choice, short-answer questions).	○	○	○	○	○
14. I try to study in a place that has no distractions (e.g., noise, people talking).	○	○	○	○	○
15. I forget to ask my teacher questions about things that confuse me.	○	○	○	○	○
16. I wait to the last minute to start studying for upcoming math tests.	○	○	○	○	○
17. I try to forget about the topics that I have trouble learning.	○	○	○	○	○
18. I ask my teacher questions when I do not understand something.	○	○	○	○	○
19. I make pictures or diagrams to help me learn math concepts.	○	○	○	○	○
20. I make sure no one disturbs me when I study.	○	○	○	○	○
21. I tell myself exactly what I want to accomplish before studying.	○	○	○	○	○
22. I let my friends interrupt me when I am studying.	○	○	○	○	○
23. I look over my math homework assignments if I don't understand something.	○	○	○	○	○
24. I carefully organize my study materials so I don't lose them.	○	○	○	○	○
25. I think about the best way to study for each math test.	○	○	○	○	○
26. I avoid asking questions in class about things I don't understand.	○	○	○	○	○
27. I finish all of my studying before I play video games or play with my friends.	○	○	○	○	○
28. I forget to bring home my study materials when I need to study for math tests.	○	○	○	○	○

Is a <u>student</u> OR <u>teacher</u> MORE RESPONSIBLE for the following things?

Use the following 7-point answer scale:

THE TEACHER				THE STUDENT		
1 Mainly the teacher	**2** Definitely more the teacher	**3** Slightly more the teacher	**4** Both equally	**5** Slightly more the student	**6** Definitely more the student	**7** Mainly the student
○	○	○	○	○	○	○

	THE TEACHER				THE STUDENT		
Who is MORE RESPONSIBLE for the following things…the TEACHER or the STUDENT?	**1** Mainly the teacher	**2** Definitely more the teacher	**3** Slightly more the teacher	**4** Both equally	**5** Slightly more the student	**6** Definitely more the student	**7** Mainly the student
1. Who is more responsible for a student being unprepared for a test?	○	○	○	○	○	○	○
2. Who is more responsible for a student being motivated to learn in school?	○	○	○	○	○	○	○
3. Who is more responsible for a student <u>not</u> finishing homework assignments?	○	○	○	○	○	○	○
4. Who is more responsible for a student doing well on a test?	○	○	○	○	○	○	○
5. Who is more responsible for a student being unprepared to participate in class?	○	○	○	○	○	○	○
6. Who is more responsible for a student solving assigned problems successfully?	○	○	○	○	○	○	○
7. Who is more responsible for a student understanding assigned homework readings?	○	○	○	○	○	○	○
8. Who is more responsible for a student <u>not</u> understanding a class discussion?	○	○	○	○	○	○	○
9. Who is more responsible for a student understanding the teacher's lecture?	○	○	○	○	○	○	○
10. Who is more responsible for a student fooling around in class?	○	○	○	○	○	○	○

Teacher Background Information

Please answer the following questions.

What is your gender?
☐ Female
☐ Male

Please specify your ethnicity.
☐ White (non-Hispanic)
☐ Hispanic or Latino
☐ Black or African American
☐ Native American
☐ Asian/Pacific Islander
☐ Other: _____

What is your age? _____

How many years have you been teaching? _____

What is the highest degree or level of education that you have completed?
☐ BS/BSA
☐ MS/MA
☐ PhD/EdD
☐ Other: _____

Self-Regulation Strategy Inventory – Teacher Rating Scale

Student Name:_____ Teacher Name:_____ Date:_____

We are interested in the types of behaviors that students exhibit in relation to your course. Please fill in the circle next to each question to indicate **HOW OFTEN** this student does each behavior or activity.

There is no right or wrong answer. It is important that you answer each statement to the best of your ability. Use the following categories below to answer all questions. If you do not know how often the student does something, please fill in the **"Don't know"** circle (**be sure to fill in the entire circle**).

Please fill in only one circle completely for each question like this: ○ ● ○ ○

1	2	3	4	5	6
Almost never	Not very often	Somewhat often	Very often	Almost always	Don't Know

HOW OFTEN?	1 Almost never	2 Not very often	3 Somewhat often	4 Very often	5 Almost always	6 Don't Know
1. The student asks about topics that might appear on upcoming tests.	○	○	○	○	○	○
2. The student keeps his or her class materials very organized.	○	○	○	○	○	○
3. The student asks insightful questions in class.	○	○	○	○	○	○
4. The student asks questions about errors he or she makes on tests or assignments.	○	○	○	○	○	○
5. The student seeks help or attends extra help sessions.	○	○	○	○	○	○
6. The student asks questions in class when he or she does not understand something.	○	○	○	○	○	○
7. The student keeps himself or herself motivated even when they struggle to learn something.	○	○	○	○	○	○
8. The student monitors how well he or she learns class material.	○	○	○	○	○	○
9. The student asks about the format of upcoming tests (short-answer, multiple choice).	○	○	○	○	○	○
10. The student pushes himself or herself to understand the details of the topics presented in class.	○	○	○	○	○	○
11. The student is enthusiastic about learning.	○	○	○	○	○	○
12. The student makes excellent use of class time.	○	○	○	○	○	○
13. The student is prepared for class.	○	○	○	○	○	○