VALIDATION OF THE SELF-REGULATION STRATEGY INVENTORY – PARENT RATING SCALE

A DISSERTATION

SUBMITTED TO THE FACULTY

OF

THE GRADUATE SCHOOL OF APPLIED AND PROFESSIONAL PSYCHOLOGY

OF

RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY

BY

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IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE

OF

DOCTOR OF PSYCHOLOGY

NEW BRUNSWICK, NEW JERSEY OCTOBER 2015

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Abstract

The current dissertation gathered empirical evidence of convergent and predictive validity for the Self-Regulation Strategies Inventory – Parent Rating Scale (SRSI-PRS), which measures parents' perception of their child's use of self-regulated learning (SRL) strategies during mathematics activities. The SRSI-PRS, which is part of the larger SRSI scale system incorporating a teacher version (SRSI-TRS) and a student version (SRSI-SR), was administered as part of a longitudinal study with middle school students that also included the SRSI teacher and student versions and three student motivational measures (self-efficacy, task interest, and perceived responsibility). Participants included 105 7^{th} and 8^{th} grade parents and their respective students and students' teachers from a Northeastern suburban school district. Convergent validity was examined by assessing Pearson's correlations between: (a) SRSI-PRS subscales, the SRSI-TRS, and SRSI-SR subscales, and (b) SRSI-PRS subscales and the three types of motivational beliefs. Hierarchical regression analyses were used to examine the unique variance that the SRSI-PRS accounted for when predicting students' academic achievement. Two regression analyses were conducted across two different measures of academic achievement: (a) standardized test scores and (b) course grades. In terms of convergent validity evidence, the results showed that the three SRSI-PRS subscales exhibited medium and statistically significant relations with the SRSI-TRS, and small to medium statistically significant relations with the three SRSI-SR subscales and student self-efficacy. Additionally, two of the SRSI-PRS subscales displayed statistically significant, albeit small, relations with student's task interest, but none of the SRSI-PRS subscales exhibited significant relations with the student's perceived responsibility scale. Finally, there were mixed results

regarding the predictive validity of the SRSI-PRS. The SRSI-PRS composite accounted for unique variance *(R^2* = 4.4%) in course grades, but did not account for any unique variance in predicting standardized mathematics test scores after controlling for student and teacher ratings.

Acknowledgements

I would like to begin by thanking the members of my dissertation committee: Dr. Timothy Cleary and Dr. Susan Forman for their help and support throughout my dissertation project. I would especially like to thank my advisor, Dr. Timothy Cleary, for his continued guidance, endless editing of drafts of my dissertation, and mentorship throughout my graduate training at Rutgers, the Graduate School of Applied and Professional Psychology. I truly appreciate the amount of time and energy you have dedicated to this dissertation project and in making me want to complete the best work possible. I would also like to specifically thank Dr. Susan Forman for being my 2nd dissertation committee member, academic advisor, and mentor throughout my entire graduate school experience. I truly appreciate your support and motivation, which have allowed me to strive for excellence since my first day of the program.

Finally, I would like to thank my family and friends for their patience and understanding throughout the duration of this project. I owe you a debt of gratitude and truly appreciate all of your encouragement and support. I particularly want to thank my parents, Wendy and Gary Lubin, and my boyfriend, Andrew Klein, for their continual source of support.

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Introduction

Self-Regulated Learning (SRL) is a process through which individuals trigger and maintain cognitions, affects, and behaviors in order to be effective learners and achieve personal goals (Schunk & Zimmerman, 2012). Research has shown that SRL is a causal determinant of academic success, meaning that effective learners tend to be those who are able to use SRL most efficiently (Pintrich & Schunk, 2002; Zimmerman & Martinez – Pons, 1986). Further, SRL strategies have been shown to decrease maladaptive behaviors (e.g., disruption of class time or verbalization of negative statements; Kern, Ringdahl. Hilt, & Sterling-Turner, 2001) and increase positive behaviors (e.g., time of on-task behavior; Kern, Ringdahl, Hilt & Sterling-Turner, 2001; Reid, Trout, & Schartz, 2005). Along with the development of various SRL interventions in school, research has focused on the assessment of SRL strategy use and behavior in students.

Numerous self-report questionnaire and rating scale assessment measures have been developed to evaluate different components of SRL behaviors; however, minimal attention has been devoted to developing a multi-source assessment to comprehensively and cohesively develop a picture of a student's SRL functioning at school and home (Cleary, 2011; DiBenedetto & Zimmerman, 2013; Greene & Azvedo, 2007b; Miller & Brown, 1991; Pintrich, Smith, Garcia, & McKeachie, 1993; Weinstein, Palmer, & Schulte, 1987). To address this limitation, Cleary and colleagues developed the *Self-Regulated Strategy Inventory*, (SRSI) which includes self-report questionnaire (SRSI-SR), teacher rating scale (SRSI-TRS), and a parent rating scale (SRSI-PRS). In this study the validity of the parent version of the SRSI was examined (Chen, Cleary, & Lui, 2014). To date, only one study has focused on the SRSI-PRS, and thus more information needs to

be gathered in regards to the validity and importance of the measure. In this study, the student (Cleary 2006) and teacher (Cleary & Callan, 2014) versions of the SRSI were used, along with a set of motivational belief measures, to gather convergent validity evidence for the SRSI-PRS. The predictive validity of the SRSI-PRS was also examined by determining whether it accounts for unique variance in academic achievement when compared to the student and teacher versions of the scale.

Overview of SRL

SRL is a broad term that is applicable to multiple situations and contexts. It refers to how well an individual is able to manage internal processes, such as mood states, thoughts, attention and impulses, as well as external events or contexts, as well as their behaviors and the contexts in which student learn (Pintrich & Schunk, 2002; Ross, 2008). From a social cognitive theoretical framework, Bandura (1991) conceptualized SRL in terms of three processes: (a) self-monitoring one's behavior, its determinants, and its effects; (b) judging one's behavior in relation to personal standards and environmental circumstances; and (c) engaging in affective self-reaction. This cyclical model was later expanded by Zimmerman (2000), who created a three-phase cyclical feedback loop to better convey process through which students can regulate different dimensions of functioning.

Zimmerman's (2000) three-phase model includes forethought, performance, and self-reflection phase processes that operate in a sequential, cyclical manner. He developed this framework to organize how different SRL sub-processes relate or interact to guide regulated behaviors. For example, during the forethought phase, which occurs prior to learning, students set goals of what they would like to achieve (goal setting) and

devise strategic plans regarding how they will accomplish those goals (strategic planning). During the performance phase, which typically occurs during learning or action, students implement their strategic plans and may use various types of self-control tactics, such as help-seeking, task strategies, or time management, to optimize their learning. During learning, effective regulators will also seek to monitor their progress and observe the work they are producing (self-observation). Given that students' use of learning and regulatory strategies are often overt and thus easiest for others to observe, a central focus on this dissertation is focusing on measures that capture how frequently students use various types of strategies when learning.

Finally, during the self-reflection phase, which occurs after performance or learning, students will self-evaluate their goal progress and will make various other types of self-judgments and reactions to determine when and if they need to adapt before the next cycle of learning. Successful SRL strategies can help individuals manage their own behaviors through motivational beliefs, strategic actions, and metacognition (Cleary, 2006).

Consistent with the premise that thoughts, feelings, and beliefs impact what people do, SRL researchers emphasize the importance of motivational beliefs on learning and SRL behaviors. Further, social cognitive theorists emphasize the key role of cognition in human motivation, meaning that people use forethought and expectations to guide actions based on what they believe will lead to successful outcomes. These motivation beliefs, in turn, will impact SRL strategy use and effect academic outcomes (Pintrich & Schunk, 2002). Examples of common types of motivation beliefs include self-efficacy (confidence in their ability to complete a task; Bandura, 1997; Eccles &

Wigfield, 2002), task interest (how students' perceive their enjoyment and the value of a specific assignment or subject; Cleary, 2006), and perceived responsibility (how a person perceives the extent to which he or she should assume control over life events; Zimmerman & Kitsanstas, 2005). Research has demonstrated relations between all three of these motivational measures and students' academic achievement. For example, students with strong self-efficacy have been shown to exert greater effort and persevere longer in trying to accomplish their goals (Bandura, 1992, 1997; Eccles & Wigfield, 2002). Students with higher task interest have been shown to have more persistence with academic challenge, a higher academic self-concept, and high academic performance (Walker et al., 2006). Further, students with perceived responsibility have also been shown to have a higher quality of homework and take more initiative with learning (Zimmerman & Kitsantas, 2005).

Importance of SRL in Middle School and Mathematics Contexts

SRL plays an important role in students' academic success, especially in middle school. During the middle school years students have to learn to navigate multiple teachers, encounter greater expectations for independent academic rigor, and experience less support from staff (Barber & Olsen, 2004; Dembo & Eaton, 2000; Hill & Tyson, 2009; Rudolp, Lambert, Clark & Kurlakowsky, 2001). For example, unlike in elementary school, students in middle school have to take personal responsibility for managing different class work and assignments without a primary teacher to manage work for them or to hold them accountable. Adolescence is also a time when students need to increase their use of cognitive strategies, such as such as logical and analytic thinking, problem solving, planning, and decision-making (Halpern-Felsher & Cauffman, 2001; Hill &

Tyson, 2009; Keating, 2004). Further, middle school students have to develop their own goals, learn how to identify what they want to accomplish, and choose the most effective way to achieve their goals.

Another challenge for many middle school students is learning mathematics. Research has shown that effective SRL and motivational beliefs have been linked to student success in mathematics due to the complex nature of mathematics (DeCorte, Verschaffel, & Op't, 2000). Mathematics was a focus in this study because of the past research showing that SRL and motivational beliefs have been linked to mathematics achievement in middle school students. Mathematics involves solving multiple step problems, learning different strategies, and applying concepts correctly. For example, it has been shown that high achieving students in mathematics will often use SRL strategies effectively when learning different theories and applying ideas, and that low achieving students have been shown to use less of these same strategies (Dunlap & Dunlap, 1989; Montague, 2007; Perels, Dignath, & Schmitz, 2009; Usher & Pajares, 2009).

Assessment of SRL

In the field of school psychology, it has long been established that best practices in assessment involves the use of a multi-method, multi-source, multi-setting format. The rationale with this approach is that gathering information from different observers and perspectives in various settings can generate a more comprehensive profile of a student's functioning (Merrell, 2003). Although SRL researchers have not traditionally employed multiple methods and sources to evaluate student SRL processes in a particular research study, they have shown much interest in assessing student SRL using a variety of different types of measures. Winne and Perry (2000) proposed that all SRL measures can

be broadly classified into one of two categories: event measures and aptitude measures. Event measures target SRL as a situation-specific event with a clear beginning and end. For example, think-aloud protocols, SRL microanalytic interviews, diaries and traces or logs are all considered to be event measures of SRL because they target SRL processes as they are being implemented by an individual during task performance (Winne & Perry, 2000). A think-aloud protocol entails students verbalizing what they are thinking during a specific task, whereas a diary would include prompts for students to record strategy use as students perform the activity (Boekaerts & Corno, 2005; Schmitz & Schmidt, 2011). These measures are helpful in examining how SRL strategies are being used in real time during an actual event, but often have weaker validity since students typically assess themselves without evaluator oversight (Schmitz, Klug, & Schmidt, 2011; Zimmerman, 2008).

Although event measures are valuable, the focus of the current study is on aptitude measures, such as self-report questionnaires and rating scales. Unlike event measures, aptitude measures tend to capture SRL as a more global and broad construct. These measures do not typically examine SRL behaviors at a specific time, but rather seek to examine a wide array of strategies across specific situations (Cleary, 2011). Examples of these measures include self-report questionnaires, retrospective interviews, and parent and teacher rating scales (Winne & Perry, 2000). Most aptitude measures use a Likert scale format whereby individuals rate their regulatory beliefs, actions, or affect. For example, a self-report questionnaire may ask a student to rate using a 5-point Likert scale how often they are prepared for a test or how they productive of a studying environment they create (Cleary, 2006).

Aptitude SRL measures are global in nature in that they often target students' use of a broad array of strategies in a general sense, or across different situations or contexts. Self-report questionnaires represent the most common type of SRL assessment, in part because they have high reliability estimates and are efficient and easy to use. Further, these types of measures are useful in that multiple informants can be used to assess typical student SRL behaviors or beliefs (Hart & Lahey, 1999; Kamphus & Mays, 2011; McConaughy & Ritter, 2008; Merrell, 2003; Pintrich, Wolters, & Baxter, 2000). Finally, assessing SRL in a more broad sense, rather than as a dynamic process as is the case with event measures, is important because they provide a more global picture of the student, they have been found to have higher rates of reliability, and they can capture behaviors and cognitions that are not easily observable (Hart & Lahey, 1999; Kamphus & Mays, 2011; McConaughy & Ritter, 2008; Merrell, 2003).

Self-report questionnaires. Common SRL questionnaires that have been previously developed are the Self-Regulated Learner Questionnaire (SRQ; Miller & Brown, 1991), the Learning and Study Strategies Inventory (LASSI; Weinstein et al., 1987), and the Motivated Strategies Learning Questionnaire (MSLQ; Pintrich et al., 1993). These SRL questionnaire measures ask students to rate SRL strategy use in an academic setting, but either used a domain-general approach or were validated on a college population (Miller & Brown, 1991; Pintrich et al., 1993; Weinstein et al., 1987). Further, although each of these measures is widely used by researchers, none of these scales have complementary rating scales, such as for parent or teachers. Another example of an SRL self-report questionnaire is the *Self-Regulation Strategies Inventory- Self Report* (SRSI-SR; Cleary, 2006). Cleary (2006) began development on this scale with the

prospect of creating a multi-informant system: self-reports, teacher ratings, and parent ratings. The self-report questionnaire gathers information from students about their use of SRL strategies in specific content areas, such as science and mathematics. The scale uses several SRL strategies and situations into 28-items with a Likert scale format. Principal component analysis has shown the scale to have a three-factor structure: (a) seeking and learning information; (b) managing environment/ behavior, and (c) maladaptive regulatory behavior. It has also been shown to have high internal consistency between the overall SRSI-SR and subscales, and to reliably differentiate achievements levels in science and mathematics students (Cleary, 2006; Cleary and Chen, 2009).

Rating scales. In school contexts, rating scales are often used to supplement self-report questionnaires. Rating scales are structured similarly to a self-report questionnaire in that individuals are asked to provide retrospective ratings of students' behaviors using Likert scales. Further, similar to questionnaires, rating scales use aggregates or a composite score to make inferences about a target underlying construct. Unlike questionnaires, however, rating scales are completed by informants other than the student (i.e., teachers and parents). Obtaining data from informants other than students can provide vital information and be extremely advantageous, despite potential threats of response bias, rater tendency to use middles points on a scale, and variance in how responders interpret items (Merrell, 2003; Sattler & Hoge, 2006). A first advantage is that rating scales target behavior that occurs in "natural" environments that researchers may not be able to observe, such as studying at home. Second, these measures target the perspectives of individuals with strong knowledge about the student that has accumulated over long periods of time (Merrell, 2003). Teachers, for example, interact with students

on a daily basis and have the opportunity to observe them in the classroom in comparison to their same-aged peers. Along the same lines, parents are able to provide information about student behaviors at home that teachers and researchers are not likely to observe. Third, rating scales can be used to complement or supplement information provided by self-report questionnaires (De Los Reyes, Salas, Menzer, & Daruwala,, 2013; Winne & Perry, 2000). Finally, rating scales can help provide information about students' ability to self-regulate in home or school contexts and thus have the potential to add value to the overall depiction of SRL processes (De Los Reyes et al., 2013; Hunsley & Mash, 2007).

Recognizing the value of multiple informants in assessing SRL behaviors and processes, Cleary and colleagues recently developed teacher and parent versions of the *Self-Regulation Strategies Inventory*. The self-report version of the SRSI served as the foundation for the *Self-Regulation Strategies Inventory- Teacher Rating Scale (SRSI-TRS;* Cleary & Callan, 2014) and the *Self-Regulation Strategies Inventory- Parent Rating Scale (SRSI-PRS;* Chen et al., 2014). The SRSI-TRS is a 13-item Likert scale that asks teachers to rate individual students regarding their regulatory strategies and motivated behaviors during class activities. For example, items on this scale target information pertaining to how often students seek out help or information as well as how often they come prepared to class. The SRSI-TRS has been found to exhibit moderate correlations with student reports of SRL and motivation. In addition, the SRSI-TRS was found to have high internal consistency and to be a significant predictor of student achievement in mathematics (Cleary & Callan; 2014 Cleary & Kistantas, 2015). It was also found to account for unique variance in students' mathematics achievement (Cleary & Callan, 2014).

The SRSI-PRS is the most recent version of the SRSI system, and, to current knowledge, is the only parent rating scale designed to specifically assess students' academic SRL. The SRSI-PRS is a 23-item Likert scale that asks parents to rate how frequently their child utilizes SRL strategies when studying at home. For example, scale items may ask about homework habits or prioritization of work at home. Chen et al. (2014) evaluated the factor structure of the SRSI-PRS and reported a three factor structure: (a) Managing Behavior and Learning (MBL), Maladaptive Regulatory Behaviors (MRB), and Managing Environment (ME). The SRSI-PRS was also found to show small to moderate correlations between the SRSI-SR, two motivational belief scales, and student mathematics grades. Both the MBL and MRB subscales of the PRS demonstrated predictive validity for student mathematics achievement.

Although Chen et al. (2014) ran an important study it had a few limitations. First, the study only used course grades to measure for academic success. These types of outcomes can be problematic because they reflect on more than mathematics achievement and because several factors are typically used to determine grades, such as participation and homework completion. A second limitation is that the study's sample was mostly comprised of White participants from middle to upper middle class backgrounds; a factor which greatly limits interpretation and generalizability. Finally the study did not include many other types of SRL measures and did not include self-efficacy beliefs, which is largely regarded as the core motivation beliefs from social-cognitive paradigms.

Rationale and Objectives of the Current Study

SRL is a complex process that is a key academic enabler of student success in schools. Traditionally, self-report questionnaires have been the most frequently used measure of SRL (Winne & Perry, 2000). These measures can be useful but research has shown that students may under- or over-estimate their own abilities and inaccurately recall past behaviors (Pintrich et al., 2000). Although researchers have turned to using event types of measures, such as observations and think-alouds (DiBenedetto & Zimmerman, 2013), there is also interest in using teacher and parent rating measures of student SRL. Many of the previous studies focused on observing SRL within an academic setting, typically a classroom (Cleary & Chen, 2009; Hill & Tyson, 2009; Rudolph et al., 2001). There is a particular need in the SRL literature to develop reliable and valid SRL parent rating scales. In addition to being one of the least frequently used types of SRL measures tools, parent ratings are important because parents have the unique opportunity to observe their child outside of school contexts and can provide information that reflects students regulatory actions over long periods of time and across different types of tasks. For example, parents observe their children complete homework, study for tests, and organize their course material.

The overall objective of this research project is to further examine the reliability and validity of the SRSI-PRS, focusing specifically on middle school context and mathematics. More specifically, the data collected in this study will be used to provide evidence to support inferences that the SRSI-PRS is in fact a measure of SRL. This study set out to provide additional evidence for the validity of the SRSI-PRS (See Appendix B). Convergent validity evidence between the SRSI-PRS and both the student ratings (SRSI-

SR) and teacher ratings (SRSI-TRS) of student SRL, and between SRSI-PRS and three motivational belief measures was gathered to expand of previous research. unique variance the SRSI-PRS adds to predicting academic achievement after accounting for the SRSI-SR and SRSI-TRS was also examined.

My first research question is to what extent does the SRSI-PRS correlate between the SRSI-SR and SRSI-TRS. There is evidence across multiple contexts that parent ratings correlate with teacher ratings and student self-reports with low (r = .10 to .30; Cohen, 1988) to medium (r = .30 to .50; Cohen, 1988) levels of correspondence (i.e., *r's* ranging from .20s to .60s; Achenbach et al., 1987; Cohen, 1988). For example, prior research with SRSI measures has shown small sized relations between the SRSI-SR and SRSI-PRS, (r's =.11 to .26; Chen et al., 2014). Research with the SRSI-TRS also found medium relations with other student report measures (r's =.32 to .42*;* Cleary & Callan, 2014). As a result, medium effect sizes were expected between the SRSI-PRS and both the SRSI-SR and SRSI-TRS when running Pearson correlations.

My second research question is to examine the extent to which the SRSI-PRS correlates with motivational beliefs including self-efficacy, math interest, and perceived responsibility. Based on SRL theory and research, students' SRL strategy use should correlate with motivational beliefs. For example, students with high self-efficacy have been shown to exhibit more SRL strategies (Bandura, 1997; Eccles & Wigfield, 2002). Research has also shown that the SRSI-PRS correlates at a statistically significant level with other types of motivational beliefs, such as at medium level with task interest (.30 to .50; Cohen, 1988) and at a small level

(.10 to .30; Cohen, 1988) with perceived instrumentality (*r*'s =.11 to *r* =.26; Chen et al., 2014). Additionally, the SRSI-TRS has been shown to correlate at a medium level with self-efficacy and mathematics interest (*r*'s =.32 to .42; Cleary & Callan, 2014). As a result, medium and statistically significant relations with task interest and self-efficacy were expected, and statistically significant but small relations with perceived responsibility were expected, when using Pearson correlations.

Finally, the third research question was how much unique variance does the SRSI- PRS account for in predicting mathematics academic achievement relative to the SRSI-SR and SRSI-TRS. Hierarchical regression analysis was run to determine if the SRSI-PRS accounts for unique variance in academic achievement after controlling for the student and teacher measures (SRSI-SR and SRSI-TRS). Even though medium correlations were anticipated between the parent, teacher, and student versions of the SRSI, it was hypothesized that the SRSI-PRS will account for unique variance in predicting academic achievement. These predications were based, in part, on prior research with the SRSI-PRS (Chen et al., 2014) and SRSI-TRS (Cleary & Callan, 2014). Across these studies each type of rating scale was found to statistically contribute additional insight into how successful students were in the classroom. In this study, however, standardized measures of achievement were used and, for the first time, it included all versions of the SRSI assessment system were used in one analysis.

Methods

The data used for this study was be derived from an extant longitudinal study that included three data collection phases: Spring of 2013, Fall of 2013, and Spring of 2014. The overall goals of the longitudinal study were to examine the extent to which students' motivational beliefs, self-regulation skills, and personal responsibility predict how they perform in school. Several different assessment methods were used to collect data including archival records, self-report questionnaires, a teacher rating scale, and a parent rating scale. Information for this dissertation pertained specifically to the measures administered during the third and final phase of this study in the Spring of 2014, with a particular focus on the Self Regulation Strategy Inventory - Parent Rating Scale (SRSI-PRS). The parents who originally consented for their children to participate at the beginning of the longitudinal study were asked to participate in the study by completing the SRSI-PRS during Spring of 2014.

Sample

School. The participating middle school was located in a Northeastern suburban school district that participated in a longitudinal study from the Spring of 2013 to the Spring of 2014. In this school of approximately 1200 students, 28.7% were from low socioeconomic status (SES), 16% were students with disabilities, and 2.2% had limited English proficiency. The largest ethnic population was characterized as Caucasian (43.4%), followed by Hispanic (26.8%), Asian (17.4%), Black (12.2%), two or more races (0.2%), and Native American (0.1%). More than half of the population spoke English as the primary language at home (60.1%). Furthermore, 73% of the student

population reached proficiency in Language Arts while 76% had Mathematics proficiency.

Participants

Parents. In April of 2014, 354 parents who had given consent for their children to participate in the longitudinal study were asked to complete the SRSI-PRS. Of the 354 parents, 115 returned the consent form and parent rating scale. However, ten surveys were removed prior to analysis due to missing parent, teacher, or student data. Of the remaining 105 surveys, 73 parents (69.5%) of this sample had children in the 7th grade and 32 (30.5%) had children in the 8th grade. Sixty-six (62.9%) of the parents in the sample had children who were female, and 39 parents (37.1%) in the sample had children who were male. Of those parents in the sample, 85 (81.0%) were mothers and 20 (19.0%) were fathers. The ethnicity of these parents was predominantly Caucasian (59.0%), Hispanic (10.5%) and Asian (16.2%). There were 3.8% Black, 8.6% Interracial, and 1.9% classify as "Other" in the participant group. Fourteen (13.3%) of those parents in the sample identify as receiving free and reduced lunch, compared to 91 (86.7) who do not.

Students. Survey information from all 105 students whose parents consented for them to participate and who had corresponding and completed teacher and parent surveys were included in the current dissertation project. Of this sample, there were 66 (62.9%) females and 39 (37.1%) males. Seventy-three (69.5%) of these students were in the 7th grade and 32 (30.5%) were in the 8th grade.

Teachers. Survey information from the mathematics teachers of the 105 students who had completed surveys was included in the current dissertation project. There were

ten mathematics teachers who completed the teacher version of the SRSI-TRS during the same time. Teachers were primarily female (70%) and Caucasian (80%).

Measures

Self-Regulation Strategy Inventory- Parent-Report (SRSI-PRS). The *Self-Regulation Strategy Inventory: Parent Rating Scale (SRSI-PRS)* is a 23-item rating scale that was developed to measure parents' perceptions of their children's self-regulatory behaviors at home during the learning and studying of mathematics (Chen et al., 2014). The SRSI-PRS parallels a self-report version (SRSI-SR) and a teacher rating measures (SRSI-TRS), which, collectively, gathers multi-informant data about the students' self-regulation of learning in order to create a robust account of their regulatory behaviors.

All items on the SRSI-PRS follow the format of a consistent stem, "How often my child…" All of the items focused on a single idea or concept relating to SRL, for example, "…relies on math notes to study" or "… plans how to study for a math test." Items were written both positively and negatively. Items that were negative were purposely written in such a way to determine maladaptive behavior. These items were reverse coded for during statistical analysis of this dissertation. The response choices use a Likert scale of six items ranging from 1 (*almost never*) to 5 (*almost always*), and an option for each item 6 (*don't know*). This last option was later treated as missing data.

Exploratory factor analysis has shown the SRSI-PRS to exhibit a three-factor structure (Chen et al., 2014). The internal consistency, or correlations among items as measured with Cronbach's alpha, showed adequate reliability for each of the three factors (Keppel, Saufley, & Tokunga, 1992). For example, the alpha for the first factor *Managing Behaviors and Learning* (MBL) was $\alpha = .92$; the second factor *Maladaptive*

Regulatory Behaviors (MRB) demonstrated an α = .76, and the third factor *Managing Environment (ME)* displayed an α = .84. The SRIS-PRS has also shown predictive validity in terms of students' mathematics grades. Chen et al. (2014) found that the SRSI-PRS subscales predicted students' mathematics grades. The correlations between these subscale and achievement were as follows: MBL, of r = .28; MRB, r = .38; and ME, r = .16. All of these correlations were statistically significant. Finally, the three factors on the SRSI-PRS exhibited statistically significant correlations (r's = .11 to .26) with the three factors on the SRSI-SR; interestingly, the parents' perceptions of students' maladaptive regulatory behaviors did not correlate at a statistically significant level with any of the SRSI-SR subscales.

The Self-Regulation Strategy Inventory- Teacher-Report (SRSI-TRS). The SRSI-TRS is a 13-item measure designed to assess teacher ratings of student SRL during mathematics class activities. These items were developed to parallel the items on the SRSI-SR, to allow for comparison between raters. In this study, all items were worded in relation to mathematics class and used a five-point Likert scale ranging from 1 (*almost never*) to 5 (*almost always*) with specific anchors for each scale unit. Sample items from this scale include "How often the student seeks help or attends extra help lessons?" and "How often the student is prepared for class?" It was found to have high internal reliability (α = .97). This measure has been found to display medium correlations with student reports of SRL and motivation (i.e., mathematics interest, r =.32; maladaptive regulatory behaviors, r = -.41; test taking strategies, r = -.42; Cleary & Callan, 2013). In addition, the SRSI-TRS was found to be a significant predictor of student achievement in mathematics (Cleary & Callan, 2014; Cleary & Kistantas, 2015). It was also found to

account for unique variance in the students' mathematics achievement, with the SRSI-SR findings showing that the SRSI-TRS and motivational scales accounted for approximately 38% of the variance in mathematics achievement. More specifically the SRSI-TRS contributed a medium level of variation (9.4%) in mathematics test score (Cleary & Callan, 2014; Cohen, 1988). These results demonstrated that the SRSI-TRS added unique value to the prediction of mathematics achievement and was the primary SRL predictor of students' academic achievement.

Self-Regulation Strategy Inventory- Self-Report (SRSI-SR). The Self-Regulation Strategies Inventory- Self-Report (SRSI-SR) is a 28-item self-report measure designed to gather information about student reports of their use of self-regulation strategies relative to homework and studying in mathematics. All items were worded in relation to mathematics class and used a five-point Likert scale ranging from 1 (*almost never*) to 5 (*almost always*) with specific anchors for each scale unit. A general stem phrase "How often do you do these things when doing math?" was used. Factor analysis has shown this measure to possess a three-factor structure: (a) *Managing Environment and Behavior (*MEB*)*; (b) *Seeking and Learning Information* (SLI); and (c) *Maladaptive Regulatory Behavior* (MRB; Cleary, 2006). The Management Environment and Behavior subscale consists of twelve items that target the frequency with which students use strategies while managing their studying and if they are engaging in self-control during studying. For example, a question on this subscale is "I make sure no one disturbs me when I study." The Seeking and Learning Information subscale consists of eight items that measure how frequently the student reports using specific study strategies or asking for help during studying. An example item from this subscale is, "I ask my teacher

questions when I do not understand something." The Maladaptive Regulatory Behavior subscale is made up of eight items that measure how often students report engaging in maladaptive regulatory behaviors. An example item from this subscale is, "I forget to bring home my study materials when I need to study for math tests." The questions in this scale are stated negatively to determine maladaptive behavior but will be reverse coded for this study. Research has shown excellent internal consistency for the overall SRSI-SR (α = .92) and good internal consistency for individual subscales (α = .60 to .86; Chen et al., 2014; and α = .72 to .88; Cleary, 2006). Cleary (2006) found that all of the SRSI-SR subscales loaded onto one higher order factor, with factor loadings that ranged from .83 to .71. Further, it was shown that this measure reliably differentiated high and low achievers in science.

Sources of Mathematics Self-Efficacy Scale (SMES). The *Sources of Mathematics Self-Efficacy Scale* (Usher & Pajares, 2008) is a 7-item scale that targets student perceptions of efficacy to regulate their behavior during mathematics tasks. Based on Bandura's (1997) four sources of self-efficacy assessment in middle school mathematics students, it uses a 5-point Likert scale that ranges from 1 (*not well at all*) to 5 (*very well).* An example item is "How well can you participate in math class discussions?" It has been found to have an adequate internal consistency (α = .85 to .92). Consistent with theoretical predictions, the scale was also shown to converge with other motivational constructs such as self-concept and mastery goals (Usher & Pajares, 2008).

Task Interest Inventory (TII). The *Task Interest Inventory* (Cleary, 2006) is a 6-item self-report scale that was customized to measure students' interest in mathematics activities. Students are asked to use a 5-point Likert scale, ranging from 1 (*Strongly*

disagree) to 5 (*strongly agree,* to rate "How much do you agree or disagree with the following statements about math." An example item is "I look forward to going to math class." The measure has been found to exhibit adequate internal consistency (α = .75) and has been used to reliably differentiate between high and low achieving groups, showing evidence for discriminant validity among achievement groups in high school (Cleary, 2006).

Perceived Responsibility Scale (PR). The *Perceived Responsibility Scale* (Zimmerman & Kitsantas, 2005) is a 20-item measure that assesses students' perceptions of whether they or their teachers are most responsible for various academic-related activities. The stem "Who is more responsible for the following things…the teacher or the student?" was then followed by a 7- point Likert scale ranging from 1 (*mainly the teacher*) to 7 (*mainly the student)* for each question. An example item was, "Who is more responsible a student understanding assigned homework readings?" It has been found to have strong internal consistency (α = .97) and to be predictive of students' high school grades (r =.08*;* Zimmerman & Kistantas, 2005).

Mathematics achievement. The school provided students' STAR mathematics scores and fourth quarter report card grades for all participating students for the current 2013-2014 academic year of the study. STAR Math is an online, standardized, adaptive assessment by Renaissance Learning, Inc. that provides insight into students' academic progress (Renaissance Learning, 2009). The STAR Math used for this study was administered in May 2014.

Demographic information. Students' socio-economic status, gender, grade, and ethnicity, were be obtained through school records. Socio-economic status was determined as measured by qualification for free or reduced lunch. (See Appendix C).

Procedures

The sample represented a subset of parents, students, and teachers who participated in a larger, longitudinal research study conducted at one middle school in New Jersey. However, the primary focus of this study involves parent reports about students' SRL behaviors during homework and studying activities. Although the student and teacher data (i.e., SRSI-SR and SRSI-TRS) was collected as part of the larger longitudinal, the SRIS-PRS was added to the last phase of data collection in Spring of 2014 specifically for the purposes of this dissertation.

The parent participant pool consisted of the 354 parents who consented for their children to participate in the longitudinal study. Envelopes were sent home with students in their homeroom to inform parents of the study and ask them to complete the SRSI-PRS. Envelopes included a list of directions, a consent form, the parent rating scale, and an empty legal sized envelope. Parents were asked to return the completed consent form and survey in the legal envelope, along with sealing and signing the back to ensure the confidentiality of the responses. Students handed in the parent surveys in sealed envelopes to the main office of the target school. After two weeks, parents who had not yet returned the consent and rating scale were sent a reminder and another packet to complete and return.

Completed parent surveys were entered into an SPSS dataset by the primary investigator. Parent names were replaced with a private ID# linked to the students'

identification numbers. Student and teacher surveys were collected through the larger longitudinal study and entered into the database by other doctoral research assistants as part of that larger project. The participating school provided information regarding each students' gender, grade, final mathematics grade for the 2013-2014 school year, mathematics class level, and if the students receive free or reduced lunch.

Results

This chapter examines the results from the data analytic techniques performed. Before engaging in statistical analyses to address the research questions, preliminary analyses were conducted to assess the adequacy of measures, check statistical assumptions, and examine missing data. All statistical analysis was performed using IBM SPSS Statistics Premium GradPack 22. Following the preliminary analyses, descriptive and inferential statistical procedures were conducted to address the following three research questions: (1) To what extent does the SRSI-PRS correlate between the SRSI-SR and SRSI-TRS; (2) To what extent to does the SRSI-PRS correlate with motivational beliefs including self-efficacy, math interest, and perceived responsibility; and (3) How much unique variance does the SRSI-PRS account for in mathematics academic achievements relative to the SRSI-SR and SRSI-TRS.

Screening Procedures and Examination of Assumptions

Missing data. Of the 115 participants whose parents originally returned completed informed consents and parent rating scales, 10 parent-student pairs were removed from the regression analyses due to incomplete or missing student, teacher, or parent questionnaire data. There were six missing or incomplete student SRL and motivational questionnaire scales, one missing teacher SRL scale, and three partially completed parent SRL scales. A total of 105 parent scales and the 105 respective student and teacher scales were included in the final analyses.

Of these 105 parents, students, and teacher composites, no individual was missing more than recommended limit of 20% of items on an individual scale (Downey & King, 1998). In terms of the SRSI-PRS, it is important to note that this measure included an

option of "don't know." All don't know responses were treated as missing items. Any PRSI-RS item that had more than 10% missing data (Schlomer, Bauman, & Card, 2010). Three items were deleted from analyses due to missing more than 10% of the items: "My child tries to identify the format of upcoming math tests (e.g., multiple-choice or open-ended questions)," "My child makes pictures or diagrams to help himself or herself study math concepts," and "My child tells himself or herself exactly what he or she wants to accomplish before studying." Of the remaining 20 items, 18 had relatively low levels of missing data, ranging from 1% - 7.6%.

Missing data for the student version of the SRSI was extremely low. Three of the 28 items were missing one data point (1%). No other missing data was observed for this measure. Regarding the13-item SRSI-Teacher Rating Scale (TRS), only one missing data point for one item was noted. There were also a very low number of missing values for the motivation measures: the self-efficacy (one of nine items exhibited missing one data point, 1%); math interest (one of six items were missing one data point, 1%); and perceived responsibility (5 of 20 items were missing one to two data points, 1% - 1.9%). Due to the extremely low percentage of nature of the missing data, the expectation maximization (EM) algorithm method of replacing missing values was used through SPSS 22 (Meyers, Lawrence, Gamat, & Guaino, 2013).

Assumptions of normality. In order to evaluate normality, histograms were visually inspected and then skewness and kurtosis values were examined (see Table 1). There were no identified areas of concerned and all but one of the values were less than one or negative one. The one value that was beyond this suggested range was just slightly

over and still considered acceptable for the current study (Kline, 2005). The range of skewness values was -1.10 to .14 while the range of kurtosis values was -.87 to .85.

Table 1

Means, Standard Deviations, Skewness, Kurtosis, and Alphas of Variables

Measure	**Mean**	**Standard Deviation**	**Skewness**	**Kurtosis**	**Alpha**
PRS-Composite	3.54	.74	-.35	-.22	.914
PRS-Managing behavior and learning	3.26	.88	-.15	-.77	.885
PRS-Managing environment	3.54	.96	-.26	-.71	.821
PRS-Maladaptive regulatory behaviors[a]	4.16	.76	-1.10	.85	.824
TRS	3.62	.91	-.18	-.66	.944
SR Composite	3.69	.66	-.45	.11	.923
SR-Managing environment / behavior	3.51	.81	-.53	.46	.890
SR-Seeking and learning information	3.55	.76	-.54	.19	.771
SR-Maladaptive regulatory behaviors[a]	4.12	.60	-.83	.67	.744
Sources of Mathematics Self-Efficacy	3.94	.71	-.50	-.28	.822
Task Interest Inventory	3.64	.85	.14	-.87	.888
Perceived Responsibility	4.78	.74	-.05	.52	.848

Note. N = 105 (parents and corresponding teachers and students). PRS = SRSI parent rating scale. SR = SRSI self-report. TRS = SRSI teacher rating scale.
[a] = reverse coded.

Analysis

To address the three research questions, version IBM SPSS Statistics Premium GradPack 22 was used to run all statistical procedures. To address the first research question, Pearson correlations were used to examine the level of convergence between the parent rating scale (SRSI-PRS) and the teacher rating scale (SRSI-TRS) and student self report (SRSI-SR). For the second research question, Pearson correlations were used to examine the level of convergence between the SRSI-PRS and student motivation belief measures. To address the third research question, hierarchical regression analysis was used to examine whether the SRSI-PRS emerged as a unique predictor of student achievement after controlling for both the SRSI-TRS and SRSI-SR. One-tailed tests using a significant level of $p < .05$ were used in all analysis. Cohen's (1988) criteria to describe the strength of relations was also used, with .10 - .30 indicating small relations, .30 - .50 indicating medium relations, and .50 - .70 indicating large relations.

Research Objective #1: To what extent does the SRSI-PRS correlate between the SRSI-SR and SRSI-TRS? The first question examined the extent to which parent ratings of student SRL converge with student and teacher reports of student SRL. To address the first research question, bivariate correlations were computed between the measures of interest; SRSI-PRS, SRSI-TRS, and SRSI-SR. It was hypothesized that there would be medium relations between the SRSI-PRS and the other two measures. As expected, all subscales from the SRSI-PRS exhibited statistically significant correlations with the SRS-TRS, with the size of relations ranging from $r = .29$ to .45. Thus, students whose parents who rated them as exhibiting regulatory behaviors on a frequent basis at home were also likely to be rated in a similar way by their teachers.

Regarding the level of convergence expected between the SRSI-PRS and SRSI-SR, the hypothesis that there would be medium relations across all subscales was partially confirmed (see Table 2). The SRSI-PRS Managing Behavior and Learning subscale displayed statistically significant positive correlations with all subscales from the SRSI-SR, with the range in size of relations from r = .23 to .38. The SRSI-PRS Managing Environment subscale exhibited statistically significant positive correlations with all three of the SRSI-SR subscales, with the size of those relations being r = .17 to .23. Finally, the SRSI-PRS subscale of Maladaptive Regulatory Behaviors, which was reverse coded for analysis, exhibited statistically significant positive correlations all subscales on the SRSI-SR, with the size of those relations being r = .21 to .36. This

Table 2

Correlations Among Parent, Teacher, and Student SRL Measures

Measures	1	2	3	4	5	6	7
1. PRS–Managing behavior and learning	--						
2. PRS-Managing environment	.53**	--					
3. PRS-Maladaptive regulatory behaviors[a]	.59**	.46**	----				
4. TRS	.36**	.29**	.45**	--			
5. SR-Managing environment / behavior	.33**	.23**	.36**	.27**	--		
6. SR-Seeking and learning information	.38**	.17*	.28**	.17*	.84**	--	
7. SR-Maladaptive regulatory behaviors [a]	.23**	.20*	.21*	.33**	.58**	.52**	--

Note. N = 105 (parents and corresponding teachers and students). PRS = SRSI parent rating scale. TRS = SRSI teacher rating scale. SR = SRSI self-report.
*p < .05 ** p < .01
[a] = reverse coded.

means that parents who rated their children as exhibiting lower negative behaviors had children who rated their positive SRL strategy use higher.

Research Objective #2: To what extent to does the SRSI-PRS correlate with motivational beliefs? To address the second research question, bivariate correlations were computed between the SRSI-PRS and three motivation belief measures: Sources of Mathematics Efficacy Scale, Task Interest Inventory, and Perceived Responsibility. The hypothesise was that there would be medium relations between the SRSI-PRS and both the Sources of Mathematics Efficacy Scale and Task Interest Inventory. It was also hypothesized that there would be small relations between the SRSI-PRS and Perceived Responsibility. These hypotheses were only partially confirmed. All subscales of the SRSI-PRS displayed statistically significant and positive correlation with the Sources of Mathematics Efficacy Scale (SMES), with the range of relations from size from $r = .25$ to .34. Thus, parents who rated their children as using more SRL strategies had children who rated themselves as having a sense of higher self-efficacy.

The Task Interest Inventory exhibited statistically significant positive correlations with only two of the SRSI-PRS subscales, with relations $r = .18$ and .20, but contrary to hypotheses regarding the size of the relations, these relations were smaller than expected.

There was also no statistically significant relation between the Task Interest Inventory and the Managing Environment subscale of the SRSI-PRS ($r = .06$). Finally, contrary to expectations, none of the subscales from the SRSI-PRS exhibited significant relations with the Perceived Reasonability scale. In fact, all three subscales had negative relations, albeit in the small to no relation range. Thus, there was no relation between

Table 3

Correlations Among Parent SRL Measure and Student Motivational Measures

Measures	1	2	3	4	5	6
1. PRS-Managing behavior and learning	--					
2. PRS-Managing environment	.53**	--				
3. PRS-Maladaptive regulatory behaviors[a]	.59**	.46**	--			
4. Sources of Mathematics Self-Efficacy	.25**	.28**	.34**	--		
5. Task Interest Inventory	.20*	.06	.18*	.56**	--	
6. Perceived Responsibility	-.06	-.11	-.05	.22*	.31**	--

Note. N = 105 (parents and corresponding teachers and students). PRS = SRSI parent rating scale.
*$p < .05$ ** $p < .01$
[a] = reverse coded.

parents who rated their children as using SRL strategies and children's rating of who they believed is most responsible for their success in school. Although it was not included as part of the original research questions, it is noteworthy, particularly when compared with the relations between the PRS and motivation belief measures, that all three self-report subscales of the SRSI displayed statistically significant correlations with the student reported motivational scales. The majority of these relations were in the moderate to large range (see Table 4). The Sources of Mathematics Efficacy Scale exhibited large relations with all SRSI-SR subscales (*r'*s = .54 to .74). The Task Interest Inventory had medium to large relations with all three student self-report subscale (*r*'s = .40 to .52). Finally, the Perceived Responsibility displayed small to medium relations with all three subscales (MEB, *r'*s = .28 to .34). These findings are similar to previous research that student

Table 4

Correlations Among Student and Teacher SRL Measure and Student Motivational

Measures	1	2	3	4	5	6
1. SR – Managing learning and behavior	--					
2. SR – Seeking learning / environment	.84**	--				
3. SR - Maladaptive regulatory behaviors[a]	.59**	.52**	--			
4. Sources of Mathematics Self-Efficacy Scale	.74**	.62**	.54**	--		
5. Task Interest Inventory	.51**	.52**	.40**	.56**	--	
6. Perceived Responsibility	.34**	.29**	.28**	.22*	.31**	--

Measures

Note. N = 105 (parents and corresponding teachers and students). SR = SRSI student rating scale.
*$p < .05$ ** $p < .01$
[a] = reverse coded.

reports of their SRL behaviors were more closely related to their motivational beliefs than parent reports of student SRL behavior.

Research Objective #3: How much unique variance does the SRSI- PRS account for in mathematics academic achievement relative to the SRSI-SR and SRSI-TRS? To address the third research question, hierarchical regression analysis was used to determine whether the addition of the SRSI-PRS subscales improved prediction of student's mathematical achievement over and above that variance accounted for by the teacher and student versions of the SRSI. The hypothesis was that the SRSI-PRS would show a unique contribution to mathematics achievement after controlling for the student and parent versions. In the regression models, composite score for both the parent and

student scales were used. The predictive validity of the SRSI-PRS across two separate dependent measures of mathematics achievement (i.e., standardized mathematics scores and course grades) were also examined.

Table 5

Hierarchical Regression Analysis Predicting Students' Standardized Mathematics Scores with Student, Teacher, and Parent Variables

Model	Zero-order correlation	Semipartial correlations (sr^2)	β	*t*	R^2
Step 1					.139
SRSI-TRS	3.35	.287 (8.2%)	.29	2.98*	
SRSI-SR	.25	.165 (2.7%)	.17	1.77	
Step 2					.141
SRSI-TRS	.34	.239 (5.7%)	.27	2.56*	
SRSI-SR	.25	.142 (2.0%)	.16	1.52	
SRSI-PRS	.24	.045 (0.2%)	.05	.48	

Note. Step 1: Adjusted R^2 = .122; Step 2: Adjusted R^2 = .115; ΔR^2 = .002. PRS = SRSI parent rating scale. TRS = SRSI teacher rating scale. SR = SRSI self-report.
* $p < .05$; ** $p<.01$

In terms of the first model, SRL predictor variables were entered in two blocks and standardized measure of mathematics achievement was used, STAR Math, as the dependent variable. In block 1, the SRSI-TRS and SRSI-SR assessment measures were included. Collectively, these two measures of SRL accounted for a medium level of variation (R^2 = 13.9%) in standardized mathematic achievement scores,

$F(2,99) = 8.006$, $p = .001$. To determine whether the addition of the PRS composite accounted for unique variance after controlling for all other SRL measures, change in R^2 value was examined after adding the SRSI-PRS composite. Contrary to expectations, the PRS only accounted for an additional $R^2 = 0.2\%$ of the variance in achievement, $F(3,98) = .232$, $p = .631$. Interestingly, in both models the only significant contributing scale predictor was the SRSI-TRS.

Table 6

Hierarchical Regression Analysis Predicting Students' Class Grades with Student, Teacher, and Parent Variables

Model	Zero-order correlation	Semipartial correlations (sr^2)	β	*t*	R^2
Step 1					.243
SRSI-TRS	.48	.417 (17.0%)	.44	4.85***	
SRSI-SR	.26	.134 (1.80%)	.14	1.56	
Step 2					.287
SRSI-TRS	.48	.348 (12.1%)	.35	3.73***	
SRSI-SR	.26	.077 (0.6%)	.07	.78	
SRSI-PRS	.42	.209 (4.4%)	.24	2.49*	

Note. Step 1: Adjusted $R^2 = .243$; Step 2: Adjusted $R^2 = .287$; $\Delta R^2 = .044$. PRS = SRSI parent rating scale. TRS = SRSI teacher rating scale. SR = SRSI self-report.
* $p < .05$; ** $p < .01$

For the second regression model, the fourth quarter class grades as the dependent variable were used and the analysis were rerun. Similar to the first regression model, the

objective for block 1 was to identify the amount of variance accounted for by student and teacher measures of student SRL, whereas the objective in block 2 was to examine whether the SRSI-PRS adds a unique contribution in predicting achievement. In block 1, the teacher and student SRL measures accounted for 24.3% of the variance in course grade achievement, $F(2,102) = 16.399$, $p = .000$. Interestingly, unlike in the previous model that used a standardized measure of mathematics achievement, the SRSI-PRS accounted for an additional significant amount of variance ($R^2 = 4.4\%$) in achievement, $F(3,101) = 6.181$, $p = .015$.

To examine whether the contribution from the parent scale was due to one of the subscales, post hoc regression analysis was run using the three PRS subscales rather than the overall composite. Similar to the previous analysis, fourth quarter class grades were used as thedependent variable and the self-report composite and teacher rating scales were entered as predictors in block one. In block 2 all three PRS subscales were included to determine the unique variance the subscale contributes to predicting academic achieving after accounting for the teacher and student ratings. As with the previous regression, in block 1 the teacher and student SRL measures accounted for $R^2 = 24.3\%$ of the variance in class grade achievement, $F(2,102) = 16.399$, $p = .000$. After adding the three subscales, the overall model was still significant $F(5,99) = 8.638$, $p = .015$). The overall change in R^2 was also significant $F(5,99) = 2.864$, $p = .041$, but was slightly more than in the previous model using the PRS composite score ($R^2 = 30.4\%$). Interestingly, none of the PRS subscales entered in block 2 emerged as a significant predictor for this regression analysis.

Table 7

Hierarchical Regression Analysis Predicting Students' Class Grades with Student, Teacher, and Parent Variables (N = 105, parents and corresponding teachers and students)

Model	Zero-order correlation	Semipartial correlations (sr^2)	β	*t*	R^2
Step 1					.243
SRSI-TRS	.48	.417 (17.0%)	.44	4.85***	
SRSI-SR	.26	.134 (1.8%)	.14	1.56	
Step 2					.304
SRSI-TRS	.48	.286 (8.2%)	.33	3.40**	
SRSI-SR	.26	.066 (0.4%)	.07	.79	
SRSI-PRS- Managing Behavior / Learning	.34	.010 (0.1%)	.01	.91	
SRSI-PRS- Managing Environment	.34	.114 (1.3%)	.14	1.36	
SRSI-PRS- Maladaptive Regulatory Behaviors	.43	.137 (1.9%)	.18	1.63	

Note. Step 1: Adjusted R^2 = .243; Step 2: Adjusted R^2 = .304; ΔR^2 = .060. PRS = SRSI parent rating scale. TRS = SRSI teacher rating scale. SR = SRSI self-report.
* $p < .05$; ** $p<.01$; ** $p<.001$

Discussion

The purpose of this dissertation was to provide convergent and predictive evidence supporting the validity of the SRSI-PRS, a measure designed to gather information on parents' perceptions of their children's self-regulatory behaviors at home during the learning and studying of mathematics. This current study is important because it builds upon SRL assessment literature, supporting the premise that parent rating scales can serve as a useful supplement to help develop a more robust profile of students' use of SRL strategies. This study was unique because it included the parent version (SRSI-PRS), teacher version (SRSI-TRS), and student version (SRSI-SR), along with additional measures of motivation (SMES, TII, PR). Results showed that the parent rating scale correlated in expected directions with the teacher and student versions of the scale, the self-efficacy scale, and partly with the task interest scale. This study also demonstrated that the parent rating scale adds unique variance to the prediction of mathematics achievement, but only for student course grades. Contrary to the hypotheses, the parent rating scale did not show correlations with the perceived responsibility scale and the scale was not shown to add unique variance in predicting standardized mathematics scores. These results are discussed in more detail below.

Relations Between SRSI Parent Rating, Teacher Rating, and Self-Report Measures

For the first research objective it was examined whether parent ratings of student SRL strategy use was related to teacher ratings and student ratings of SRL strategy use. Medium-sized and statistically significant relationships between the SRSI-PRS and both the teacher and student versions of the SRSI were expected. For the most part, these hypotheses were confirmed.

Relations between SRSI-PRS subscales and SRSI-TRS. In terms of the level of convergence between teacher (TRS) and parent ratings (PRS) of student SRL, the hypothesis was confirmed, as relations between the parent rating measure and the teacher rating measure were shown to be medium in size (*r*'s = .29 to .45). This size of relations may mean that the parent and teacher ratings may target related, but different constructs, and provides further support that the parent rating scale is a measure of SRL. Conceptually, this makes sense as both scales ask about overt behaviors, or behaviors in which both the parent and the teacher can see the direct impact, but in different settings. Medium relations, compared to high relations that show highly related and overlapping constructs, may make sense as different settings elicit different SRL behavior. Teachers are commenting on behaviors observed during the school day and parents are commenting on home behaviors. While gathering different information, students in these various contexts may portray similar behavior or may exhibit behavior that affects the other setting. For example, remembering to bring home study materials affects the student's ability to complete homework and receive homework credit in class the next day. The results between parent and teacher ratings are also similar to the medium levels found in previous research on the SRSI-TRS and its relations to student report measures (Cleary & Callan, 2014). In their study, researchers used high school students and their teachers to examine the predictive validity and level of convergence between student self-report questionnaires and the same teacher rating scale that was used in the current study. Cleary and Callan's (2014) study also showed moderate correlations between the teacher ratings and student self-report ratings.

Relations between SRSI-PRS subscales and SRSI-SR subscales. The majority of the relations observed between the parent subscale and student subscale measures were in the medium range, but there was a wide range of relations observed. Thus, overall, the parents rating of their children's use of SRL strategies use is measuring related but distinct behavior than the construct students are rating themselves. As discussed with the teacher rating scale, it makes sense that medium relations were observed as the students are measuring how they perceive their SRL behavior, whereas parents are measuring how they perceive their child's home behavior. These are two different outlooks and interpretations. These results are similar to previous findings between the parent and student rating scale on SRL. In the original study by Chen and colleagues (2014), in which middle school students and their parents completed ratings scales on SRL and motivation, small to medium relations were found between all three subscales on both the parent rating scale and the student self-report questionnaire.

In contrast to expectations, small but significant correlations were observed between the parent subscale asking about how students' manage their environment and the student report subscale that asks about how they try to find and learn information. In other words, the parents' ratings of their children's ability to manage their learning environment and the students' ratings of their ability to seek and learn new information were shown to only have slightly related constructs. Small, but significant, relations were also shown between all three subscales on the parent rating scale with students' ratings of their maladaptive regulatory behavior.

These findings are similar to other multi-informant measures involving parents and their children, such as with an anxiety disorders scale (Brown-Jacobsen, Wallace, &

Whiteside, 2011) and personality traits (Zapolski & Smith, 2013). The size of these correlations are also supported by research on multiple informants that shows small to medium levels of correspondence between multiple raters (Achenbach et al., 1987; Cohen, 1988). The result between the parent ratings and student self-report ratings are somewhat expected given the prior research that between the SRSI-PRS and the SRSI-SR that also had exhibited small relations (Chen et al., 2014). Again, this relates back to Achenbach and colleagues (1987) research, along with the idea that outside observers rate more objectively compared to students' subjective ratings (Winne & Perry, 2000).

Although not a direct objective of the current paper, it is interesting that student self-reports across the three SRSI-SR subscales exhibited large to very large relations with each other (*r*'s = .52 - .84), suggesting that the three individual subscales are measuring overlapping constructs. Also worth noting, there were small to medium statistically significant relations between the self-report subscale and the teacher rating scale (*r*'s = .17 to .33). This suggests that the teacher and student self-report scales also measures distinct but related constructs, which is to be expected based on the results exhibited between the parent rating scale and self-report scale.

Relations Between SRSI-PRS Subscales and Motivational Measures

I hypothesized that statistically significant relationships of medium size would emerge between all three SRSI-PRS subscales and student reports of self-efficacy (SMES) and task interest (TII), and small relations between the SRSI-PRS and student reports of perceived reasonability (PR). The rational for these hypotheses was based primarily on past research that found small to medium levels of correspondence between

the SRSI-PRS and motivational levels (*r*'s = .11 to .42; Chen et al., 2014; Cleary & Callan, 2014).

The hypotheses were generally confirmed. The three SRSI-PRS subscales showed statistically significant and small to medium relations with the self-efficacy scale. These results are similar to other findings between SRL measures and self-efficacy (Cleary & Callan, 2014; Cleary & Zimmerman, 2004; Eccles & Wigfield, 2002; Schunk, 1984). For example, a recent study in Spain on six-year-olds found an interaction between self-efficacy beliefs and SRL predicted performance (Salmerón-Pérez, Gutierrez-Braojos, Fernández-Cano, Salmeron-Vilchez, 2010). This link between motivation and SRL is similar to relations shown in a wide range of SRL measures. Thus, the fact the PRS showed similar findings provides evidence that the SRSI-PRS is a measure of SRL strategy use.

Although not a direct objective of the current paper, it was of interest that student self-reports across the three SRSI-SR subscales exhibited large relations with their ratings of self-efficacy (*r*'s = .54 - .74), suggesting that when the same source of motivation and SRL information is used, higher relations might be expected. Of greater importance, however, was the current finding that both parents and teachers had significant medium relations with the self-efficacy scale. This is different than the previous research by Cleary and Callan (2014) that showed the SRSI-TRS does not exhibit significant relations with self-efficacy. One reason for this difference may be that the study by Cleary and Callan (2014) used a different scale to measure mathematics self-efficacy, which focused on how students perceived their ability to perform well in class. The researchers in the study questioned the utility of using mathematics self-efficacy to relate to all classroom

behaviors observable to other informants. The current results may validate their rationale for why they had non-significant findings in their study.

The SRSI-PRS subscales of Managing Behavior and Learning and Maladaptive Regulatory Behaviors exhibited small but statistically significant relations with the Task Interest Inventory. These low relations are still significant, but indicate that how interested students are in a task may not be related as strongly with how frequently students use SRL strategies as perceived by parents. These relations are highly similar to the relations reported by Chen and colleagues (2014). In that study of the parent rating scale with middle school students self-reports of SRL and motivation, researchers found *r* = .21 and .23, respectively. The link between the PRS and student task interest beliefs also fit with previous research finding showing that task interest reliably differentiates high and low achievers (Cleary, 2006). Interestingly, and different than in prior findings, the SRSI-PRS subscale of asking about how their children manage the environment did not demonstrate a statistically significant relation with the task interest scale, meaning that parents did not rate student's ability to create a learning environment as having a relationship with students' interest on the task. When all SRSI-PRS subscales are viewed collectively, the results may suggest that a student's interest in math may not impact how they will structure their learning environment at home. It may mean that a student's interest in math may impact their studying strategies and how they prioritize math work.

Additionally, none of the SRSI-PRS subscale showed significant correlations with the Perceived Responsibility scale. This may mean that the student's perceived responsibility does not measure the same construct as the SRSI-PRS rating scale. The rational that there would be statistically significant relations between perceived

responsibility and parent reports of student SRL was based on research showing that individuals with higher SRL use and self-efficacy tend to recognize more personal responsibility (Zimmerman & Kitsantas, 2005). Zimmerman and Kitsantas (2005), who developed the Perceived Responsibility scales used in this study, found that high school females showed significant paths between student responsibility, self-efficacy beliefs, and academic grades point averages. They hypothesized that self-regulation may play a mediating role in this relation. Possible reasons for the mediating effects found in their study and the current study's non-significant findings may be two-fold. First, the original study examined the scale on an older population, who developmentally may have more awareness of their academic success being within their control along with taking more initiative over academic behaviors. Second, parents are outside observers of the work being done, and not privy to the students' internal process of who's accountable for success.

Predictive Validity of the SRSI-PRS

The third research objective of this dissertation was to explore the predictive validity of the SRSI-PRS. It was hypthesized that the SRSI-PRS would account for unique variance in mathematics achievement, across both standardized test score and course grades. This was partially confirmed with the SRSI-PRS showing unique variance in predicting course grades but not standardized test scores. This is an interesting finding in that the SRSI-PRS composite did not add uniquely to standardized achievement levels, but the SRSI-TRS did show medium predictive validity for this measure. The SRSI-PRS accounted for 4.4% of variance in achievement after controlling for the SRSI-TRS and SRSI-SR when using fourth quarter mathematics course grades as the dependent measure.

Collectively all three rating scales predicted 28.7% of the mathematics course grades. This finding is consistent with a comprehensive literature base showing that students' use of SRL strategies and behaviors are linked to achievement (Asaro-Saddler & Saddler, 2010; Perels et al., 2009). Chen et al. (2014) examined the predictive validity of the SRSI-PRS on course grades when controlling for the SRSI-SR and student-reported motivational beliefs. In that study, the authors found that the parent rating scale accounted for an additional 12% of the variance. These findings emphasize the importance having multiple informants contribute perspectives in order to better understand the complete profile of a student. In the Chen et al. (2014) study the teacher rating scale was not included, which may be the reason for the lower amount of variance explained by the SRSI-PRS in the current study. This may mean that there is some overlap in the parent and teacher rating scale constructs, but that they are still both measuring unique aspects of SRL behavior.

However, in terms of standardized math scores, the parent rating scale unexpectedly accounted for only 0.2% of the variance in achievement after controlling the 13.9% of the variance accounted for by both teacher and student self-report measures of student SRL. This was an unexpected result since research discusses the importance of having the parent's perspective of observing their child's SRL strategies in the home environment (De Los Reyes et al., 2013). It was hypothesized that the home behaviors observed by parents would contribute to unique insight for student achievement, as they were with course grades, but it is possible that standardized testing relies more heavily on just individual content skills and not how a student applies SRL strategies.

General perspective on the parent, teacher, and self-report versions of the SRSI. Overall, the results from this study showed that both the SRSI-PRS and the SRSI-TRS contribute unique variance in student mathematics grades. This is a critical finding because it demonstrates that the parent rating scale adds additional information to the overall understanding of a student's SRL use and validates that the scale does, in fact, have predictive validity. Together, the teacher rating scale and the parent rating scale provide a robust perspective of students' SRL behaviors and strategy use. Interestingly, the results revealed that the self-report questionnaire did not predict academic achievement, meaning that parent and teacher ratings of student SRL were far superior to students' reports of their own behavior in predicting achievement.

However, the results also showed that none of the PRS subscales accounted for unique variance in student achievement. The current result differs from the prior research by Chen and colleagues (2014) by showing smaller values of unique variance than the current study. As discussed earlier, their study did not include teacher ratings and may be why the current study found lower result values for the variances attributed by the SRSI-PRS. In addition, in the current study the larger amount of variance accounted for by teachers than parents may be the result of the grading system used. Teachers include SRL related strategy use or tasks, such as homework completion and class participation, in their grading so it makes sense that they are similarly rating students when asked about SRL.

Another interesting aspect was the finding that the SRSI-PRS composite did not add uniquely to standardized achievement levels, but the SRSI-TRS did show medium predictive validity for this measure. This is an important point because prior research

questioned whether the SRSI-TRS was only useful in predicting course grades (Cleary & Callan, 2014). Thus, the rating of student SRL provided by teachers appears to be an extremely important predictor of achievements, as it predicts both standardized test performance and more contextualized academic outcomes. There are a couple of reasons why teacher ratings are valuable. It is possible that teachers understand what is expected for academic success compared to same-aged peers. Teachers also observe students on a daily basis completing a wide range of learning tasks, whereas parent may only see a limited sample of SRL behaviors. The importance of teacher ratings is consistent with prior research. Powers, Doherty, Panichelli-Mindel, Karustis & Eiraldi (1998) conducted a study to examine if parent and teacher ratings could differentiate AD/HD in boys and girls aged six to 14 years. In their study, researchers concluded that both parents and teachers significantly predicted diagnostic status; however, teachers were more predictive of what subtype of AD/HD students received (Powers et al., 1998). Previous research by Zapolski and Smith (2013) studying the predictive validity of parent and student reports of personality traits also found mixed findings in the amount of unique information parents contributed. In their study looking at the predictive validity of parent reports on six maladaptive behaviors in their children, parents only exhibited statistical predictions for three of the six traits: lack of planning, negative urgency, and positive urgency (Zapolski & Smith, 2013). These inconsistent findings fit with the idea that parents may not be able to predict all behaviors, but do have insight into some of their children's use of strategy.

Limitations and Future Research

It is important for future research to continue to expand on the validity and reliability of this parent rating scale measure. This dissertation expanded on the initial study of the SRSI-PRS conducted by Chen et al. (2014) by including a teacher rating scale and a more robust range of motivational measures. There were some limitations in the current dissertation, however. First, a relatively small sample was used in this study. Although there was adequate statistical power to conduct the desired statistical analyses, the sample was somewhat small in comparison with other psychometric studies. The limited sample studied mean that the results cannot be as generalizable as with a larger sample that is representative of a larger group. Next, data was collected as part of a larger longitudinal data, so parents were only asked to participate if they had consented to their children participating the previous year. These students were originally recruited if they were in 6^{th} or 7^{th} grade, meaning that at the time of the current study they were only in 7^{th} or 8^{th} grade. This creates a restricted range in regards to age, and further research should continue to validate the parent rating scale with students of different grades. One future direction is to use the SRSI-PRS with other age populations. As previously discussed, there was a deliberate reason for assessing the middle school population; however, understanding SRL strategy use at both the elementary and high school levels could be useful and can create a continuum of evidence for the importance of using parent reports of student SRL strategy to understand student achievement. In addition to the important changes student experience in middle school, studies could help in identifying students at the elementary school level at risk for poor SRL can be useful. Students in the later

elementary years are starting to develop the SRL strategies that are so important at the middle school level and for future success.

Another limitation of the current study includes measures used to find convergent validity. The three SRL scales and three motivational scales are all considered aptitude measures that capture a more global perspective of SRL behavior. It would be helpful to include additional event measures, such as observations or micro-analytic interviews, to compare how accurate parent perceptions are to SRL strategy use as it occurs (Winne & Perry, 2000). Rating scales and self-report questionnaires ask the raters to retroactively measure how they believe they acted. While this is helpful and shown to have high reliability, the inclusion of event measures would provide additional insight into the validity of these measures by measuring real-time behavior in comparison to perceptions of behavior.

Implications for School Psychologists

Several of the findings from this study have strong implications for educators and school psychologists. The findings suggest that the SRSI-PRS is a reliable and valid measure for targeting students' SRL strategy use. Another implication was that targeting parents as an assessment source of student SRL can help to provide a more robust profile of a student's SRL performance. Multi-dimensional assessments, such as those that include multiple informants and multiple settings in evaluations, are an important approach in the field of school psychology. Just as previous research has highlighted the importance of multiple informants and multiple settings in assessment (Achenbach et al., 1987; Merrell, 2003), the current findings parents are able to support the unique perspective and insight that can be captured from parents when trying to assess student

performance in school. The parent rating scale is important because parents are able to report on observed behaviors that occur in the home setting, which teachers and administrators may not readily see during the school day. This, in turn, can create a deeper understanding of the student's current functioning and impact intervention strategies.

The scale system can also be used as a tool for school psychologists and other practitioners to screen students and identify those who need aid in developing SRL strategies. Along with providing additional insight during the assessment and evaluation process, parents play a central part of intervention planning for students struggling in school. Parents can reinforce SRL strategy use at home, creating a continuum of adaptive behaviors between the home and school. For example, parents can remind students to set goals and observe their behavior, make smart decisions in terms of when and what to study, and structure the home environment with the student to be the most efficient for academic success.

Finally, another implication of this study is that the three SRSI scale measures, self-report, teacher ratings, and parent ratings, exhibit fairly solid reliability and validity data. It is clear that these measures are tapping a somewhat similar construct, although the medium-sized relations suggests that they measure related but distinct constructs. In addition, the measures have different predictive validity, with the TRS emerging, at this point, as the most robust aptitude SRL predictor of achievement. Despite this, there are still the limitations and future directions for this study, as discussed above, and in other research on SRSI scales (Chen et al., 2014; Cleary & Callan, 2014).

Conclusion

The results from the current dissertation provide convergent validity and predictive validity evidence regarding the SRSI-PRS. Evidence for convergent validity was demonstrated by small to medium relations with the SRSI-TRS, most SRSI-SR subscales, and most measures of student motivation beliefs. It appears that all three measures of the SRSI system are measuring overlapping constructs, although based on the medium-sized relations it appears that they are not measuring identical constructs. Finally, this study showed that the SRSI-PRS adds unique information to the prediction of math course grades after controlling for student and teacher ratings; the SRSI-PRS, however, did not predict standardized academic achievement scores after controlling for the other sources of student SRL.

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Appendix A: Literature Review

Self-Regulated Learning (SRL) is a process through which individuals' trigger and maintain cognitions, affects, and behaviors in order to be effective learners (Schunk & Zimmerman, 2012). SRL has been assessed using various assessment tools, such as microanalytic interviews, direct observations, and self-report questionnaires. Obtaining SRL data from multiple perspectives is important because it helps researchers to understand how people perceive observations SRL strategies differently; however, to date, there has been minimal research examining parent reports when assessing student SRL. The *Self-Regulation Strategies Inventory –Parent Report Scale* (SRSI-PRS) is a relatively new rating scale that has been developed to gather parents' insights into students' use of regulatory behaviors and strategies during homework and studying activities at home. In this chapter, the literature is reviewed that supports the major themes of this paper. A detailed conceptualization of SRL is provided, various approaches to assess SRL are delineated, and the importance of parent rating scales when evaluating this construct are underscore.

Self-Regulated Learning Theory

SRL is a broad term that is applicable to multiple situations and contexts. It refers to how well an individual is able to manage internal processes, such as mood states, thoughts, attention and impulses, as well as external events or contexts (Pintrich & Schunk, 2002; Ross, 2008). Most theorists view SRL as a complex process through which individuals' manage their own behaviors, motivational beliefs, strategic actions, and metacognition (Boekaerts, Pintrich, & Zeidner, 2000; Butler, 1995; Cleary, 2006; MacMahon & Luca, 2001; Weinstein, Husman, & Dierking, 2000). In the academic

realm, SRL has been shown to be a causal determinant of academic success, meaning that effective learners tend to be those who are able to use SRL most efficiently (Schunk, Pintrich, & Meece, 2008).

In the 1800s, learning was viewed exclusively as a result of an individual's intelligence or attentiveness (Ross, 2008). It was up to students to figure out a way to overcome any learning limitations. By the 1900s, the field of psychology was better defined and researchers began to shift their focus to how individual characteristics could be addressed within a learning environment through individuals' SRL. It was during the mid- to late-1900s that theories about how learning occurs began to take shape. Examples of these theories include social-cognitive theory, constructivism, behaviorism, and information processing theory (Schunk & Zimmerman, 2012). There are also several specific SRL models that have evolved from these general learning paradigm, including: Boekaerts' (1996) model of adaptable learning, Borkowski's (Borkowski, Chan, & Muthukrishna, 2000) process-oriented model of metacognition, Pintrich's (1989, 2000) general framework for SRL, Winne's (Winne & Hadwin, 1998) four-stage model of self-regulated learning, and Zimmerman's (2000) social cognitive model of self-regulation (Puustinen & Pulkkinen, 2001).

This dissertation project is grounded in Bandura's (1986) social cognitive theory and Zimmerman's (2000) social cognitive model of self-regulation. Social cognitive theory (SCT) is grounded on the premise that human learning is a social event based on how individuals react to their environment. From this perspective, learning can occur either through observing others or through performing behaviors. In addition, this framework emphasizes the importance of reciprocal determinism, or how dimensions can

influence each other, among environment, behavior, and personal factors (e.g., a change in the classroom environment may change how a student learns and their academic performance). Another key premise in SCT is how motivational influences, such as goals, outcome expectations, values, and self-efficacy affect learning (Schunk & Ertmer, 2012).

Students who engage in SRL proactively seek to manage affective, cognitive, motivational, and behavioral strategies to attain a goal (Cleary & Zimmerman, 2004). This fits with the SCT framework of Bandura (1991), who described three main self-regulative mechanisms: (a) self-monitoring one's behavior, its determinants, and its effects; (b) judging one's behavior in relation to personal standards and environmental circumstances; and (c) affective self-reaction. This model fits well with the current study because of the emphasis on the role SRL strategies within environment, behavior, and personal factors have on academic achievement, along with the combination of both self-regulation and motivation.

Zimmerman (2000) expanded Bandura's (1986) original formulation of SRL by creating a more comprehensive cyclical feedback loop in order to better convey the interrelations and complexity among motivational, strategic, and metacognitive processes. From this perspective, SRL occurs in a three-phase cycle composed of the forethought, performance, and self-reflection stages. Forethought phase subprocesses typically occur before learning efforts begin, the performance phase includes regulatory processes that are enlisted during learning and performance, and the self-reflection phase occurs after the learning has occurred (Zimmerman, 2002).

Within the forethought phase, there are two major classes of processes: task analysis and self-motivation. Task analysis consists of *goal setting* and *strategic*

planning. Goal setting is what an individual consciously sets out to achieve, whereas strategic planning is how an individual plans to accomplish that goal (Bandura & Cervone, 1983; Bandura, 1991; Lunenburg, 2011). Self-motivation beliefs involve several types of beliefs the individual possesses, including perceptions of their self-efficacy, intrinsic interest, and learning goal orientation (Zimmerman, 2002; Eccles & Wigfield, 2002; Bandura, 1997). These motivation beliefs are important because they have been shown to correlate with academic achievement and be a part of SRL.

The performance phase subprocesses occur after forethought and involve processes that occur during the learning, such as use of strategies to learn and monitoring one's learning progress (Schunk & Ertmer, 2012). The two primary classes of regulatory processes in this phase of the feedback loop involve *self-control* and *self-observation*. Self-control relates to the use of strategies selected during the forethought phase in order to effectively achieve a goal. For example, students may use various task strategies, tactics to manage their time and to focus their attention, as well as self-instruction statements (Zimmerman, 1989). Students' self-control and strategy use can be easily seen by outsiders, such as parents and teachers. For example, a student may purposefully relocate herself into a quiet room at home because of distractions or ask a parent for help when they are confused on how to solve a mathematics problem. In these situations the parent is able to monitor and observe while the student is engaging in their own self-observation. In contrast, self-observation refers to how one monitors the work produced. Examples of self-observation tactics include noting what strategies are used to organize information and monitoring their work (Zimmerman & Martinez-Pons, 1986). Self-observation processes provide useful information that students can use to identify

patterns in their thoughts, emotions, and behaviors that may impact learning (DiBenedetto & Zimmerman, 2010). Self-monitored information represents a critical part of cyclical regulatory processes because it provides the information that students use to adjust their strategies and behaviors as they engage in learning over time (Cleary & Zimmerman, 2004; Zimmerman, 2000). This internal feedback allows students to compare what they are doing to what they should be doing, and often cueing students to maintain appropriate target behaviors or change inappropriate target behaviors (Reid et al., 2005).

Finally, in the self-reflection phase of the feedback loop, people make various self-judgments and self-reactions. One form of self-judgment is *self-evaluation*, or the comparison of oneself to another person's performance, preset benchmarks, or self-set standards. Also subsumed under self-judgment is the concept of *causal attribution*, which is how an individual conceptualizes their errors and successes (Schunk & Ertmer, 2012; DiBenedetto & Zimmerman, 2010). Causal attributions are important to the regulatory process because it can impact how individuals respond in the future. For example, if a poor performance is attributed to a fixed ability, then the motivation for future performance decreases (DiBenedetto & Zimmerman, 2010). Individuals then use the knowledge gained during self-reaction to drive future actions, thereby completing a feedback loop (Bandura, 2001).

SRL and motivation. Motivation is a key component of SRL that affects learning. Social-cognitive theories believe that much of human motivation is rooted in cognition, meaning that people use forethought and expectations to guide actions based on what they believe will lead to successful outcomes. Schunk (1991) defines academic

motivation as a form of personal expectancy that influences behavior. Examples of these cognitions include causal attributions (how an individual conceptualizes their errors and successes), outcome expectancies (anticipation on consequence based on behaviors), and cognized goals (the ability to use self-influence and evaluation in viewing ones accomplishments). In this study, however, three specific types of motivation beliefs were looked at: *self-efficacy*, *perceived responsibility*, and *task interest*. All of these beliefs are subsumed within the forethought phase of the three-phase feedback model are critical to this study because they have been shown to related to students' use of SRL strategies.

Self-efficacy, or confidence in their ability to complete a task, is a key tenant of social cognitively theory. Individuals with strong self-efficacy will exert greater effort and persevere longer in trying to accomplish their goals (Bandura, 1992, 1997; Eccles & Wigfield, 2002). Efficacy beliefs effect individuals' thoughts, feelings, motivation and behavior (Bandura, 1992). With increased self-efficacy, individuals learn to predict, regulate, and revise their judgments based on what they already know. As students become more aware of their performance, as well as their strengths and weaknesses, their self-efficacy will be affected. A student with poor self-efficacy typically possesses low motivation and will devalue tasks (Cleary & Chen, 2009; Eccles & Wigfield, 2002; Schunk, 1991). Self-efficacy is a type of belief that impacts both motivation and self-regulation, meaning poor self-efficacy can result in poor attention in class, failure to devote sufficient time to studying, and possibly increased likelihood of dropping out (Cleary & Zimmerman, 2004; Schunk, 1984). Self-efficacy is influenced by four primary sources: prior accomplishments/mastery, physiological reactions, vicarious experiences, and forms of persuasion (Bandura 1997). However, because mastery experiences are

typically thought to exert the most influence on self-efficacy, the focus on this study was on student perceptions of their self-efficacy through questions relating to accomplishments/mastery.

Another key motivational belief that was included in this project students' sense of perceived responsibility. This construct relates to how a person perceives the extent to which they should assume control over their lives, including academic behaviors, stressors, avoidance activities, and anxiety arousal. Through SRL and self-efficacy, individuals can recognize that with an increased sense of responsibility they can impact their performance as they seek to accomplish a goal (Bulter & Winne, 1995; Wood & Bandura, 1989). For example, Zimmerman and Kitsantas (2005) found in a study of 179 girls and their homework completion that the participants who finished a higher quality of homework were more likely to have more perceived responsibility towards learning. The researchers found that perceived responsibility was very highly correlated with GPA (r = .86) and that it predicted 22% more variance in GPA than homework practices (Zimmerman & Kitsantas, 2005).

The third motivation belief included in this project was task interest, or how much students enjoy specific assignment or subject. This concept is similar to intrinsic motivation, or the idea that motivation begins from within an individual and that their level of interest will increase their desire to reach competency (Deci & Ryan, 2000). Task interest often impacts students' preference to engage in certain activities and how much time they wish to spend working on a task. The more effort put forth in task completion can lead to more successful outcomes (Schunk, 2008). In a study with 191 college students, Walker et al. (2006) demonstrated that those with higher intrinsic motivation

and task interest displayed greater persistence with an academic challenge, higher academic self-concept, and higher academic performance. Walker et al. (2006) also found that both intrinsic motivation and self-efficacy contribute uniquely to cognitive engagement and academic success. The importance of task interest has also been illustrated with middle school and high school students. Cleary (2006) conducted a study with 142 high school students to examine the relations among students' self-reported SRL strategies, motivation beliefs, and achievement. Using principal factor analysis, Cleary (2006) found that students' self-reported SRL strategies were structurally distinct from motivation factors, which included both task interest and self-efficacy. Of particular interest was that that task interest was able to reliably differentiate high and low achievers (Cleary, 2006).

In summary, research has shown that all three of these motivational beliefs correlate with students SRL practices and their achievement levels, such as higher GPA (Cleary, 2006; Eccles, Wigfield, Flanagan, Miller, Reuman & Yee, 1989; Pintrich & Schunk, 2002). This point relates back to Zimmerman's (2000) model, which highlights the effects of motivational beliefs on regulatory behaviors, meaning that students with high levels of motivation are more likely to exhibit frequent SRL strategy use. As such, researchers view self-efficacy, perceived responsibility, and task interest as important predictors of motivation and academic success (Cleary & Kisantas, 2015).

Assessment of SRL

Due to the complex nature of SRL, a variety of different types of assessment measures are often needed to capture its multiple components (Cascallar, Boekaerts, & Costigan, 2006). During the initial development of SRL assessment approaches in the

1970s and 1980s, researchers directed much of their attention on individual student's knowledge and strategic skills. Two broad categories of strategic skills include cognitive strategies and metacognitive strategies. Cognitive strategies, such as rehearsal, elaboration, or problem-solving strategies, help students learn, remember, and understand class material. Metacognitive strategies are distinctive because, rather than focusing on acquiring information or enhancing retention, these strategies are used for planning, monitoring, and modifying studying cognition (Boekaerts & Corno, 2005; Garcia & Pintrich, 1994; Pintrich et al., 2000; Schunk & Zimmerman, 1994; Zimmerman, 1986; Zimmerman & Schunk, 1989). During this time there was a proliferation of self-report questionnaires that focused primarily on targeting students' use of these regulatory and metacognitive strategies. However, because these types of questionnaires often do not capture SRL as a dynamic process during specific learning task, over the past few decades, researchers have employed a variety including behavioral observations, contextualized interviews, diaries, and traces of mental events/inferences on processes, and situational manipulations (Cascallar et al., 2006; Cleary, 2006).

Because many different measures have been developed over the years, some researchers have been interested in examining the strengths and weaknesses of each approach. To facilitate these comparisons, Winne and Perry (2000) developed a general coding scheme including two categories: event measures and aptitude measures. Event measures include those that depict SRL as a contextualized event, often with a clear beginning and an end. This type of assessment tool is important because it allows one to examine how SRL unfolds in real time during actual academic events (Cleary, Callan, & Zimmerman, 2012; Winne & Perry, 2000; Zimmerman & Cleary, 2009). On the other

hand, aptitude measures assess SRL as a broader or global construct in that composite scores are used based on aggregating several items depicting different SRL events or situations. These aptitude measures are often used to examine how individuals regulate in a more global sense and to predict future behavior (Winne & Perry, 2000; Zimmerman & Cleary, 2009). Although the current study focuses specifically on aptitude measures of SRL, specifically student and parent rating scales, in the following section a general overview and common examples of event measures to assess students' SRL is provided.

Event measures.

Think-alouds. Think-aloud measurements are used by having students' verbalize what they are thinking as they perform a task (Ericsson, 2006; Boekaerts & Corno, 2005). Think-alouds were used to assess SRL by Greene and Azvedo (2007) when studying SRL during a science task involving hypermedia. In their study, 148 adolescents used think-alouds while learning about the circulatory system using hypermedia. The authors found through think-alouds that participants displayed a qualitative mental shift in mental models and at post-test were able to differentiate between six SRL processes. Further, the researchers used the think-alouds to propose that SRL processes accounts for the shift in mental models. A strength of think-alouds is that they occur during the actual learning process and are not dependent on memory or recall. Bandura (1986) and Zimmerman and Bell (1972), however, raised concerns with this form of measurement because they caution that this measure also requires individuals to put their thoughts into words when prompted by the examiner, which may lead to misrepresented thoughts or distractions during a task.

***Microanalysis*.** SRL microanalytic protocols represent another type of assessment measure that can be used to examine students' regulatory processes as they engage in particular learning tasks. SRL microanalytic protocols are a type of structured interview whereby examiners administer specific questions before, during, and after a student completes some type of learning task. This method has been used to assess a variety of motivation, such as self-efficacy, and SRL processes, such as goal-setting, strategic planning, monitoring, self-evaluation, and attributions (Cleary et al., 2012). Over the past decade, Cleary and colleagues and others applied this approach to study regulation across free-throw shooting, dart throwing, diagnostic reasoning, and reading studying (Cleary, 2011; DiBenedetto & Zimmerman, 2013; Zimmerman, 2008). Researchers have found that SRL microanalysis has strong psychometric characteristics including reliability and validity. An important limitation of this approach, however, is that this method is time intensive for both the researcher and the participant (Cleary, 2011; DiBenedetto & Zimmerman, 2013; Zimmerman, 2008).

***Diaries and logs*.** Both diaries and logs are frequently used when assessing SRL as an event because they can be used to assess SRL processes as they naturally occur and are used by individuals rather than outside examiners (Schmitz et al., 2011). Diaries often involve prompts or questions that lead students to record their use of SRL strategies and processes as they occur, whereas logs tend to have students record specific processes that they are using (DiBenedetto & Zimmerman, 2013). Trace logs were developed to try to address the limitation of not having an examiner present and have been used by many authors to measure SRL as an event (Winne, Hadwin, Nesbit, Kumar & Beaudoin, 2006). A trace log automatically logs an individual's strategy use, such as through a software

program that records how often a student seeks help. This mitigates the need for an investigator to be present, but they also may not fully capture the SRL strategies being used by a student (DiBenedetto & Zimmerman, 2013). Strengths of these measures include being more sensitive than self-report questionnaires since they assess as self-regulation at it occurs and allow one to examine trends in student behavior over time; however, a weakness or limitation of this measure is that it depends on the accuracy and consistency with which actually use this method; a factor which may lead to data with poor validity (Schmitz et al., 2011; Zimmerman, 2008). Although this data provides valuable insight for students, the focus was on aptitude SRL assessments since they quickly allow for a broader picture of a student's SRL strategy use.

Aptitude measures.

Self-report questionnaires. Self-report questionnaires are the most common type of SRL assessment (Cleary, 2006). For these measures, individuals are typically asked to retrospectively rate their self-regulation behavior using a Likert scale. For example, students may be asked to rate the quality with which they create an optimal study environment or how prepared they are for in-class assessments. Although some researchers question the utility of questionnaires because they cannot capture specific instances of SRL behaviors and they rely on long-term memory recall and generalization, they were chosen to for this study because of the efficiency with which they can provide a large amount of information about student belief, attitudes, and perceived behaviors (Cleary, 2006; Pintrich et al., 2000). Further, researchers have found that questionnaires often have higher rates of reliability than other methods of measurement, such as the semi-structured interview (Pintrich et al., 2000). Other advantages of self-report

questionnaires are that they can capture SRL behaviors and cognition that may not be readily observable due to infrequency, and because they generate data that are quite comparable to other types of aptitude measures, such as teacher and parent ratings (Hart & Lahey, 1999; Kamphus & Mays, 2011; McConaughy & Ritter, 2008; Merrell, 2003).

Examples of common self-report questionnaires include the Learning and Study Strategies Inventory (LASSI; Weinstein et al., 1987) and the Motivated Strategies Learning Questionnaire (MSLQ; Pintrich et al., 1993). A brief review the basic characteristics of each of the measures follows.

The *Learning and Study Strategies Inventory* (LASSI; Weinstein et al., 1987) is another domain-general questionnaire that asks students about their learning in the hopes of classifying and comparing students into regulated learning levels. LASSI is constructed of 80-items in ten learning and studying subscales. An example of one subscale is "attitude towards studying and motivation for success." Pintrich et al. (1991) developed the *Motivated Strategies for Learning Questionnaire* (MSLQ) as a self-report questionnaire to measure college students' motivational orientations and use of learning strategies in a domain-specific view. This scale was developed with the perspective that motivation and learning are not static traits of the student, but that "motivation is dynamic and contextually bound and that learning strategies can be learned and brought under the control of the student" (Duncan & McKeachie, 2005). This 81-question self-report divided learning into two categories: motivation and learning strategies. The intention of the measure was to help researchers study student motivation, learning strategies, and study skills within a given academic college course (Artino, 2005; Pintrich et al., 2000).

More recently, Cleary and colleagues developed an SRL assessment system called the *Self-Regulation Strategy Inventory (SRSI),* which includes self-report, teacher, and parent versions (Cleary, 2006; Cleary & Callan, 2014; Chen et al., 2014). Of these different versions, the self-report version was the first to be developed. This questionnaire, which is a 28-item scale to gather information about students' use of SRL strategies, was developed as part of a research study conducted with high school students (Cleary, 2006). Using a sample of 142 ninth and tenth graders, principal component analysis revealed a three factor structure for the SRSI-SR: (a) seeking and learning information; (b) managing environment/ behavior, and (c) maladaptive regulatory behavior. Findings showed that there was high internal consistency for the overall SRSI-SR (α =.92) and the individual subscales (α = .72 - .88). Further, it was shown that this measure reliably differentiated high and low achievers. This scale served as the foundation for developing the teacher and parent rating scale versions; all of which are used in the current study.

Rating scales. There has been a recent push in the SRL literature to use alternative SRL tools including event measures and ratings scales completed by other informants, such as teacher and parent rating scales. Research on the psychological assessment of children and adolescents has long shown the value in collecting information from multiple informants, including those from parents, teachers, and children or adolescents; however, these informants have also been shown to have discrepant views of behavior (De Los Reyes et al., 2013; Hunsley & Mash, 2007). For example, differences between parents and teachers have been shown to reflect upon different observations of the same student (Achenbach, 2011). Achenbach, McConaughy,

& Howell (1987) ran a meta-analysis of 269 samples in 119 studies and found low to moderate levels of correspondence, *r*'s ranging from .20s to .60s, between multiple informant reports. More specifically, they found the weighted mean *r* between different informants was $r = .28$ with a range from $r = .24$ for parent and mental health worker pairs to $r = .42$ for teacher and observer pairs. They also found that the mean correlation between children self-reports and those by their parents, teachers, and mental health workers was $r = .22$, a low correlation according to Cohen (1988). Similar raters, such as a mother and father or two teachers both rating a child, had the highest correlation of around $r = .60$, which is still only moderate according to Cohen's criteria. For this study, a parent rating scale is important in researching the unique information along with corresponding data, especially since parents are viewing children's SRL outside of the school environment.

Congruency or differences between assessment sources can provide a more comprehensive and accurate account of students' functioning (De Los Reyes et al., 2013; Laird & Weems, 2011). In recent years, best practice guidelines suggest that differences among assessment sources can serve as useful information for interpreting results and deriving a clear picture of a child or adolescent profile (Achenbach, 2006; De Los Reyes et al., 2013). Each informant can provide valuable input and insight into student SRL across different settings. In this project how student, teacher, and parent reports converge in terms of student motivation and SRL strategies and behaviors, specifically focusing on parent ratings, was examined.

SRL teacher rating scales. To date, most SRL assessment research has primarily focused on using questionnaires to ascertain student perceptions and beliefs about their

regulatory behaviors and strategies. Questionnaires can be problematic because of response biases due to reliance on asking students to retroactively recall general behaviors in global situations. Given that students tend to have poor calibration and insight into their own behaviors, student responses may not always accurately reflect what they do (Chen et al., 2014). For these reasons, researchers have begun to advocate going beyond self-report questionnaires and to develop complementary measures from other informants who observes students' behavior. For example, reports from parents and teachers are important in collecting data about how they view the students' engagement with tasks (Winne, 2005). In contrast, the large number of self-report measures currently available, there is a lack of developed scales for teachers and parents to provide insight into the observation of their children's SRL processes.

Zimmerman and Martinez-Pons (1988) created one of the first SRL teacher rating scales, a 12-item *Rating Student Self-Regulated Learning Outcomes: A Teacher Scale* designed to evaluate teacher ratings of their students use of SRL strategies in mathematics and English. Eighty high school students were also interviewed on how they perceived their study practices through an interview tool called the *Self-Regulated Learning Interview Schedule (SRLIS)* that measured 14 SRL strategies. Results indicated a correlation of $r = .70$ between student responses to the interview and the teacher ratings along with both convergent and discriminative validity.

More recently, Cleary and Callan (2014) developed a teacher version of the SRSI-Teacher Rating Scale (SRSI-TRS) in order to ascertain teacher perceptions of students' motivation and SRL strategies specifically in classroom contexts. This measure was adapted from the SRSI-SR and includes 13-items. Cleary and Callan (2014) found that

the SRSI-TRS exhibited moderate correlations with four different self-report measures of student SRL and motivation. It was also found to have high internal consistency and to be a significant predictor of student achievement in mathematics contexts (Cleary & Callan, 2014; Cleary & Kitsantas, 2015). Further, researchers found that the teacher rating scale accounted for 10% unique variance in the students' mathematics achievement (Cleary & Callan, 2014). These findings highlight the important perspective and insight teachers can contribute when assessing student self-regulation. Given that the SRSI-TRS was developed in conjunction with the self-report version, both versions were included in this validation study.

*SRL parent rating scales***.** As discussed, having multiple informant perspectives about student SRL helps to create a more robust and deeper understanding of students' SRL strategy use in various settings. Just as teachers ratings were found to account for unique variance in mathematics achievement, parents can be equally informative about their child's SRL skills. Chen et al. (2014) conducted a study to develop one of the first comprehensive parent measures targeting students' academic SRL processes. This measure was adapted from the SRSI-SR and SRSI-TRS and is called the *Self-Regulation Strategies Inventory- Parent Rating Scale (SRSI-PRS)*. Chen and colleagues (2014) conducted a study using 451 middle school aged students and their parents. Students completed the SRSI-SR measure along with two measures of motivational beliefs: task interest and perceived instrumentality. Parents then completed the SRSI-PRS. Factor analysis showed that the PRS exhibited a three-factor structure similar to that found with the SRSI-SR: (a) Managing Behavior and Learning (MBL; $\alpha = .92$), Maladaptive Regulatory Behaviors (MRB; $\alpha = .76$), and Managing Environment (ME; $\alpha = .84$). In

addition, the PRS was shown to exhibit small to moderate correlations between the SRSI-PRS, SRSI-SR, the two motivational belief scales, and student mathematics grades. Both the MBL and MRB subscales of the PRS demonstrated predictive validity for student mathematics achievement.

The study, however, did not include the SRSI-TRS, only included one subscale from the SRSI-SR, and only included two motivational beliefs (i.e., task interest and perceived instrumentality). A key objective of the current dissertation project was to address these limitations by examining whether the SRSI-PRS correlates with the SRSI-TRS and SRSI-SR, as well as with a broader array of motivation beliefs (i.e., self-efficacy and perceive responsibility). The SRSI-TRS assesses student SRL behavior in mathematics classrooms based on teacher ratings, whereas the SRSI-PRS assesses student SRL behavior at home based on parent reports. Further, the SRSI-SR assesses student SRL both relative to home and school contexts. Including all three types of measures can provide much information regarding the use of multiple informants and can offer insights into a students' SRL behavior. The inclusion of self-efficacy and perceived responsibility will also further demonstrate the convergent validity of the SRSI-PRS on measures that have been shown to relate to academic achievement in the past.

Importance of SRL in Middle School Academic Contexts

Now that the importance of a parent ratings, and other types of aptitude measures of SRL, has been established, this section will provide an overview of several key issues that further underscore the importance of SRL, particularly regarding the use of various assessment tools to evaluate SRL in the mathematics domain and within the middle school context.

SRL and academics. SRL is an important concept that should be incorporated into schools since it can decrease maladaptive behaviors and increase positive behaviors (Reid et al, 2005). SRL strategies can include self-assessment, self-recording, self-instruction, self-questioning, self-monitoring, and self-reinforcement, goal-setting, and self-evaluation (Montague, 2007; Rafferty, 2010). All of these tactics allow learners to better identify ways to improve their learning and academic performance. Strong SRL skills allow students to control their own actions and to move closer to independent learning without relying on prompts from adults (Asaro-Saddler & Saddler, 2010). However, students are often not given opportunities to develop and exercise autonomy in the classroom, which can result in self-defeating cycles in regards to their motivational beliefs (Cleary & Zimmerman, 2004; Eccles et al., 1993). Further, research has shown that fewer than 10% of teachers were found to integrate lessons on how to self-regulate with cognitive activity in the classroom (Perels et al., 2009). Similarly, only 9% of teachers' lessons were found to discuss how to incorporate self-regulation techniques with students (Perels et al., 2009). Below, research is discussed that links SRL strategies use to academic achievement in subject areas like mathematics and with the middle school population, given the current dissertation is integrated within these two contexts. The information middle school mathematics teachers gain through assessments, for example questionnaires and rating scales, can further direct teachers and students on what strategies they may need additional practice.

SRL and middle school contexts. Research has shown that as students' progress through middle school there are large increases in the prevalence of emotional dysfunction and maladaptive behaviors. Eccles (1993) called this transition

"developmentally regressive" due to the contradiction of the new structure compared to the psychological needs of middle school adolescents. For example, there are high rates of reported anxiety, depression, substance abuse, and antisocial conduct (Rudolph et al., 2001). This increase in academic, personal, and interpersonal issues has been hypothesized to be due to differences in school structure, classroom organization, and teacher expectations (Hill & Tyson, 2009). Also at play are key changes in adolescent development in regards to biological growth, cognitive growth, social development, and adapting family relationships (Hill & Tyson, 2009). Middle school tends to have students rotate between more teachers and have more students in each class. Teachers at the middle school are often less personal, more controlling, and require more cognitive skills of their students compared to the elementary school level. These changes can lead to a lack of predictability and increased ambiguity in regards to school expectations (Barber & Olsen, 2004; Dembo & Eaton, 2000; Rudolph et al, 2001). As a result, students need to be more adept at SRL in order to be successful at the middle school level.

During adolescence the ability to engage in SRL strategies, such as logical and analytic thinking, problem solving, planning, and decision-making, increases. Goals also begin to become internalized (Halpern-Felsher & Cauffman, 2001; Hill & Tyson, 2009; Keating, 2004). Further, Eccles (1983) argued that students need greater autonomy and increased positive interpersonal connections with adults and peers during this time compared to the less personal and more controlling nature of middle school. The development of skills and the desire for independence result in a critical development period for SRL instruction that can greater facilitate student success in school. Zimmerman and Risemberg (1997) argued that self-regulatory skills can help all students

improve their academic achievement, specifically in the areas of motivation, methods of learning, use of time, physical environment, social environment and performance. Studying the middle school aged population, which is typically in this transition stage, provides insight into SRL and its effects, along with how changes may occur during the middle school time period.

Rudolph et al. (2001) conducted a study that proposed personal vulnerability would increase the risk for negative outcomes in adolescents who experienced school transition over those who did not. First, they conceptualized SRL as a combination of cognitive, evaluative, and behavioral processes that guide goals and emotions. They also hypothesized that the students' view of their probability of success on academic tasks will determine behaviors and academic performance. The researchers used 187 adolescents who experienced a recent transition from elementary school to middle school, and 142 adolescents who remained in the same school. It is important to note that the adolescents in the non-transition group had a transition seven to nine months before the study started. Rudolph et al. (2001) found that the transition interacted with preexisting maladaptive self-regulatory beliefs that formed depression vulnerabilities. Further they state that:

> Maladaptive self-regulatory beliefs were more strongly predictive of increases in perceptions of school-related stress and depressive symptoms over the course of the middle school transition than in the absence of a transition. That is, adolescents who believed that they could not exert much influence over their success in school and who showed little investment in academic success reported more school-related stress and became more depressed when they experienced a transition into middle school, but not when they remained in the same school between fifth and sixth grade (Rudolph et al., 2001, p. 940).

The authors concluded that students who exhibited more difficulty with the transition to middle school had higher levels of academic and social stress. They attributed this to SRL and academic motivation.

In another study, Cleary and Chen (2009) assessed SRL, motivation, and mathematics achievement in 880 middle-school students. The researchers found that the seventh graders demonstrated a more maladaptive SRL and motivational profile than sixth graders. They also found SRL behaviors and strategies may be more important to achievement in demanding contexts. For example, students in honors math classes who were identified as high achievers exhibited significantly more frequent SRL strategy use than low achievers in the same context. However, in regular math classes, this pattern of achievement group differences did not emerge.

Self-regulation during the middle school period is especially important when looking at research that estimates that a quarter of all school-based referrals have a motivation component (Bramlett, Murphy, Johnson & Wallignsford, 2002); however, even with acknowledgement from teachers and staff about its importance, SRL is not typically included in assessment protocol for when issues arise. The continued study of SRL within these contexts is a critical need.

SRL in mathematics. Just as SRL can be studied as a multitude of grade levels, it can also be assessed in several different subject areas. One of these domains has been the academic subject of mathematics, which is the key focus of the current dissertation. A variety of studies assessing SRL in mathematics have shown that SRL and motivational beliefs differentiates those who are able to regulate effectively during multiple step

problems, learn different strategies, and apply a concept correctly (Usher & Pajares, 2009).

Montague (2007) focused on learners with mathematic learning disabilities, a population that has been shown to typically have poorer self-regulation. She found through a review of five research-based SRL interventions that that SRL instruction was an effective method when teaching mathematics problem solving and direct instruction of basic skills. This may be due to the fact that mathematics requires students to acquire and apply a wide variety of different concepts across several different branches. As students take on more difficult mathematics tasks and concepts during secondary school, the importance of students exhibiting effective use of SRL strategies, such as self-monitoring and self-correction, is critical (Montague, 2007).

Several studies have also shown that increased application of SRL strategies is related to higher mathematics achievement. Dunlap and Dunlap (1998) researched this using a self-monitoring checklist. The checklist included five statements: I copied the problem correctly, I regrouped when I need to, I borrowed correctly, I subtracted all the numbers, and I subtracted correctly. Evaluating this checklist with three learning disabled students and their subtraction problem solving, the researchers found that all of the students improved and maintained performance when the self-monitoring checklist was replayed with a reward system, suggesting that students taught themselves how to detect and correct errors. Again, this study showed that increasing self-monitoring, a key tenet to SRL, leads to increased accuracy and academic performance.

Finally, Perels et al. (2009) applied self-regulation strategies with learning content in mathematics lessons with a sample of 53 sixth-grade students. The experimental group

had a teacher incorporate self-regulation units into nine different lessons on dividing and multiplying. Goal diaries were used to self-monitor and self-reflect performance. A questionnaire on self-regulated learning, mathematics tests, and transfer measurements were also used for self-reflection. The control group, with the same teacher, was taught the standard nine mathematics lessons without any self-regulation. Perels et al. (2009) found that there were positive effects in the experimental group for self-regulation, including the subscales of goals, volition, learning strategies, monitoring, attribution, handling mistakes, and self-efficacy. Students' demonstrated knowledge in goal setting, concentration, and the shifting of negative thoughts into positive ideas by the end of the study. This awareness was significantly more present than in the control group, which exhibited a significant drop in self-regulated behaviors.

Take together, assessing SRL in mathematics, and at the middle school level, can provide a unique insight into how students' behaviors affect their academic success. Further, the inclusion of multiple informants, such as parents, can create an overall composite and deeper insight into students SRL strategy use and mathematics performance. Various interventions and field developments can then be extrapolated by furthering our understanding of this interaction.

Appendix B: Research Questions

Table B1

Research Questions, Hypothesis, Measures, and Statistical Analysis

Research Question	Hypothesis	Dependent Measures	Statistical Analysis
1. What is the level of convergence between the SRSI-PRS, SRSI-SR, and SRSI-TRS?	There will be medium size relations (.30 to .50; Cohen, 1988) between parent reports of their child's self-regulation with the teacher's report and child's report of self-regulation.	(a) Self-Regulation Strategy Inventory—Parent Report Scale (SRSI- PRS) (b) Self-Regulation Strategy Inventory—Teacher Report Scale (SRSI-TRS) (c) Self-Regulation Strategy Inventory—Self Report Scale (SRSI-SR)	Pearson correlation
2. Is there a correlation between SRSI-PRS and motivational beliefs?	There will be small (PR) to medium (SMES, TII) correlations between parents' views of their child's self-regulation and the child's report of their motivation in mathematics	(a) SRSI-PRS (b) Sources of Mathematics Self-Efficacy Scale (SMES) (c) Task Interest Inventory (TII) (d) Perceived Responsibility (PR)	Pearson correlation
3. How much unique variance does the SRSI- PRS account for in mathematics academic achievement relative to the SRSI-SR and SRSI-TRS?	The SRSI-PRS will demonstrate a unique contribution to predicting academic achievement after controlling for SRSI-SR and SRSI-TRS	(a) Block one- Mathematics achievement a. May 2014 STAR Math (b) Block two- Other SRSI scales a. SRSI-TRS b. SRSI-SR (c) Block three- Parent scale a. SRSI-PRS (a) Block one- Mathematics achievement a. Fourth quarter grades (d) Block two- Other SRSI scales a. SRSI-TRS b. SRSI-SR (e) Block three- Parent scale a. SRSI-PRS	Hierarchical regression analysis with semi-partial correlations

Appendix C: Demographic Tables

Table C1

Student Demographic Information

	n	%
Gender		
Male	39	37.1
Female	66	62.9
Grade Level		
7^{th}	73	69.5
8^{th}	32	30.5
Ethnicity		
Caucasian	62	59.0
Asian/ Pacific Islander	17	16.2
Hispanic/Latino	11	10.5
Interracial	9	8.6
Black or African American	4	3.8
Other	2	1.9
Free/ Reduced Lunch Program		
No	91	86.7
Yes	14	13.3

Table C2

Teacher Demographic Information

	n	%
Gender		
Female	7	70
Male	3	30
Ethnicity		
Caucasian	8	80
Hispanic/Latino	1	10
Unknown	1	1
Age		
24	2	20
25	1	10
30	1	10
32	1	10
35	2	20
50	1	10
58	1	10
Unknown	1	10
Teaching Degree		
BS/BA	8	80
MS/MA	1	10
Unknown	1	10

Years Teaching		
6	1	10
12	1	10
27	1	10
35	1	10
Unknown	1	10

Table C3

Parent Demographic Information

	n	%
Gender		
Mother	85	81.0
Father	20	19.0

Appendix D: Scale Measures

Self-Regulation Strategy Inventory - Parent Rating Scale

Parental Beliefs and Behaviors Scale - Self-Regulation Strategy Inventory (PRS)

Parent/Guardian Name:_____

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

I am the child's:

○ Mother ○ Father ○ Guardian (Female) ○ Guardian (Male)

Dear Parent or Caregiver:

We are interested in knowing how your child studies, completes homework assignments, and prepares for tests in **MATH**. Please fill in the circle next to each question to indicate **HOW OFTEN** your child does each 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 your child 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 Almost never | **2** Not very often | **3** Somewhat often | **4** Very often | **5** Almost always | **6** 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. My child plans out how much time he or she needs to study for math tests. ...	○	○	○	○	○	○
2. My child checks himself or herself to see whether he or she is learning important details from the study notes.	○	○	○	○	○	○
3. My child gives up or quits when he or she does not understand something. ...	○	○	○	○	○	○
4. My child re-writes class notes to make sure they are neat and organized.	○	○	○	○	○	○
5. My child tries to study in a quiet place.	○	○	○	○	○	○
6 My child relies on math class notes to study.	○	○	○	○	○	○
7. My child studies hard for math even when there are more fun things to do at home.	○	○	○	○	○	○
8. My child quizzes himself or herself to see how much he or she is learning during studying.	○	○	○	○	○	○
9. My child makes a schedule to help organize his or her study time.	○	○	○	○	○	○
10. My child loses important math dittos/worksheets that he or she needs to study.	○	○	○	○	○	○

	1 Almost never	2 Not very often	3 Somewhat often	4 Very often	5 Almost always	6 Don't Know
HOW OFTEN?						
11. My child thinks about the types of questions that might be on math tests to help him or her study.	○	○	○	○	○	○
12. My child tries to forget about the topics that he or she has trouble learning.	○	○	○	○	○	○
13. My child tries to identify the format of upcoming math tests (e.g., multiple-choice or open-ended questions).	○	○	○	○	○	○
14. My child tries to study in a place that has no distractions (e.g., noise, people talking).	○	○	○	○	○	○
15. My child gets easily distracted when studying for math tests.	○	○	○	○	○	○
16. My child makes pictures or diagrams to help himself or herself study math concepts	○	○	○	○	○	○
17. My child makes sure no one disturbs him or her during study time.	○	○	○	○	○	○
18. My child forgets to bring home math materials when he or she needs to study.	○	○	○	○	○	○
19. My child asks me for help if he or she gets confused during studying.	○	○	○	○	○	○
20. My child tries to memorize all math formulas and math facts in his or her notes.	○	○	○	○	○	○
21. My child tells himself or herself exactly what he or she wants to accomplish before studying.	○	○	○	○	○	○
22. My child lets friends interrupt him or her when studying.	○	○	○	○	○	○
23. My child plans on how to study for a math test.	○	○	○	○	○	○

(Chen et al., 2014)

Self-Regulation Strategy Inventory- Teacher Rating Scale

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.	○	○	○	○	○	○

(Cleary & Callan, 2013)

Self-Regulation Strategy Inventory – Self-Report Questionnaire

How OFTEN do you do the following things when you do homework or study for MATH?

Use the following 5-point answer scale:

1 Almost never	2 Not very often	3 Somewhat often	4 Very 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 Very 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.	○	○	○	○	○

How often do you do these things when doing MATH?	**1 Almost never**	**2 Not very often**	**3 Somewhat often**	**4 Very often**	**5 Almost always**
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.	○	○	○	○	○

(Cleary, 2006)

Sources of Mathematics Self-Efficacy Scale

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?	○	○	○	○	○

(Usher & Pajares, 2008)

Task Interest Inventory

How much do you AGREE or DISAGREE with the following five statements about MATH?

Use the following 5-point answer scale:

1 Strongly disagree	2 Disagree	3 Unsure	4 Agree	5 Strongly agree
○	○	○	○	○

How much do you AGREE or DISAGREE?	1 Strongly disagree	2 Disagree	3 Unsure	4 Agree	5 Strongly agree
1. I enjoy learning about things in my math class.	○	○	○	○	○
2. I like studying math.	○	○	○	○	○
3. I think math is boring.	○	○	○	○	○
4. Learning how to do math is very interesting.	○	○	○	○	○
5. I like learning about math even when it is very difficult.	○	○	○	○	○
6. I look forward to going to math class.	○	○	○	○	○

(Cleary, 2006)

Perceived Responsibility Scale

Is a student OR teacher 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…	**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. a student being unprepared for a test?	○	○	○	○	○	○	○
2. a student being motivated to learn in school?	○	○	○	○	○	○	○
3. a student not finishing homework assignments?	○	○	○	○	○	○	○
4. a student doing well on a test?	○	○	○	○	○	○	○
5. a student being unprepared to participate in class?	○	○	○	○	○	○	○
6. a student solving assigned problems successfully?	○	○	○	○	○	○	○
7. a student understanding assigned homework readings?	○	○	○	○	○	○	○
8. a student not understanding a class discussion?	○	○	○	○	○	○	○
9. a student understanding the teacher's lecture?	○	○	○	○	○	○	○
10. a student fooling around in class?	○	○	○	○	○	○	○
11. a student not taking notes in class?	○	○	○	○	○	○	○

	THE TEACHER				THE STUDENT		
Who is MORE RESPONSIBLE for…	**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
12. a student doing homework assignments correctly?	○	○	○	○	○	○	○
13. a student being interested?	○	○	○	○	○	○	○
14. a student remembering information from assigned readings?	○	○	○	○	○	○	○
15. a student not concentrating in class?	○	○	○	○	○	○	○
16. a student not valuing good grades in school?	○	○	○	○	○	○	○
17. a student given(giving?) extra effort when needed?	○	○	○	○	○	○	○
18. a student just going through the motions without really trying in class?	○	○	○	○	○	○	○
19. a student setting goals as important to his or her future success?	○	○	○	○	○	○	○
20. a student receiving good grades?	○	○	○	○	○	○	○

(Zimmerman & Kitsantas, 2005)

Appendix E: IRB Approval Form

RUTGERS UNIVERSITY
Office of Research and Sponsored Programs
ASB III, 3 Rutgers Plaza, Cook Campus
New Brunswick, NJ 08901

April 4, 2014

P.I. Name: Cleary
Protocol #: 13-483Mc

Timothy Cleary
152 Frelinghuysen Rd.
Busch campus

Dear Timothy Cleary:

(Initial / Amendment / Continuation / Continuation w/ Amendment)

Protocol Title: "Factors that Influence Students' Achievement in Middle School"

This is to advise you that the above-referenced study has been presented to the Institutional Review Board for the Protection of Human Subjects in Research, and the following action was taken subject to the conditions and explanations provided below:

Approval Date:	3/28/2014	**Expiration Date:**	3/27/2015	**Expedited Category(s):**	7
Approved # of Subject(s):	812	**Currently Enrolled:**	382		

This approval is based on the assumption that the materials you submitted to the Office of Research and Sponsored Programs (ORSP) contain a complete and accurate description of the ways in which human subjects are involved in your research. The following conditions apply:

- **This Approval-**The research will be conducted according to the most recent version of the protocol that was submitted. **This approval is valid ONLY for the dates listed above;**
- **Reporting-**ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications-**Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s)-**Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;
- **Continuing Review-**You should receive a courtesy e-mail renewal notice for a Request for Continuing Review before the expiration of this project's approval. However, it is your responsibility to ensure that an application for continuing review has been submitted to the IRB for review and approval prior to the expiration date to extend the approval period;

Additional Notes: **Continuation with Amendment Expedited Approval per 45 CFR 46.110(b)(2) for addition of key personnel: C. Kleeman, Spanish translated version of Informed Consent Form, re-phrasing and adding several items so they can examine student perceptions.**

Failure to comply with these conditions will result in withdrawal of this approval.
Please note that the IRB has the authority to observe, or have a third party observe, the consent process or the research itself. The Federal-wide Assurance (FWA) number for the Rutgers University IRB is FWA00003913; this number may be requested on funding applications or by collaborators.

Respectfully yours,

Acting For,
Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board
(MW: lb)

RUTGERS UNIVERSITY
Office of Research and Sponsored Programs
ASB III, 3 Rutgers Plaza, Cook Campus
New Brunswick, NJ 08901

April 4, 2014

P.I. Name: Cleary
Protocol #: 13-483Mc

Timothy Cleary
152 Frelinghuysen Rd.
Busch campus

Dear Timothy Cleary:

(Initial / Amendment / Continuation / Continuation w/ Amendment)

Protocol Title: "Factors that Influence Students' Achievement in Middle School"

This is to advise you that the above-referenced study has been presented to the Institutional Review Board for the Protection of Human Subjects in Research, and the following action was taken subject to the conditions and explanations provided below:

Approval Date:	3/28/2014	**Expiration Date:**	3/27/2015	**Expedited Category(s):**	7
Approved # of Subject(s):	812	**Currently Enrolled:**	382		

This approval is based on the assumption that the materials you submitted to the Office of Research and Sponsored Programs (ORSP) contain a complete and accurate description of the ways in which human subjects are involved in your research. The following conditions apply:

- **This Approval-**The research will be conducted according to the most recent version of the protocol that was submitted. **This approval is valid ONLY for the dates listed above;**
- **Reporting-**ORSP must be immediately informed of any injuries to subjects that occur and/or problems that arise, in the course of your research;
- **Modifications-**Any proposed changes MUST be submitted to the IRB as an amendment for review and approval prior to implementation;
- **Consent Form(s)-**Each person who signs a consent document will be given a copy of that document, if you are using such documents in your research. The Principal Investigator must retain all signed documents for at least three years after the conclusion of the research;
- **Continuing Review-**You should receive a courtesy e-mail renewal notice for a Request for Continuing Review before the expiration of this project's approval. However, it is your responsibility to ensure that an application for continuing review has been submitted to the IRB for review and approval prior to the expiration date to extend the approval period;

Additional Notes: **Continuation with Amendment Expedited Approval per 45 CFR 46.110(b)(2) for addition of key personnel: C. Kleeman, Spanish translated version of Informed Consent Form, re-phrasing and adding several items so they can examine student perceptions.**

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Respectfully yours,

Acting For,
Dr. Beverly Tepper, Ph.D.
Professor
Chair, Rutgers University Institutional Review Board
(MW: lb)

RUTGERS
Graduate School of Applied and Professional Psychology

Graduate School of Applied and
Professional Psychology
Rutgers, The State University of New Jersey
152 Frelinghuysen Rd
Piscataway, NJ 08854-8020

http://gsappweb.rutgers.edu
Phone: 848-445-2000
Fax: 732-445-4888

April 1, 2013

Dear Parent,

My name is Timothy Cleary and I am a professor in the Graduate School of Applied and Professional Psychology at Rutgers University. As you probably already know, I have been working with Kreps Middle School over the past year to better understand the things that help middle school students succeed, specifically in the area of mathematics. The title of this research project is **"Factors that influence students' achievement in middle school."** At this point, my research team and I have surveyed students and teachers, but we are now inviting parents to share their perspectives about children's homework and studying behaviors at home.

We are only seeking participation from parents who had previously granted us permission to survey their children over the past year. In short, if you elect to participate, we are asking you to complete a short survey questionnaire about your 7th or 8th grade child's homework and studying behaviors, specifically in relation to their math work. As part of the survey, we will also be asking you a few questions about your gender, relationship to the child (i.e., mother, father, guardian-female, guardian-male), and your primary spoken language. The survey should take you approximately 10-12 to minutes to complete.

There are no known risks to you for participating in this study. Participation in this study is voluntary. You may choose not to participate, and you may withdraw at any time during the study without penalty. Your decision to participate will have no impact on your relationship to the school nor will it have any impact on your child.

This research study is being conducted by me and not Melvin H. Kreps Middle School or the East Windsor school district. Thus, all information in this project will be held **strictly confidential**. This means that although I will be collecting information about you, such as gender, age, etc., and your survey responses, this information will be kept private by restricting its access and keeping it in a highly secure location at Rutgers University. The research team (myself and graduate research students from Rutgers) and 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 the East Windsor 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. Further, results will only be presented in aggregate form (i.e., average of all participant responses, not individual responses).

If you have any questions about the research project, you may contact me by email at timothy.cleary@rutgers.edu or by phone at (848) 445-3982. 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: 848 932-0150

Email: humansubjects@orsp.rutgers.edu

RUTGERS

Thank you very much for considering this request. Your support is greatly appreciated.

Sincerely,

Timothy J. Cleary Ph.D.
Associate Professor
Rutgers University
timothy.cleary@rutgers.edu

****

I agree to participate in the research study, "Factors that influence middle school achievement in mathematics", that will be conducted by Dr. Timothy Cleary and his research team. I understand that I will be asked to complete a short survey that asks about my perceptions of my child's homework and studying behaviors as well as some personal about myself (e.g., ethnicity, gender, primary spoken language).

Signature of Parent _____ Date _____

Name of Parent/Guardian (printed name) _____