# RELATING STUDENT PERCEPTIONS OF PARENT ATTITUDES TO STUDENT MOTIVATION FOR LEARNING MATHEMATICS

by

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## Dedication

*Dedicated to my pack: Barney, Chopper, Jade, and Miley. Thank you for loving me unconditionally throughout this journey.*

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## Abstract

In response to declining national academic rankings, the United States developed a set of common standards (Common Core State Standards Initiative [CCSSI], 2015; Neuman & Roskos, 2013); however, success requires student effort. In that respect, the purpose of this study was to explore the relationship between student perceptions of parent attitudes toward student ability and effort following implementation of the Common Core Standards for Mathematics (CCSSM) and student motivation for learning mathematics. The construct of perception evident in Weiner's attribution theory of interpersonal motivation indicates individuals attribute motivation to factors they perceive to be real (Weiner, 2000). Student perceptions of parent attitudes can influence student motivation. This study utilized a quantitative cross-sectional design with survey methodology to gather data online from middle school students in a district that implemented the CCSSM. The study used 122 participants for an alpha of .05, power of .80, and medium effect size. The study utilized Pearson's *r* and Spearman *r* along with simple linear regression and multiple regression analyses to describe the relationship between the variables. Results indicate that student perceptions of parent attitudes toward student ability have a greater influence on student motivation than student perceptions of parent attitudes toward student effort. Student perceptions of parent attitudes toward both student ability and student effort are more positive than student perceptions of their own ability and effort, consistent with Weiner's (2000) social component of motivation. The study implies possible changes to policy and practice that would increase parent communication and involvement in a child's education.

# Chapter 1: Introduction

For years, U.S. students have been relying on tips and tricks to learn mathematics (Faulkner, 2013; Karp, Bush, & Dougherty, 2015). While these techniques may make learning mathematics tolerable for an unwilling child, they affect conceptual understanding which is necessary to make connections among topics. Many of these tricks and shortcuts do not allow students to make connections across mathematical content (Faulkner, 2013). Some students have been successful using mathematical shortcuts like cross-multiplication to solve proportions. However, students suffer from a lack of long-term conceptual understanding when they fail to understand exactly why the shortcuts work (Burns, 2012).

The need to focus on conceptual understanding is apparent. The United States continues to slide downward in international rankings for mathematics (Organization for Economic Cooperation and Development [OECD], 2014), and graduating high school seniors are not adequately prepared mathematically to enter college or become productive members of the labor force (Common Core State Standards Initiative [CCSSI], 2018). The adoption of the Common Core State Standards for Mathematics (CCSSM) is one effort to solve this problematic decline and to increase student academic performance in the United States (Neuman & Roskos, 2013; Peterson, Barrows, & Gift, 2016; Schmidt & Burroughs, 2012). However, it is difficult to improve student achievement if students are not motivated to learn (Usher & Kober, 2012). Parents play a role in increasing student motivation by showing an interest in their child's education (Gonzalez-DeHass, Willems, & Holbein, 2005). Increased motivation for learning mathematics leads to students continuing in mathematical coursework and careers, whereas low motivation leads to fewer students continuing into higher mathematics and mathematical career

fields (Simpkins, Davis-Kean, & Eccles, 2006; Wang, 2012) which negatively affects the United States' international mathematics rankings (OECD, 2014).

Student motivation for learning mathematics continues to be problematic in the United States. Student-reported motivation is lower in the United States than among international competitors (OECD, 2014). After efforts to improve the mathematics standards in the United States failed to improve international academic rankings, factors leading to motivation are worthy of consideration. This chapter introduces a quantitative correlational study with survey methodology intended to investigate the relationship between student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics at the middle school level following the implementation of the CCSSM. The current study adds to the existing body of literature by introducing new research concerning student perceptions of parent attitudes and the relationship to student motivation. This chapter discusses the issues the study evolved from, the specific problem the study addresses, and the purpose of the study. A discussion of the theoretical framework that supports the study will follow along with the specific research questions guiding the current study. This chapter will also present the assumptions, limitations, and delimitations of the study to clarify the specific context of the study. The significance of the study includes the potential to provide parents, educators, and school officials with valuable data concerning student perceptions of parent attitudes as factors related to student motivation. The results could have significant effects on classroom practice and parent awareness of their own communication with their children. This chapter also provides definitions of terms clarifying their use in the study and a summary of the components discussed.

**Background and Contextualization of the Issue**

Nations such as France, Italy, Bangladesh, Israel, the Philippines, South Korea, and Vietnam have historically viewed the United States as a leader (Pew Research Center, 2014), yet results from multiple Program for International Student Assessment (PISA) reports indicated the United States has not been among the top-performing countries mathematically for nearly two decades (OECD, 2014). The United States placed in the lower half of all tested countries, ranking 27 out of 34 on the PISA in 2012. The number of U.S. students scoring at least a Level 5, where Level 6 is the highest, dropped by 1.1%, and those scoring less than a Level 2, the PISA baseline, increased by 2.5% from 2009 (OECD, 2014). This decrease in the percentage of high-achieving students and the increase in the percentage of low-achieving students is contrary to the progress needed to become a more mathematically competitive nation. The United States has remained academically competitive with nations such as Lithuania, Sweden, Spain, and Russia (OECD, 2014); however, the United States wants to rank above these nations academically and be competitive with top-ranking contenders like Singapore and Shanghai-China (OECD, 2014; Schmidt & Burroughs, 2012). These comparable academic scores for the United States and the rest of the globe were not surprising to many education advocates (Kadlec & Friedman, 2012). Bill Gates, a long-time proponent for mathematical education reform, claimed that students need practice with challenge to solve the economic issues of the world (Kadlec & Friedman, 2012); thus he provided financial support to efforts designed to help the United States become a more mathematically competitive nation (Peterson et al., 2016).

The United States has long been struggling to stay mathematically competitive with top-ranking countries on the PISA, scoring nearly two grade levels below top-ranking countries for the last twenty years (National Center for Education Statistics [NCES], 2000, 2003, 2005, 2007,

2009b) indicating a need for change. In 2009, the Council of Chief State School Officers and the National Governors Association, with funding from the Bill and Melinda Gates Foundation, jointly began creating the Common Core State Standards for Mathematics (CCSSM) (Neuman & Roskos, 2013; Peterson et al., 2016). These common mathematics standards provide a continuity among adopting states, indicating what students should be able to do and understand at each grade level (CCSSI, 2018; Schmidt & Burroughs, 2012).

As part of the effort to rise to the top of academic standings among nations, and to groom students for higher education and careers, the United States sought ways to keep up with the global trends for the twenty-first century (Stewart, 2005). Among these trends is increased creativity, where students are creators and co-creators of knowledge not simply recipients of knowledge provided by instructors (Eaton, 2010). This trend, supported by the National Council of Teachers of Mathematics (NCTM, 1989), helped lead to the development of the CCSSM. Stipek, Givvin, Salmon, and MacGyvers (2001) described current reform efforts as the utilization of "activities that require reasoning and creativity, gathering and applying information, discovering and communicating ideas" (p. 214). With the adoption of the CCSSM, the growing trend in mathematics is to help students develop understanding through problem-solving activities that assist them in connecting mathematical concepts and communicating their understanding (Eaton, 2010).

One goal of implementing the CCSSM at all levels is to increase conceptual understanding among students (Burns, 2012; CCSSI, 2018; Li, Moorman, & Dyjur, 2010; Thoron, Myers, & Abrams, 2011), which provides students with practice for post high school experiences (Burns, 2012; CCSSI, 2018). According to Skemp (1976), failure to teach students at all levels what to do, and why to do it, was a major cause of mathematical failure in U.S.

society. The CCSSM require that students understand *why* the algorithm works rather than just *how* the algorithm works (Burns, 2012). The process of solving mathematical problems with rote memorization of traditional algorithms, which was the previous instruction method, is no longer sufficient to demonstrate conceptual understanding, and so the CCSSM may seem foreign to those unfamiliar with this thought process (Bartlo & Sitomer, 2008). Students who attributed mathematics success to learning shortcuts the same way their parents did are no longer able to use such tricks without also demonstrating conceptual understanding (Faulkner, 2013; Karp et al., 2015). With the CCSSM implemented in adopting states, parents will likely see an emphasis in students' mathematics homework on conceptual understanding of mathematics through real-life experiences (Neuman & Roskos, 2013); this way, students can expect to discover algorithms through investigations rather than simply being provided an algorithm and applying it (Gewertz, 2012; Li et al., 2010).

Whether states adopted the new standards or not (CCSSI, 2015), research shows that these standards raise the bar in terms of rigor, focus, and coherence, aspects evident in the mathematical standards of the highest-achieving nations (Khaliqi, 2016; Neuman & Roskos, 2013; Schmidt & Burroughs, 2012; Woolard, 2012). By 2013, 45 states had adopted and begun implementing the CCSSM (CCSSI, 2018; Reys et al., 2013). It is yet to be determined if these standards alone will raise the United States to higher academic standings (Schmidt & Burroughs, 2012), but it is the United States' intent, by implementing the standards, to once again become a mathematically competitive nation (CCSSI, 2018; Gaddy, Harmon, Barlow, Milligan, & Huang, 2014; Peterson et al., 2016; Toscano, 2013).

Many schools adopted a change in mathematics instructional delivery geared toward inquiry based on this trend of problem-solving almost simultaneously with the implementation of

the new set of standards (Akkus, 2016; Schmidt & Burroughs, 2012). Through the current educational reform effort, changes have occurred impacting the level at which specific curricular content delivery occurs (Schmidt & Burroughs, 2012) as well as changes in the sequence of standards across grades for some states (CCSSI, 2015). These changes have created confusion among those unfamiliar with the standards, and the public response to the reform effort has been conflicted (Henderson, Peterson, & West, 2015).

A year after the release of the CCSSM, Achieve (2011) conducted a national poll to determine public response. The results indicated that 78% of the public supported improving public education, while only 8% felt public education was adequate. This initial support, however, dwindled as public support for the CCSSM fell to 65% in 2013, and 53% in 2014 in the Education Next Poll (Henderson et al., 2015). However, Henderson et al. (2015) pointed out that support for the CCSSM in the 2014 poll rose to 68% when the questions simply dropped the common core label. In other words, if the question did not mention it was common core related, the responses were more supportive of the change in the standards than when the question indicated the change was due to the common core. It has been said, "When people oppose a label but not the basic concept to which it is attached, it may mean they have heard the label but understand it to refer to something else, possibly something more far-reaching" (Henderson et al., 2015, p. 10). In addition, the 2014 Education Next Poll revealed that in response to statements concerning the Common Core: "only a minority of the public perceived any of these statements in the same way that the CCSSI does" (Henderson et al., 2015, p. 11), indicating public response to the reform effort could be based on misconceptions. The public has also raised concern over the amount of money spent on the implementation of the new standards, ranging anywhere from $3.9 billion to $10 billion per state (Murphy & Regenstein, 2012; Pullmann,

2016). Whether or not the public understands or supports the CCSSM and instructional methods, students' perceptions of their parents' attitudes could influence their motivation (Baker, 2003; Gottfried, Marcoulides, Gottfried, & Oliver, 2009; Margolis, 2005; Simpkins, Price, & Garcia, 2015). Student success will likely be affected by their motivation to learn (Usher & Kober, 2012).

Some of the literature has focused on student perceptions of classroom environments and student perceptions of teachers (Jussim, Robustelli, & Cain, 2009; Wigfield & Cambria, 2010). Research has found that student perceptions can influence student motivation leading to academic achievement (Jussim et al., 2009; Radovan & Makovec, 2015). However, a specific focus on student perceptions of parent attitudes toward student ability and student effort leading to student motivation is especially limited in the literature.

Student motivation for learning mathematics may be influenced by the attitudes students perceive their parents to have concerning student ability or effort (Bhowmik & Banerjee, 2013). Parents could experience confusion by the transition to *creating* algorithms rather than simply *using* algorithms if they never have had to develop a conceptual understanding of how algorithms work (Bartlo & Sitomer, 2008). This confusion leads to frustration in parents, which students may observe and might influence student motivation (Margolis, 2005). Weiner's attribution theory of interpersonal motivation (2000) indicates an individual's behaviors can influence the motivation of another. Motivation, which plays a major role in student success (Schiefele & Csikszentmihialyi, 1995) and conceptual understanding (Usher & Kober, 2012), could fluctuate with student perceptions of parent attitudes following the implementation of the CCSSM. As motivation has been identified as an influence on student academic success, and as

the United States desires to become a more academically competitive nation, factors influencing student motivation are worthy of consideration, especially at the middle school level.

Motivating students is a necessity at any age but is of increased importance at the middle school level. In middle school, students begin to develop an understanding of social cues which continues through adolescence (Rice, 1999). During this time, they experience social and cognitive changes influencing motivation (Wehrspann, Dotterer, & Lowe, 2016). Therefore, the developmental period at the middle school level is a critical time to examine student perceptions of parent attitudes. The Common Core Standards appear to have instigated a change in parent attitudes toward mathematics education that is noticeable to students, as parents have exhibited frustration with the new requirement to demonstrate conceptual understanding (Bartlo & Sitomer, 2008; Phillips & Wong, 2012; Rothman, 2014); thus the consequences of this change are worthy of review. Specifically, this research concerns how students perceive the attitudes of their parents and how that perception relates to student-motivation.

Weiner's attribution theory of interpersonal motivation (2000) indicated that student *perceptions* of causal attributes concerning student ability and effort, rather than *actual* causal attributes, lead to motivation. Examining the relationship between student perceptions of parent attitudes toward the CCSSM related to student ability and effort and student motivation is worthwhile as increased motivation leads to increased student performance (Karsenti & Thibert, 1994). Wang and Goldschmidt (2003) identified the middle school years as a period that significantly predicts achievement in high school mathematics and ultimately affects a student's post-secondary opportunities. The middle school years are a prime period for students to begin to solidify their identity and explore career interests; thus any possible influences on motivation are of great concern (Rice, 1999; Simpkins et al., 2006). However, research examining a possible

relationship between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level is limited.

Previous research studies reveal that parents' attitudes have an impact on students. Jayaratne (1987) and Simpkins, Price, et al., (2015) discovered the attitudes and behaviors of a parent tend to influence the attitude of the child and form a foundation for motivation. If parent attitudes influence the student, and if parent attitudes toward the new standards are less favorable than that of the child (Allen & Fraser, 2007), eventually the attitude of the parents could become the attitude of the student as well (Jayaratne, 1987; Simpkins, Price, et al., 2015).

Research has indicated that students need motivation to learn (Obergriesser & Stoeger, 2015). Several researchers (Herges, Duffield, Martin, & Wageman, 2017; Middleton & Spanias, 1999; Weiner, 2012) found that success influences motivation, and according to Karsenti and Thibert (1994), the reverse is true as well: motivation influences success. The United States hoped that the implementation of the CCSSM would lead to increased success (Schmidt & Burroughs, 2012), which may require increased motivation (Karsenti & Thibert, 1994). With evidence that the public opinion is mixed concerning the effectiveness of the current reform effort (Henderson et al., 2015), students may perceive various attitudes from their parents that could influence their motivation (Karsenti & Thibert, 1994; Simpkins, Price, et al., 2015). In that respect, this study provides research necessary concerning student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM in relation to student motivation for learning mathematics at the middle school level.

**Problem Statement**

For nearly two decades, the United States has fallen in international rankings for mathematics, scoring an average of 20 points lower than other countries participating in the PISA. In other words, 15-year-old individuals in the United States are scoring an equivalence of two grade levels behind their peers in other countries (OECD, 2014). Graduating high school students preparing to enter college are increasingly in need of remedial coursework, and many students preparing to enter the workforce are not adequately prepared to do so (CCSSI, 2018). Over one-fourth of U.S. students are low performers according to international standards, ranking a two or less on a six-point scale. Additionally, less than 8% of U.S. students are performing at a high level, ranking either a five or six (OECD, 2014). The implementation of the CCSSM was an important step in improving the United States' international mathematics rankings (Khaliqi, 2016; Neuman & Roskos, 2013; Schmidt & Burroughs, 2012; Woolard, 2012). However, a lack of student motivation to learn continues to frustrate practicing educators in the field (Tadayyon, Zarrinabadi, & Ketabi, 2016). The student-reported motivation for learning mathematics in the United States is only 50%, which is below the average of OECD countries (OECD, 2014). If the U.S. standards are now parallel to those of the highest performing countries, requiring students to develop conceptual understanding (Neuman & Roskos, 2013), while the country's rankings are not on the rise (OECD, 2014), then low achievement could be attributed to the continuing problem of limited motivation to learn mathematics (Tadayyon et al., 2016). As motivation is highly correlated to achievement (DiPerna & Elliot, 1999; Smart, 2014; Tadayyon et al., 2016), factors contributing to motivation, specifically following the implementation of the new standards, are worth considering.

With the recent transition to the CCSSM, the possibility of student perceptions of parent attitudes influencing student motivation to learn mathematics is relatively new. Research on motivation is common among the literature, as is investigating the effects of attitudes on mathematical success. Sir Hermann Bondi (1976) indicated: "the negative attitude to mathematics, unhappily so common, even among otherwise highly-educated people, is surely the greatest measure of our failure and a real danger to our society" (p. 8). While attitudinal research is prevalent, research is limited that connects student perceptions of parent attitudes, specifically toward student ability and effort, to student motivation following implementation of the CCSSM, which have had time to manifest themselves with implementation in 45 states (CCSSI, 2018), to student motivation. The limited amount of research on this topic, along with a history of non-competitive rankings (OECD, 2012, 2014) generates a need for further investigation of this possibility. This study sought to add to the literature a connection between student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics at the middle school level.

**Purpose Statement**

The purpose of this quantitative correlational study was to examine whether a relationship exists between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level. Specifically, the study investigated the perceptions of middle school students in Grade 6 through Grade 8 in a public-school district in an upper Midwestern state of the United States that fully implemented the CCSSM over the last five years.

**Overview of Theoretical Framework and Methodology**

This study builds on the framework of Weiner's (2000) attribution theory of interpersonal motivation, an extension of his attribution theory (Weiner, 1979). Attribution theory evaluates the perceived causes of events or behaviors and contains implications for motivation among students (Weiner, 1979). Weiner (1979, 1985) posited that previous experiences of success or failure determine motivation, and individuals will attribute their successes and failures to factors that provide positive feelings about oneself and that help maintain a positive self-image while decreasing the feelings of incompetence should a failure occur. Attribution theory has a reputable history with roots in motivational theories such as Hull (1943) and Spence's (1956) drive theories and expectancy-value theories of Rotter (1954), Lewin (1935) and Tolman (1932). Weiner's attribution theory has survived multiple decades with a long list of empirical support and has evolved to meet challenges and objections, proving itself worthy as a "dominant conception in motivation" (Weiner, 2000, p. 1).

Three initial constructs within attribution theory provide potential explanations for individual successes and failures and may provide explanations for motivation as well. These constructs include locus, stability, and control (Weiner, 1979). Locus refers to the origin of the cause, whether it is internal or external; the attribute either originates within the individual or is an environmental factor (Weiner, 1979, 1985). Stability refers to whether the identified cause of success or failure will again be present if the task is repeated (Weiner, 1979, 1985). Control refers to whether an individual can alter the cause or not (Weiner, 1979, 1985). These three constructs are woven together in attribution theory. Weiner (1979, 1985) indicated that factors to which students attribute success or failure follow a sequence of all three constructs. For

example, if a student attributes success to ability, it is an internal, stable, and uncontrollable factor, whereas effort is an external, unstable, and controllable factor.

Weiner further elaborated that a sequence of these constructs explains four main determinants of success and failure: ability, effort, the difficulty of the task, and luck (Weiner, 1985, 2000, 2010a, 2010b, 2012). While attribution theorists generally agree that the way students use attributions can have emotional, behavioral, and motivational implications (Weiner, 1985), Weiner alone placed an emphasis on the student's perceptions of what causes the outcome (Weiner, 2000, 2010a). Weiner (2000) discovered that motivation receives the most influence in the social realm by perceptions of ability and effort. Weiner's conclusion that perceptions within interpersonal relationships influence causal attributes indicates that interpersonal relationships can also affect motivation (Weiner, 2012). Given that Weiner's attribution theory of interpersonal motivation contains multiple constructs woven together (Weiner, 2000), examining one construct of the theory in isolation would be difficult. However, Weiner (2000, 2012) established that ability and effort are two of the main determinants leading to motivation, so this study focuses on Weiner's construct of perception regarding those two determinants.

To explain how perceptions influence beliefs about behaviors leading to motivation, Weiner (2010a) discussed one view of causal belief referred to as the actor-observer perspective. This perspective states that when individuals evaluate their own behaviors, they do so from a situational point of view. However, when observing another's behaviors, they make observations concerning the characteristics of the observed person. This actor-observer perspective can thus explain different attributes for students' motivation depending on their perception, whether it is the students' beliefs of their own behavior or the students' perception of their parents' beliefs.

Most studies that focus on causes of success or failure and motivation limit themselves to Weiner's (2000, 2010a, 2010b, 2012) four attributes of ability, effort, the difficulty of the task, and luck. However, McClure (1985) and Wentzel (1998) believed that social influences, including family, teachers, and peers, affect motivation in a manner extending beyond these initial attributes. Weiner (2000) recognized the social aspect of motivation as well, which resulted in his attribution theory of interpersonal motivation, indicating that parent behaviors may influence student motivation. Parent behaviors are an extension of their attitudes, formed from parent perceptions (Philipp, 2007). If the student perceives these attitudes in the home environment, these attitudes may influence a student's motivation (Baker, 2003; Gottfried et al., 2009; Simpkins, Price, et al., 2015). This aspect of causal attributes from interpersonal relationships may differ from causal attributes of an intrapersonal perspective (Weiner, 2000).

Considering multiple perspectives, Weiner believed extensions to his theory were possible. Weiner (2000) envisioned future growth of his theories with attribution-guided research and elaboration. While Weiner's attribution theory of interpersonal motivation is dependent on an observer's perceptions of the participant's attributes for success or failure (Weiner, 2012), the present study expands Weiner's theory to consider the participant's perception of the observer's attitudes toward the participant, based on the observer's perceptions, as a factor leading to motivation. Specifically, the current study considers student perceptions of parent attitudes, which reflect the parent's perceptions of student ability and effort (Wigfield, 1983).

Weiner placed an emphasis on the student's perceptions of what causes a success or a failure leading to motivation (Weiner, 2000, 2010a). Weiner's (2000) work led him to believe perceptions of ability and effort are the main determinants of motivation. Either of these determinants could lead to increased or decreased motivation depending on whether the outcome

was a success or a failure (see Figure 1). Weiner's beliefs concerning ability and effort and their relationship to motivation, with the addition of the construct of perception absent in other attribution theories, make Weiner's theory ideal for addressing the relationship between student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics at the middle school level.

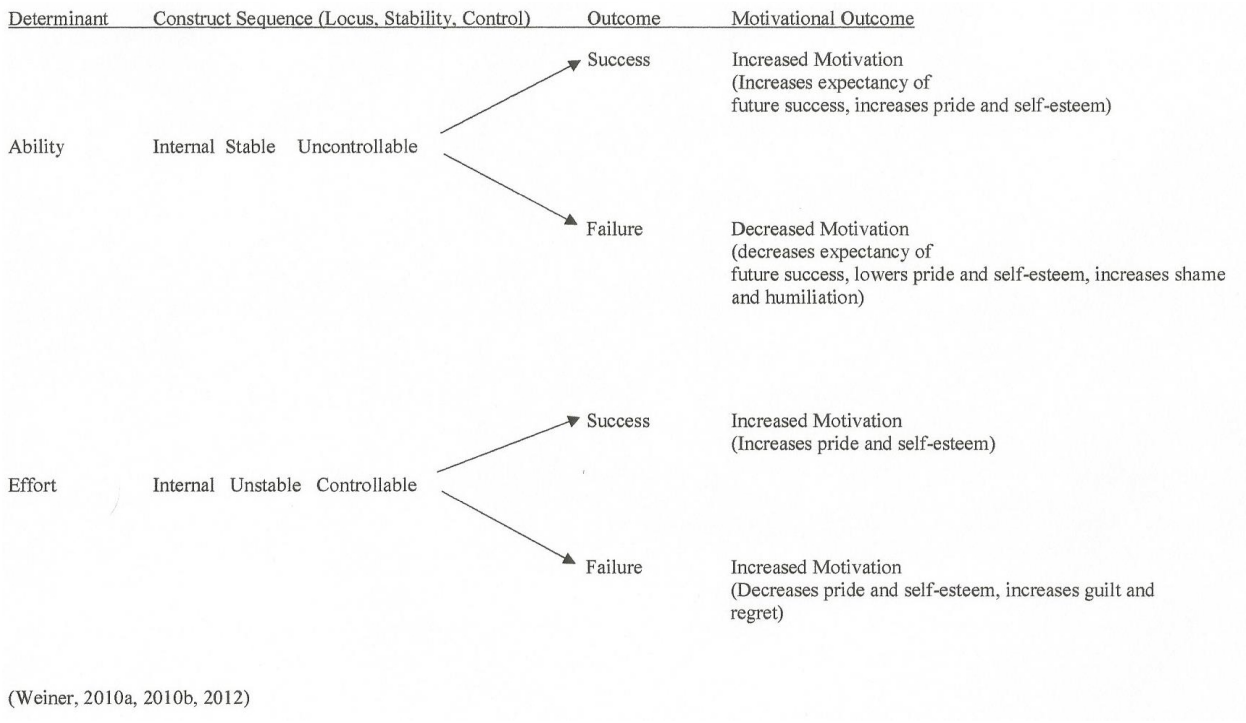


Figure 1. Weiner's effects of ability and effort as related to motivation.

This study intended to explore whether a relationship exists between middle school student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics. With the research questions addressing perceptions and motivation, Weiner's (2000) attribution theory of interpersonal motivation, with a focus on perceptions of attributes leading to success or failure and ultimately to motivation, frames the current study. The researcher specifically examined perceptions of parent attitudes toward the attributes of ability and effort as determined most influential by Weiner (2000).

The researcher utilized a correlational research design with cross-sectional survey methodology (Creswell, 2014) for this quantitative study. The researcher selected a quantitative correlational design based on the relational nature of the variables in the study (Creswell, 2014; Warner, 2013). The current study utilized a cross-sectional survey to collect data on the perceptions and motivations of middle school students. This process is a common method used to collect numerical data concerning attitudes or viewpoints of a population (Creswell, 2014; Simon, 2011). Data were analyzed using Pearson's *r* and Spearman *r* as well as simple linear regression and multiple linear regression as appropriate to the correlational design (Warner, 2013).

**Research Questions and Hypotheses**

The following central research question (RQ) developed from Weiner's (2000) attribution theory of interpersonal motivation frames the study: Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes and student motivation for learning mathematics at the middle school level? The researcher developed two associated sub-questions to investigate the relationship between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level. The research sub-questions and the corresponding hypotheses are as follows:

**RQ1:** Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level?

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

**RQ2:** Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level?

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

**Assumptions**

The current study involved several assumptions. First was the assumption that utilizing an online survey would result in a quick turnaround time of responses (Schonlau, Fricker, & Elliott, 2002). The researcher also assumed a web-based survey would increase the response rate over a paper-based survey. In a study conducted by Greenlaw and Brown-Welty (2009), web-based surveys had a 20% higher response rate than paper-based surveys when administered to populations with access to computers. The population in this study had access to laptops, as the

participating school district is one-to-one for Grade 6 through Grade 12 where each student has access to a computer, thus the web-based survey was preferred.

Also, this study made certain assumptions about the participants. One such assumption was that students participating would respond to the survey statements with a good conscience (Colton & Covert, 2007) and would possess the skills necessary to navigate the web-based survey (Timmerman, 2002). Another assumption was that students would understand the statements they are responding to and would not be distracted by the survey's layout (Timmerman, 2002). The items in the survey were worded for easy readability. Participants in the pilot study confirmed the instrument was easy to understand. If the participants did not understand a statement, the assumption was that they would ask for clarification or leave the response blank. Prior to completing the survey, participants were informed their responses were anonymous to increase the probability of candid responses (Creswell, 2014). Additionally, the researcher assumed participants were rational thinkers able to perceive social cues in their environment, particularly in their home.

By employing purposive sampling, the researcher assumed a homogenous population (Etikan, Abubakar-Musa, & Sunusi-Alkassim, 2016). The researcher assumes the results would be similar if the participants were obtained through random sampling, came from a different school district nearby with similar demographics, or if participants had been obtained from an inaccessible sample of the population (Etikan et al., 2016). The population of middle school students within the district to which the results of the study apply is a homogenous population, according to the demographics available on the district's website. Websites for neighboring districts indicate similar demographics among middle school students.

The researcher made assumptions about the parents of the participants. The researcher assumed the parents of the participants had heard of the CCSSM, whether they were originally from the area or had transferred in, and that they were aware that the school district teaches these standards. On average, it took four years for parents to become aware of the implementation of the CCSSM across the nation, even among states not adopting the CCSSM, which began in 2010 (Pullmann, 2014). By 2017, the researcher assumed that parents were familiar with this educational reform and had formed an opinion one way or another concerning the CCSSM. The researcher also assumed that the parent and the student interacted regularly and shared conversations concerning education. Such interactions between parent and student will influence student attitudes which form a foundation for motivation (Simpkins, Price, et al., 2015). When considering attitudes and behaviors, McLeod (2014) indicated the researcher must assume consistency between behaviors and attitudes. The researcher assumed consistency between parent behaviors observable by students and parent attitudes toward the reform effort.

The researcher also made assumptions concerning the ethical integrity of the participants. The researcher assumed that parents were the individuals granting consent and the students were the ones assenting to participate in the study. The researcher also assumed that the participants completing the survey were the students and not the parents. Sincero (2012) indicated that individuals often fake their identity to gain incentives provided by completing an online survey. As the incentive to complete this survey was minimal and given directly to the participant, it is assumed that parents did not impersonate their child to complete the survey.

**Delimitations and Limitations of the Study**

There are several delimitations in this study. These characteristics within the researcher's control could restrict the extent and explain the boundaries of the study (Simon & Goes, 2013).

The researcher selected the site for the study based on previous experience with parents and middle school students there. The boundaries of the study include the data collection period, October to December 2017, which occurred approximately five years after the full implementation of the CCSSM in the selected upper Midwestern state. This five-year window provided enough time for parents to form an opinion concerning the CCSSM and to start displaying attitudes the students might be observing. The study took place in a small community located in the upper Midwestern region of the United States. The study only collected data from students currently taught the CCSSM at the middle school level.

The Likert-type scale responses used in the instrument created an additional delimitation of the study. Closed-ended questionnaires might dissuade some individuals from assenting to complete the survey (Colton & Covert, 2007). The option for free response may have increased the likelihood that some potential participants would take part in the study. Some individuals are more comfortable partaking in research when they know their answers are personal and supported with their own comments, such as with qualitative data (Colton & Covert, 2007).

There are several identified limitations to this study. These characteristics are outside the researcher's control and could potentially create a weakness in the study (Simon & Goes, 2013). The method of mathematics instruction received by the parents of the participants is unknown. The method of instruction received by parents when they were students may influence their perception and ultimately their attitude toward the CCSSM. Research shows that students observe modeled behaviors and attitudes of their parents (Borup, Stevens, & Waters, 2015). The parents' education level is unknown, which might also affect their attitudes toward student ability and effort. The level of parental involvement in the students' academics is unknown, which also dictates the attitudes students perceive their parents have concerning education

(Borup et al., 2015). The current study centered on data collected in only one region of the United States and, thus, cannot describe other populations. The data collected for this study represent student-perceived attitudes of parents after the implementation of a significant educational reform effort and may not be reflective of the attitudes of parents if no such reform had occurred.

The sample size and the sampling method created additional limitations to the study. The study is limited to a group of middle school students; thus the results are not generalizable to all middle school students or their parents (Colton & Covert, 2007). Data collection occurring among a homogenous population creates an additional limitation. Various ethnic backgrounds of parents and students may contribute to student perceptions of parents' attitudes based on cultural norms. Different cultures place varying emphasis on the values of ability, effort, or even education in general (De Haan & Wissink, 2013; Miller, 1984; Weiner, 2010a), indicating the outcomes could differ had the study been conducted with a heterogeneous population.

Finally, the results of the study themselves may be limiting. Although a quantitative cross-sectional design with survey methodology is appropriate for this type of research, as the researcher is unable to control for the variables (Kothari, 2004), results could be consistent with contemporary knowledge (De Vaus, 2013). Due to the correlational, cross-sectional design, causation cannot be determined, indicating that the researcher cannot be certain that a causative factor was included in the variables (Cohen, Manion, & Morrison, 2007). Results from this study, while not generalizable to all middle school students or their parents, are specific to the population that participated in the study (Colton & Covert, 2007).

**Significance of the Study**

Student motivation continues to be lower in the United States than in other countries competing for international rankings (OECD, 2014). This study was designed to determine the relationship between student perceptions of parent attitudes and student motivation for learning mathematics. These results have implications for educators, parents, administrators, or other stakeholders, as well as policymakers. Results from this study add to the literature by demonstrating that student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM correlate to and predict student motivation for learning mathematics at the middle school level.

Student perceptions of parents have not received much attention in previous research. Previous studies have focused on student perceptions of classroom teachers (Jussim et al., 2009; Wigfield & Cambria, 2010). While these previous studies are beneficial for understanding motivation related to the classroom environment, they do not consider motivation formed within the home environment. This study provides valuable information relevant to the relationship between student perceptions of parent attitudes toward student ability and student effort and student motivation for learning mathematics at the middle school level which may benefit other school districts examining student motivation issues.

Results from this study benefit educational practices. Educators in the field may conceivably acquire discernment beneficial for planning future educational activities where student motivation is of high need. Parents, administrators, or other stakeholders may benefit from the study, as it leads to a deeper understanding of possible influences on student motivation for learning mathematics at the middle school level. Through the current study, parents may gain an understanding that their children perceive their attitudes and that these perceptions have

motivational implications (Borup et al., 2015) and ultimately affect the academic success of their child (Usher & Kober, 2012). Parents may become aware of how their children perceive their attitudes and begin to make conscious decisions about the attitudes they portray in the home.

Parent attitudes may reflect their involvement in their child's education. Sheldon and Epstein (2005), as well as Drummond and Stipek (2004), indicated that educators need to provide parents with an opportunity to become involved in the child's education. Sheldon and Epstein (2005) further argued that parental involvement in a child's education decreases the chance of a decline in the student's attitude toward a specific subject. A positive attitude leads to increased motivation, a key component leading to mathematical success (Wang, 2012). Increased motivation at the middle school level could potentially increase the number of students enrolling in upper-level mathematics classes in high school and entering mathematical careers (Simpkins et al., 2006). With a greater understanding of how student perceptions of parent attitudes contribute to student motivation, teachers and administrators can strive to increase awareness of the influencing factors on student motivation.

Teachers can influence motivation for students in the classroom. As Maehr and Midgley (1991) suggested, teachers identify the learning purpose in their classroom. Teachers may plan classroom activities that define learning purposes related to ability and effort based on the motivational needs of their students. Educators who strive to motivate students in the classroom can use the information from the current study to inform practice.

Administrators or other stakeholders can use information from this study to create opportunities for parents to receive information concerning what comprises the CCSSM to allow parents to form their attitudes based on facts rather than speculation. Administrators can create these opportunities through informational meetings, a letter sent home, or social media, such as a

website or blog entries where parents are encouraged to learn about the CCSSM and to take an active role in their child's education, as suggested by Truesdell and del Prado Hill (2015). In addition, administrators may wish to inform parents of the benefits of communicating a positive attitude, regardless of personal feelings.

Policymakers will also benefit from this study because it has the potential to change policy concerning educating parents about the implementation of the CCSSM. While education has long focused on communicating learning with the student, this study demonstrates a need for communicating learning with the parents of students as well. Maehr and Midgley (1991) discussed several policies and practices that must be reviewed when a school seeks to improve motivation; among these was communication with parents. Implementation of policy can improve communication by requiring that parents new to a school district attend informational meetings concerning the implementation of the CCSSM. These meetings should also focus on how students perceive parental attitudes and how that perception influences student motivation. Communication should go both ways and provide parents the opportunity to ask questions and contribute to their child's education.

In addition to improving communication with parents regarding the CCSSM, school policy concerning scheduling may need to be reviewed based on the results of this study. Knowing that parent attitudes influence student motivation could highlight a need for a different setting or schedule to allow for motivational activities operated outside the school or within a classroom context where parents can be present. This recommendation falls in line with the study by deCharms (1976) where changing the learning environment was found to influence motivation among students. DeCharms (1976) focused on students who were either ability-focused or task-focused, where proficiency depended on effort, thus aligning with both the

current study and Weiner's (2000) work where ability and effort were found to be the main determinants of motivation.

Student ability and effort might need consideration when selecting a curriculum for students. Policy could dictate that parents become involved in the selection of curricular materials. Administrators could seek input on the curriculum selection from a parental advisory board selected by administrators. Epstein (1989) and Marjoribanks (1979) found that parental involvement in a child's education is highly important. Parental involvement continues to be a topic of discussion; Truesdell and del Prado Hill (2015) advised that developing strong partnerships with parents could increase the success of the implementation process. While most parents can see the importance of reading to their children, convincing them of the value of their involvement in mathematical activities is more challenging (Margolis, 2005). However, the mathematical connections made through daily activities help to activate schema necessary for conceptual understanding (Truesdell & del Prado Hill, 2015). Local school districts may consider the relationship between student perceptions of parental attitudes and student motivation for learning mathematics when considering curricular materials. Policy may need to dictate that parents take a substantial responsibility in selecting curriculum at the local level to allow parents to take ownership of the curriculum and maintain a positive attitude toward the selected curriculum. Parents who show an interest in their child's education help foster the development of student motivation (Gonzalez-DeHass et al., 2005); increased student motivation leads to greater academic performance (Usher & Kober, 2012).

Finally, the results of this study could establish the foundation for future exploration concerning the relationships between student perceptions of parent attitudes. This study brings attention to motivation related to the home environment which is an understudied topic in

education literature. This study provides evidence for other school districts examining motivational issues among students which could lead to a replicative study with a possible modified instrument for data collection specific to a school district.

**Definition of Terms**

The following definitions help in understanding the elements of the study. Some terms have multiple meanings, and thus, these definitions will clarify their use in the study.

**Ability.** The term is defined as the proficiency a student possesses to understand and apply mathematical models of real-world data, to be a proficient problem solver and to use appropriate tools (CCSSI, 2018).

**Common Core State Standards for Mathematics (CCSSM).** The term is defined as the set of mathematics standards developed by the Council of Chief State Officers and the National Governors Association that identify what a student at any given grade level should understand and be able to do. These standards increase rigor, focus, and coherence by requiring students to demonstrate an understanding of mathematical concepts as well as perform procedural skills (CCSSI, 2018). Stipek et al. (2001) summed up the new standards to be a process of developing understanding through problem-solving activities that help students formulate mathematical concepts.

**Effort.** The term is defined as an achievement-related behavior linked to motivation (Chouinard, Karsenti, & Roy, 2007). It can be considered the exertion of energy, either physical or mental, to accomplish a task, such as learning mathematics.

**Learning.** The term is defined as the acquisition of a mathematical understanding allowing the student the ability, at their mathematical maturity level, to proficiently use and

model mathematics in a real-world setting. In addition, students who have learned will be able to justify how to solve a problem or explain the derivation of a mathematical rule (CCSSI, 2018).

**Motivation.** The term is defined as a set of values and beliefs children learn that propels and nurtures their desire to engage in a specific activity (Mullis et al., 2001). Graham and Weiner (1996) defined motivation as "why people think and behave as they do" (p. 63). For this study, motivation will refer to the desire to engage in the learning of mathematics.

**Parent attitudes.** The term is defined as the feelings of moderate intensity, either positive or negative, toward something either tangible or intangible (Philipp, 2007). These are visible characteristics, observable by others (McLeod, 2014). For this study, parent attitudes are the observable behaviors and actions that parents display or words they say resulting from their perception of a child's ability or effort in mathematics.

**Student perceptions of parent attitudes.** Student perceptions of parent attitudes are defined as the students' interpretation of their parents' values and beliefs, which students observe through child-parent interactions, including parent language and behavior, particularly in the home setting (Bhowmik & Banerjee, 2013).

## Definition of Measures and Variables

The researcher used a questionnaire to measure three variables. These variables included (a) student perceptions of parent attitudes toward student ability, (b) student perceptions of parent attitudes toward student effort, and (c) student motivation for learning mathematics at the middle school level. All three variables are considered after the implementation of the CCSSM. Student perceptions of parent attitudes toward student ability and student perceptions of parent attitudes toward student effort served as the independent predictor variables, while student motivation for learning mathematics served as the dependent outcome variable.

**Student perceptions of parent attitudes toward student ability**. This variable is defined as the observable behaviors a parent displays or the comments a parent makes (McLeod, 2014) concerning a student's ability to understand and apply mathematical models of real-world data, to proficiently solve problems, and to use appropriate tools following the implementation of the CCSSM (CCSSI, 2018).

**Student perceptions of parent attitudes toward student effort.** This variable is defined as the observable behaviors a parent displays or the comments a parent makes (McLeod, 2014) concerning a student's exertion of energy to learn mathematics at the middle school level following the implementation of the CCSSM (Chouinard et al., 2007).

**Student motivation for learning mathematics at the middle school level.** This variable is defined as the students' self-reported desire to engage in the learning of mathematics in Grade 6 through Grade 8 (Graham & Weiner, 1996).

## Organization of the Study

The researcher organized this study into five chapters. Chapter 1 introduced the study and presented the research problem, which was the United States' continued academic declines in international rankings for mathematics due to sub-par standards and low student motivation. Chapter 1 also presented the background and contextualization of the problem leading to the purpose of the study, which was to examine the relationship between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and its effects on student motivation for learning mathematics at the middle school level. The chapter provided an overview of the theoretical framework, including the perception construct of Weiner's (2000) attribution theory of interpersonal motivation that framed the study. Chapter 1 also introduced the quantitative correlational research design and presented the research

questions and hypotheses guiding the study. Finally, the chapter provided discussions relevant to the assumptions, limitations, and delimitations, and significance of the study, along with definitions of terminology to acquaint readers with the topic and problem addressed in the study.

Chapter 2 follows with a review of literature relevant to the current study. The literature review discusses the theoretical framework that guides the study, including the background of the theory, the constructs of the theory, and the use of the theory in educational contexts. The chapter also provides a discussion on empirical studies relevant to the background and implementation of the CCSSM, student perceptions, parent attitudes, influences on student achievement, success, and motivation, and the home environment as a source of student motivation.

Chapter 3 explains the methodology of the study, including the research design, site selection, population, sampling procedures, and methods of data collection. The ethical issues and permissions necessary to conduct the study are also described. Chapter 3 also discusses the data sources along with the instrument used for this study, the instrument review, and the efforts to ensure validity and reliability. Chapter 3 continues with discussions concerning researcher positionality and research validity. Chapter 3 concludes with the data analysis techniques for the study along with the strengths or weaknesses found in the study.

Chapter 4 presents the results of the study. Demographic data are provided to describe the participants. The processes for data preparation and collection are also included in chapter 4. The researcher analyzed the data through Pearson's *r* as well as Spearman *r.* The results were further analyzed with simple linear regression and multiple linear regression. Results of both data analyses are presented and are organized by research question.

Chapter 5 presents a discussion of the study, including an overview of the problem, purpose statement, and research questions. The chapter also provides an analysis of the major results as well as an interpretation of those results. The chapter concludes with implications and suggestions for future research based on the limitations of the current study.

**Chapter Summary**

After the United States repeatedly performed below the highest performing countries in mathematics on international rankings, such as the PISA, American education policymakers initiated a reform effort to improve student learning and improve academic achievement. This effort has created a conceptual overhaul that is revising the roles of teachers, administrators, school districts, states, and educational organizations across the country (Wiener, 2013; Woolard, 2012). The Common Core initiative is an effort to raise the United States to among the top of the academically performing countries (Neuman & Roskos, 2013; Peterson et al., 2016; Schmidt & Burroughs, 2012; Toscano, 2013) and to prepare students to attend an institute of higher education and train for a profession (CCSSI, 2018). Unfortunately, the standards alone have not led to the desired results concerning college and career readiness, nor international rankings. The United States ranked 27 out of 34 on the PISA in 2012, with the number of American students scoring at least a Level 5 dropping by 1.1%, and those scoring less than a Level 2, the PISA baseline, increasing by 2.5% from 2009 (OECD, 2014).

With achievement highly correlated to motivation (Usher & Kober, 2012), motivational aspects connected to the initiative are worthy of examination. The purpose of the current study was to explore whether a relationship exists between middle school student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics. With the varied responses from the public

(Henderson et al., 2015), and the vast amount of money already spent on Common Core implementation, from $3.9 billion to $10 billion per state (Murphy & Regenstein, 2012; Pullmann, 2016), it is imperative to determine this relationship.

This quantitative correlational study aimed to answer the following research questions: Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes and student motivation for learning mathematics at the middle school level? Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level? Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level?

Weiner's attribution theory of interpersonal motivation places an emphasis on perceptions that lead to determinants of success and failure resulting in motivational outcomes (Weiner, 2000, 2010a). With Weiner's theory as a framework, this study utilized a quantitative, correlational, cross-sectional design to collect data to determine the relationship between student perceptions of parent attitudes toward student ability and effort and student motivation to learn mathematics at the middle school level.

This chapter introduced a quantitative correlational research study to gain understanding concerning the relationship between middle school student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation to learn mathematics. As described by Weiner's attribution theory (1979), an individual's perceptions are of great importance when determining the attributes for success, failure, and motivation. The researcher chose the design as the most appropriate to address the relational

nature of the study (Creswell, 2014) and because the researcher could not control the variables (Kothari, 2004).

The results of the study answered the research questions. This study determined a statistically significant relationship exists between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level. Specifically, the results of the data analysis suggest that student motivation can be predicted by student perceptions of parent attitudes toward student ability and effort. Student motivation for learning mathematics is lower in the United States than in other countries (OECD, 2014). Understanding predictors of motivation has implications for parents, educators, and other school officials. The conclusions and implications supported by the results of this study are discussed in more detail in Chapter 5.

## Chapter 2: Review of the Literature

This chapter offers an overview of the literature to support this study on student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and its effects on student motivation to learn mathematics among middle school students. The chapter discusses the theoretical framework and empirical studies supporting this study. Limited research exists on student perceptions of parent attitudes toward student ability and effort following implementation of the Common Core Standards for Mathematics (CCSSM) and student motivation, creating a gap in the extant literature that can be filled, in part, by the current study.

Student perceptions are important for developing student motivation as described by Weiner's (2000) attribution theory of interpersonal motivation, which forms the foundation for the study. The literature review includes an analysis and synthesis of relevant empirical studies beginning with how the CCSSM have changed mathematics education. The literature review also addresses the home environment as a place where students develop motivation. With students' motivation developing in the home, a discussion of the influences of student perceived attitudes of parents is also presented. This study aims to answer this question: Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes and student motivation for learning mathematics at the middle school level? Consideration of the CCSSM, the home environment, and parental influence collectively shape the study.

With the United States maintaining a position in the bottom half of international mathematics rankings, 27 out of 34 OECD countries (OECD, 2014), a need arose to determine the cause of this demise. Several issues might have led to this decline including sub-par

mathematics standards (Rice, Barth, Guadagno, Smith, & McCallum, 2013) and students lacking interest and motivation to continue in mathematics (OECD, 2014). Neuman and Roskos (2013) reported that mathematics standards used in the United States were lagging those of higher-ranking countries, generating a need to evaluate the standards used within the United States. Given that achievement correlates to motivation (DiPerna & Elliot, 1999; Sikhwari, 2014; Smart, 2014), lower motivation is also a potential factor for consideration concerning low achievement (Herges et al., 2017). While the realization of the CCSSM became an answer to the inadequate standards (Neuman & Roskos, 2013), motivation continues to be an issue for students in the United States (OECD, 2014; Tadayyon et al., 2016). The Nation's standards now parallel those of the highest performing countries requiring students to develop conceptual understanding, yet the U.S. rankings are not on the rise (OECD, 2014; NCES, 2009a), suggesting that student motivation to learn mathematics and continue with a career in mathematics is an area worthy of investigation.

Several factors influence student motivation to learn mathematics; among these is parental involvement (Morris, Lafontaine, Pichette, & de Serres, 2013; Ryan & Patrick, 2001). The promotion of parental involvement in a child's education is not new. Presidents Reagan, Clinton, Bush, and Obama all included components of parental involvement in their education initiatives which McNeal (2014) described as "an attempt to help 'fix' a faltering education system without fundamentally restructuring schools" (p. 564). Indeed, research has found that parental involvement can increase academic performance (Hon & Yeung, 2005; McNeal, 2014; Morris et al., 2013).

Nonetheless, research conflicts on what type of parental involvement is beneficial for student achievement and motivation. Some studies (Hon & Yeung, 2005; Morris et al., 2013)

indicate positive parental involvement leads to positive student achievement, but others have found that positive parental involvement can decrease student achievement (Domina, 2005). McNeal (2014) indicated it is unclear what types of parental influence affect student motivational and achievement outcomes, creating a need to examine parental influences within specific situations. Al-Dhamit and Kreishan (2016) indicated that different types of parental attitudes can have different types of motivational effects on students, and the same attitude displayed by different parents can have a different effect on student motivation for different students. Wehrspann et al. (2016) examined different types of positive parental involvement and determined that indirect parental involvement, such as communicating the value of education rather than volunteering as a classroom parent, might be more beneficial for adolescents. Parent attitudes are one such form of indirect parental involvement that influences student outcomes (Wehrspann et al., 2016). As members of the public, parents may exhibit attitudes that reflect public opinion (Henderson et al., 2015).

Introducing the CCSSM as an educational reform effort received considerable public attention (Henderson et al., 2015). The change in standards frustrated parents and educators alike because the new standards were not exactly clear (Henderson et al., 2015). Parents frustrated with the change in standards likely display their attitude toward this reform effort at home and their children observe this frustration. The home environment is a place for students to develop motivation and learn attitudes (Ames, 1992) and can be an influential factor for student success (Bhowmik & Banerjee, 2013). In the home, students likely perceive their parents' attitudes, whether positive or negative (Walberg, Fraser, & Welch, 1986), and this perception may then influence the students' own attitude and motivation to learn mathematics (Ames, 1992; Simpkins, Price, et al., 2015).

In response to continued declines in the United States' international mathematics rankings (OECD, 2014), and with consideration of parent influences on student motivation (Morris et al., 2013; Ryan & Patrick, 2001), the purpose of this quantitative correlational study was to examine whether a relationship exists between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level. With the research questions addressing perceptions and motivation, Weiner's (2000) attribution theory of interpersonal motivation, with a focus on perceptions of attributes leading to success or failure and ultimately to motivation, was appropriate to guide the current study. The researcher specifically examined perceptions of parent attitudes toward the attributes of ability and effort as determined most influential by Weiner (2000).

## Analyses and Syntheses of Relevant Empirical Studies

To understand better the continued problematic decline of the United States' international rankings for mathematics and the efforts made to correct the problem, a background of one solution—the implementation of the CCSSM—is discussed. Additionally, other factors including student perceptions, attitudes, and the home environment, found through previous research to impact student motivation are presented. The intersection of the implementation of the CCSSM to correct the identified problem and the factors found to influence motivation provides support for the current study.

**The Common Core and mathematics education.** To understand why students might perceive different parent attitudes toward mathematics today compared to parent attitudes of the past, it is necessary to understand what changes have occurred in mathematics education over the last decade. Reform efforts have come and gone in education throughout history. Many

educators view such efforts as fads that will eventually dissolve (Wiener, 2013). However, the more interconnected a reform effort is, the less likely it will easily be dismissed as another fad to merely get through (Wiener, 2013). The CCSSM interconnect focus, coherence, and rigor in an attempt to reverse the United States' declining mathematical performance.

After the United States repeatedly performed below the highest-ranking countries, including Korea, Japan, Hong Kong, China, and Singapore, on international assessments, such as the PISA and the TIMSS (OECD, 2014), U.S. education policy-makers adopted a reform effort based on the outcomes of student learning and achievement (Neuman & Roskos, 2013). This effort has affected teachers, administrators, school districts, states, and educational organizations throughout the country (Wiener, 2013; Woolard, 2012). The Common Core initiative, the result of joint efforts between the Council of Chief State School Officers and the National Governors Association, with funding from the Bill and Melinda Gates Foundation, is, in part, an effort to raise the United States to among the top of the academically high-performing countries (CCSSI, 2015, 2018; Toscano, 2013). These two organizations worked together with educators, parents, administrators, and content experts to create a set of standards based on practices and benchmarks of top-performing competitors to groom students for global success (Neuman & Roskos, 2013). Educators implementing the CCSSM prepare individuals to be ready for not only post-secondary education but also for occupations in a knowledge-based society (CCSSI, 2018). Although the CCSSM encompass a set of shared goals and expectations for the nation's students and receive federal funding, they are not a national curriculum for the schools. Local states, school districts, and administrators still determine how to meet the standards (CCSSI, 2018).

The CCSSM also include eight Standards for Mathematical Practice (SMP) which emphasize reasoning abstractly, communication, problem-solving, modeling, using appropriate

technologies, precision, making use of structure, and repeated reasoning (CCSSI, 2015). These SMP include the use of proper vocabulary, notation, and the ability to explain traditional rules (CCSSI, 2015). Not all students approach problems in the same manner, and multiple forms of mathematical reasoning should be expected and accepted in a classroom (Burns, 2012). Educators must focus their instruction on practices that allow students to make sense of the concepts and reason with them (Karp et al., 2015). This new emphasis no longer allows presenting algorithms for students to memorize; rather, the CCSSM and the SMP insist that teachers improve students' numerical reasoning, not just numerical computations (Burns, 2012). This shift in focus has educators increasingly utilizing physical models to aid conceptual understanding in response to the mandates of the CCSSM (Cramer, Monson, Whitney, Leavitt, & Wyberg, 2010; Stegman, 2014). Allowing students to explore builds on their previous knowledge and experiences while developing understanding, enhancing the students' ability to make connections outside the classroom (Gaddy et al., 2014).

The CCSSM suggest learning should allow students to create their own meaning as they experience the world through social interaction, collaboration, and problem-solving (Ma & Singer-Gabella, 2011; Stegman, 2014). Burns (2012) posited that teachers can identify students who can work through a problem and arrive at the correct response, but those students have little conceptual understanding and lack numerical reasoning. The components of the SMP insist that students analyze, synthesize, and communicate their findings (CCSSI, 2015; Gilbert et al., 2014; Ma & Singer-Gabella, 2011; Stegman, 2014). Analyzing, synthesizing, and communicating ideas, along with student exploration, lays a foundation for future expansion on concepts and interconnections between mathematics (Gaddy et al., 2014).

The CCSSM follow a principle for school mathematics as described by the NCTM (2000) which includes interconnected mathematics. For successful implementation, this reform effort requires alignment between the standards, instruction, and assessment (Woolard, 2012). The vision of NCTM also includes a balance between instrumental understanding, where students learn mathematical rules without knowing why they work (Skemp, 1976); relational understanding, where students know what to do and why to do it (Skemp, 1976); and application, which have resulted in the three major key shifts of focus, coherence, and rigor for instruction (CCSSI, 2015). Together, these principles describe the adjustments to instruction needed for educators to implement the CCSSM (Gaddy et al., 2014).

***Focus.*** According to the recommendation made by the CCSSI (2015), instruction should focus on major mathematical ideas. This focus is not simply on procedural skills, but on the conceptualization and application of mathematical notions (CCSSI, 2018). The CCSSI (2015) recommended that teachers focus their energy in the classroom on deepening student understanding of fewer concepts. These concepts connect through the grade levels and the focus should be central to the students' learning (CCSSI, 2015; Gaddy et al., 2014). It is the intent of the CCSSM to build a solid groundwork for students, including a deep conceptual understanding, fluency, a distinguished level of procedural skills, and the competence to apply their knowledge both in and out of the classroom (CCSSI, 2018). Prior to implementation of the CCSSM in 45 states, many state standards were numerous but shallow in their depth of understanding (Woolard, 2012). Attempting to address too many topics at each grade reduced the likelihood that students participated in their education at a deeper cognitive level (Woolard, 2012). For most states, the CCSSM reduced the number of concepts prevalent at each grade to increase the level of cognitive reasoning (CCSSI, 2015). This transition to the CCSSM has greatly increased the

focus and provided for a deeper conceptual understanding of the standards at each grade level (Woolard, 2012).

***Coherence.*** While the CCSSM do allow for greater focus on standards, the standards constitute a complex, coherent progression through the grade levels. Standards presented at each grade level should not introduce a new concept, but rather be an extension of the standard taught earlier (CCSSI, 2015). Purposeful progression through the content at various levels increases coherence (Karp et al., 2015). In this way, deep connections continue to develop as mathematical topics link across concepts and grade levels (Gaddy et al., 2014). Prior to the implementation of the CCSSM, state standards included numerous standards at each grade level, leaving little time for educators to teach all those standards (Alberti, 2012; CCSSI, 2015). Frequently, the omission of standards from instruction resulted, creating a disorganized, often illogical, progression of topics and, even worse, a shallow understanding of the standard (Alberti, 2012). Students in higher performing countries benefit from curriculum coherence and demonstrate their depth of knowledge through a progression of simple-to-complex expectations as they progress through the grades (Schmidt, Wang, & McKnight, 2005). Alignment of state mathematics standards with the CCSSM creates this coherence for U.S. students as well (Khaliqi, 2016; Neuman & Roskos, 2013).

***Rigor***. As the desire to become a more competitive nation drives educational reform efforts, the expectations of students are changing, demanding a change in instruction as well (Gaddy et al., 2014). Instruction must change to parallel the best educational systems globally which challenge students through advanced standards and rigorous assessments aligned to those standards (Woolard, 2012). It is the expectation that students will succeed at a higher level on international assessments when teachers have taught the content (Gamoran, Porter, Smithson, &

White, 1997). Educators must teach mathematical content with three components of rigor: conceptual understanding, procedural fluency, and application (Alberti, 2012). Contrary to belief, increased rigor does not imply increased difficulty (CCSSI, 2018). Stakeholders, including parents, are often unclear in this area (Henderson et al., 2015). Rigor, as described by the Common Core, is a profound, authentic comprehension of mathematical topics emphasizing procedural fluency, conceptual understanding, and application (CCSSI, 2015). For students to have learning opportunities that equally encompass all of these, educators must carefully and purposefully plan activities that allow students to investigate and develop their own understanding (Gaddy et al., 2014).

***Increased cognitive expectations.*** It is not only the focus, coherence, and rigor of curricula that the CCSSM intend to improve. The CCSSM also come with higher expectations for cognition (CCSSI, 2018). Embedded within these new standards is an increase in cognitive levels. Students taught by these standards should not only be able to solve a problem accurately, but also demonstrate an understanding of how they solved the problem (Burns, 2012). Students must now provide specific evidence for any claims they make. Students must justify not only what content they know, but also how they know that content (Neuman & Roskos, 2013).

Wiener (2013) indicated there would be vast changes occurring in classroom instruction and cognitive expectations due to the implementation of the CCSSM. PISA defines cognitive expectations that range from Level 1, the memorizing of facts, definitions, and formulas, to Level 6, where students solve non-routine problems and make conjectures (OECD, 2014). These levels align with the expectations of the CCSSM (CCSSI, 2018). Woolard (2012) found that among Grade 4 mathematics standards in Ohio, one of the top-performing states in the country, the CCSSM shifted Ohio's state standards from a Level 2 to Levels 4 and 5. This shift now has

students analyzing, making conjectures, proving, and generalizing their findings which, prior to the implementation of the CCSSM, was a rare occurrence in Ohio's state standards (Woolard, 2012). With a change in standards this drastic for one of the top performing states, it is logical that other lower-performing states are experiencing even greater changes to instruction as adjustments are made to meet the new standards.

It is imperative for students taught under the new standards to make mathematical connections, not only between concepts but also across grade levels. Prior to the implementation of the CCSSM, students relied on shortcuts and mnemonic devices to help memorize mathematical algorithms (Faulkner, 2013; Karp et al., 2015). Unfortunately, these tricks and tips do not support mathematical connections and deep conceptual understanding as required by the CCSSM and students, particularly those in late middle school and beyond, will have to unlearn the habits developed over years (Faulkner, 2013). The process of unlearning these habits which parents themselves have relied on is the source of much frustration for many students and the parents who try to participate in their child's mathematics homework (Margolis, 2005).

***Support and implementation.*** Successful implementation of the CCSSM requires support and participation from parents. Truesdell and del Prado Hill (2015) indicated that a child's success in school depends on "meaningful family involvement in the child's education" (p. 430). However, some parents will not involve themselves with their child's education if they do not understand what is required (Margolis, 2005). Doyle and Zhang (2011) indicated that parents' perception of their own abilities to think at the deeper level required by the CCSSM creates a barrier to parent participation. Students may perceive this limited parent participation as a disbelief in the student's ability to succeed (Patel & Stevens, 2010). Moreover, parents have lashed out against the amount of testing they believe students face since the No Child Left

Behind Act, which parents do not recognize as separate from the Common Core Standards (CCSSI, 2018; McGuinn, 2015). Students may observe this attitude of parents toward what they believe to be the CCSSM, and it could affect motivation, but research is limited at this time to support this claim.

**Student perceptions.** Past research has taken multiple approaches to examining student motivation. Some of these approaches include teachers' perceptions, researcher observations in the classroom, and student perceptions of instructional methods and their influence on student motivation (Gilbert et al., 2014; Patel & Stevens, 2010; Smart, 2014). As Weiner (2000) discussed in his attribution theory of interpersonal motivation and as Wigfield and Eccles (2000) and Harter (1998) confirmed in their work on motivation, a student's perception of what exists determines the student's reality, regardless of what comprises the true reality. Although studies have considered teacher and observer perceptions, previous research (Anderman & Wolters, 2006; Gronlick, Ryan, & Deci, 1991a; Gilbert et al., 2014; Wigfield & Eccles, 2000; Woolley, Strutchens, Gilbert, & Martin, 2010) indicated that student perceptions are an important consideration when studying student motivation.

Previous studies (Chouinard et al., 2007; Sakiz, Pape, & Hoy, 2012; Stipek, Givvin, Salmon, & MacGyvers, 1998) have explored the perceptions students have of teacher support in the mathematics classroom and the relation to student efficacy in mathematics and motivation. Student perceptions of teacher behaviors and expectations do influence the students' motivation as well as the importance students place on learning (Gilbert et al., 2014; Smart, 2014). In Smart's (2014) study, student perceptions of how well the teacher interacted with the students predicted motivation in science classes. Emmanuel, Adom, Josephine, and Solomon (2014)

found that student perceptions of their own ability are positively related to their achievement. However, these studies did not consider student perceptions of parent attitudes.

Teachers are frequently a source of social persuasion for students. Studies are prevalent in the literature indicating that student-teacher interactions influence motivation (Finn, 1989; Opara & Agbakwuru, 2014; Smart, 2014). Opara and Agbakwuru (2014) argued that the teacher is a critical influence on student motivation. Student-perceived negative evaluations of student ability by a teacher have a greater chance to decrease student motivation than student-perceived positive teacher evaluations have to increase motivation (Smart, 2014). Finn (1989) indicated that teacher involvement might have a greater effect on students who come from non-supportive families. If student perceptions of teacher support and expectations have an influence on student motivation, as claimed by previous studies, then student perceptions of parent attitudes in relation to student motivation, especially for involved parents, is also worthy of exploration.

Comparable to the conclusions of Op't Eynde, De Corte, and Verschaffel (2007), who determined the two main components of middle schoolers' mathematical ideas relate to the students' perceptions of the class environment and their ability, Weiner (2012) identified student perceptions of ability and of effort as the two main determinants of student motivation. Weiner (2000) initially identified four main determinants attributing to success and failure among students: student perceptions of effort, ability, the difficulty of the task, and luck, but his extended research revealed that only ability and effort are consistent contributors to motivation (Weiner, 2012). Based on Weiner's discoveries, this study focuses on motivation resulting from perceptions based on the two perceived attributes of ability and effort.

***Perceptions of ability.*** Research shows that the messages students perceive from their parents concerning their ability can be more influential than feedback the student receives in the

form of a grade (Parsons, Adler, & Kaczala, 1982). A parent who celebrates a grade of a "D" sends a different message to the student about ability than the parent who shames the child for earning a "B" (Parsons et al., 1982). The behaviors a parent displays based on the attributions they make for student success and failure will influence the students' perceptions of their parent's involvement in their education, and their perception of parent-beliefs concerning ability (Patel & Stevens, 2010). Previous research concerning students' perceptions of their teacher's belief about their ability indicates it affects student performance. Motivation is often a mediator between perceptions and performance (Jussim et al., 2009; Wigfield & Cambria, 2010). If students' perceptions of their teacher's beliefs concerning their ability influences motivation, then students' perceptions of their parents' attitudes concerning their ability and the relationship it may have to their motivation is worth considering as well.

Some researchers have found the relationship between perception of ability and achievement motivation goes both directions (Gilbert et al., 2014; Madjar, Shklar, & Moshe, 2016; Silinskas, Niemi, Lerkkanen, & Nurmi, 2013), but Marsh, Koller, Trautwein, Ludtke, and Baumert (2005) found a specific direction to the relationship between perceptions of ability and achievement. They found that the relationship is stronger when it begins with perception rather than achievement (Marsh et al., 2005). Discussions have occurred concerning motivation as a mediator between perceptions of classroom environments or teacher behaviors and performance (Gilbert et al., 2014) but a discussion of a direct relationship from perceptions to motivation occurs with less frequency, and to an even lesser extent concerning student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM. Much of the research concerning perceptions of teachers' beliefs regarding students' mathematical ability

relates to the classroom environment, such as the Gilbert et al. (2014) study which hypothesized and confirmed that student perceptions of the teacher's expectations relate to student motivation.

***Perceptions of effort***. Teacher support and encouragement to try, as reported by students, is highly correlated to student motivation (Sakiz et al., 2012). Motivational patterns developed through middle school are often indicative of the student's motivation into high school (Eccles et al., 1993). This link between teacher support and student motivation develops early in a child's education and solidifies by early adolescence (Turner & Meyer, 2004; Wang & Goldschmidt, 2003; Wehrspann et al., 2016; Wolters, 2004). As students leave elementary school, they perceive less support from parents and teachers and less encouragement to exert effort through middle school and high school (Patel & Stevens, 2010; Reddy, Rhodes, & Mulhall, 2003). As students progress into middle school, they describe mathematics as less important, and they admit exerting less effort (Pajares & Graham, 1999). Unknown is whether this decrease in effort is due to a perception of less encouragement from the teacher, or whether the decrease in the value placed on mathematics is due to mathematics becoming more specific in middle school (Ryan & Deci, 2000). However, a middle school student's need for quality adult interaction and a sense of belonging increases at this critical stage of life when students perceive it to be declining (Eccles et al., 1993; Osterman, 2000; Wolters, Denton, York, & Francis, 2013).

As Ryan and Deci (2000) discussed, middle school classes have more structure than elementary classrooms. The increased structure along with the students' increased need for autonomy leads to an imbalance between a student's needs and the middle school learning environment, resulting in decreased effort and motivation (Ryan & Deci, 2000). Sakiz et al. (2012) hypothesized and confirmed that a student's perception of teacher encouragement increases student effort and student motivation for learning mathematics among middle school

students. Students who perceived greater support from teachers also reported they exerted more effort and were more motivated to learn (Sakiz et al., 2012). If, as demonstrated by Sakiz et al. (2012), a student's perception of teacher support and encouragement influences the student's effort and motivation, then the student's perception of parent support in relation to effort and motivation is also worthy of consideration. This perception especially deserves attention given that most parents are a continuous influence on their children throughout adolescence.

**Attitudes.** Attitudes are visible characteristics of humans that develop and change over time (Philipp, 2007). Students can determine parent attitudes based on these visible characteristics. Factors like achievement, anxiety, experiences, the school environment, and the home environment influence student attitudes toward mathematics (Bhowmik & Banerjee, 2013). With the home environment being an ideal place for children to observe parental attitudes, student perceptions of parent attitudes should receive consideration as an influence on student motivation.

Parents' attitudes toward mathematics today appear to be complacent. While most parents will agree that basic mathematics courses are necessary, 70% of parents feel that advanced courses are unnecessary for most children (Kadlec & Friedman, 2012). The only exception to these findings concerned algebra, which has received national attention regarding proficiency. Nearly 80% of parents viewed algebra as a necessary course for their children (Kadlec & Friedman, 2012). With these findings, it may appear to students that parents view courses beyond algebra as non-essential. A perceived attitude of course irrelevance may influence student motivation for progressing through advanced mathematics courses and ultimately choosing a career (Wang, 2012). The way students perceive parent attitudes, specifically

concerning student ability and effort following the implementation of the CCSSM as they relate to student motivation, needs additional research.

Implementation of the CCSSM created a change in curriculum for many states adopting the standards (Reys et al., 2013). Parents support changes to curriculum, but those changes also cause increased anxiety. According to Kadlec and Friedman (2012), 69% of parents indicated that mathematics is much more difficult today than it was when they were in school. As a result, many parents feel teachers and schools expect too much of students, particularly as they advance through grades (Margolis, 2005). There is an indication from parents that homework sometimes appears senseless, and parents feel powerless in helping their children (Bartlo & Sitomer, 2008). Homework difficulties arise when the tasks are too abstract or complex (Patton, 1994). Some parents try to assist in ways they understand. This creates confusion for the child if the parent does not reinforce the material in the same way the teacher presented it at school (Patton, 1994). A mismatch in the expected norms between school and home disrupts the academic equilibrium for the student (Madjar et al., 2016; Patel & Stevens, 2010). If a parent attempts to assist their child with homework but the child feels confused because of a difference in instructional strategies between the classroom and the home, the child may retaliate, causing even more frustration for the parent (Margolis, 2005). The student could perceive parental frustration as a negative attitude.

Parents today may be exhibiting different attitudes based on new expectations created with the implementation of the CCSSM. Thirty years ago, it was normal for students to receive a worksheet of numerous problems to solve with an algorithm (Bartlo & Sitomer, 2008). This practice is no longer the situation as the focus has shifted from acquiring skills to gaining a deeper understanding of mathematical ideas which align with the recommendations of the

NCTM (2000). The changes to the curricula allow an informal approach to problem-solving (Burns, 2012). If parents used their own informal mathematical knowledge rather than their own textbook knowledge, many may be able to assist their children with this approach (Bartlo & Sitomer, 2008). As Bartlo and Sitomer (2008) found, parents need to draw on both their own instructional experiences as well as their own use of informal mathematics to try to make sense of the curriculum. Unfortunately, many parents do not realize the value in their own informal mathematical knowledge which could contribute to the portrayal of a different attitude for students to perceive compared to those prior to the implementation of the CCSSM (Bartlo & Sitomer, 2008).

As a child advances through the grades, parents may find themselves less involved over time (Patel & Stevens, 2010; Simpkins, Fredricks, & Eccles, 2015). The findings from Gottfried et al.'s (2009) study indicated a significant decline in mathematics motivation among students between the ages of nine and 17, and Simpkins, Fredricks, et al. (2015) indicated parents become more hesitant to assist with homework once students are of high school age. This decline in parental involvement could be due to parents having low levels of confidence in their own mathematical skills (Mohr-Schroeder et al., 2017). In general, parents engage less frequently in mathematical behaviors with their children as their children advance through the grades or as instructional level increases (Patel & Stevens, 2010). The student could possibly perceive this decrease in parental involvement as a negative attitude toward mathematics (Drummond & Stipek, 2004; Patel & Stevens, 2010; Reddy et al., 2003; Usher, 2009).

While parental involvement influences student achievement and motivation, various researchers have debated the order of these relational influences. Jayaratne (1987) discovered the attitude of the parent is more likely to affect the attitude of the student than the reverse situation.

Simpkins, Fredricks, et al. (2015) agreed that parental behaviors are generally a foundation for student motivation, but they also discovered this order could reverse as the child progresses into high school. If the parent's attitude is a greater impact on the student than the student's attitude is on the parent (Jayaratne, 1987), and if parents' attitudes toward developing conceptual understandings are less favorable than that of their children (Allen & Fraser, 2007), eventually the parents' attitudes may influence and possibly become the students' attitudes as well. However, others (Madjar et al., 2016; Silinskas et al., 2013; Simpkins, Fredricks, et al., 2015) have indicated that the parent-child relationship is reciprocal and that either one can have an equal effect on the other. Since both arguments have been justified through research efforts, additional research is essential for exploring the relationship between student perceptions of parent attitudes, specifically toward student ability and effort following the implementation of the CCSSM, and student motivation.

Parent support for learning mathematics can have an impression on student motivation to learn mathematics. If parents feel comfortable assisting their children with homework, their attitude tends to be positively associated with learning mathematics (Drummond & Stipek, 2004). However, once parents are unsure of the task, they tend to display a non-positive attitude toward mathematics homework (Margolis, 2005). Usher (2009) found that parents who exhibit negative attitudes and feelings toward a given subject tend to have children with similar attitudes. Many factors contribute to parents' attitudes about mathematics, including instructional changes, perceptions about their child's classroom environment, and the communication and relationship with the school (Mohr-Schroeder et al., 2017). If the home environment is a place to display these parental attitudes for students to observe (Bhowmik & Banerjee, 2013), and the home environment is a source of student motivation (Buttery & Anderson, 1999; Kellaghan,

Sloane, Alvarez, & Bloom, 1993), then it would follow logically that those student perceptions of parent attitudes, specifically toward student ability and effort, influence student motivation.

Individuals' behaviors influence their emotional state which their attitude reflects (McLeod, 2014). Research indicates that the behavior demonstrated by a teacher influences a student's motivation (Maulana, Opdenakker, & Bosker, 2014; Maulana, Opdenakker, Stroet, & Bosker, 2013). This research implies that a parent's behaviors reflecting attitude may also influence a student's motivation. More specifically, Maulana et al. (2014) studied the degree to which a student's perception of a teacher's behavior concerning control, authority, care, and the student-teacher relationship influence motivation, determining that, over time, student perceptions of teachers become more influential on their motivation to learn. This prior research has studied the effect of student-perceived teacher attitudes on student motivation, but there is limited parallel research examining student perceptions of parent attitudes on student motivation.

**Home environment.** A student's environment is influential in shaping the student's values and beliefs leading to motivation (Bhowmik & Banerjee, 2013). As the environment where students spend a large percentage of their life, Arul-Lawrence and Vimala (2012) argued that the school is responsible for instilling values, but Baker (2003) argued it is the responsibility of the parents to establish values and set expectations for their children beginning at a young age. Al-Dhamit and Kreishan (2016) identified three contributors to student motivation, including student access to an expert, scaffolding, and behavioral redirection; however, their study found these contributors were inconsistent when used in the home environment, making the argument for motivational development stronger within the school setting. However, the same study indicated student motivation correlated to home support.

Regardless of where they are learned, the values and beliefs of children make up the core of their attitudes (Mullis et al., 2001) and are a major contributor to motivation (Baker, 2003). A positive environment affects students positively (Hon & Yeung, 2005). Ames (1992) claimed that the environment of a child's home influences both the child's attitude and achievement. Gottfried et al. (2009) argued the events that occur in a child's home during the elementary years have a significant role in mathematical motivations both during childhood and throughout high school. Walberg et al. (1986) analyzed data collected concerning the home and school revealing that both home and school environments are significant factors in predicting attitudes. No matter whose responsibility it is to teach these values, it is necessary to understand how parent attitudes, as perceived by the students, relate to the students' motivation for learning mathematics.

Many factors contribute to student motivation. Through research on student motivation, Tuan, Chin, and Shieh (2005) uncovered that environmental stimulation is a significant factor in motivating students to learn. The environment of a student's home contributes to student academic success (Buttery & Anderson, 1999; Kellaghan et al., 1993) as much as motivation. Farooq and Shah (2008), as well as Tezer and Karasel (2010), determined that a student's positive attitude toward mathematics could increase both the student's ability and motivation to learn mathematics, and Schiefele and Csikszentmihialyi (1995) found that positive attitudes are directly linked to future success.

**Motivation.** Motivation is not an understudied topic but looking at motivation from a student's perspective occurs less frequently in the literature. Cerezo (2004) conducted a case study to depict the student's perspective of motivation in problem-based learning environments, like those utilized after implementing the CCSSM. In that study, the researcher collected data from students concerning what motivates them to do their homework. Among the factors

provided by the students were parents, educators, friends, and personal desire, in that order (Cerezo, 2004). The study indicated that students receive more influence for motivation from their parents and in their home than from their teachers, but research concerning teacher influence is more prevalent in the literature.

Specific studies relating perceptions of parent attitudes toward the CCSSM to student motivation are lacking. This dearth may be due to the recent implementation of the standards and a greater focus currently placed on academic results of the implementation rather than perceptions and motivation resulting from the implementation (Usher & Kober, 2012). Motivation among students, however, has received a fair amount of attention. Tuan, Chin, Tsai, and Cheng (2005) addressed motivation in a middle school science classroom. Their study aimed to determine appropriate instructional approaches for developing a conceptual understanding that would best motivate students. Tuan, Chin, Tsai, et al. (2005) found hands-on activities, like those encouraged by the CCSSM, overwhelmingly motivated students, but Yerrick (2000) found that open inquiry leaves the needs of some students unmet, particularly students who have a need for content coverage and authority. Zoller (1991) determined that not all students favor the practice of discovery learning. In fact, for some students, such activities are entertaining, but the students failed to make the connections between the activity and the content (Watson, Prieto, & Dillon, 1995), which counters the intention of the CCSSM (CCSSI, 2018). This finding would indicate that developing conceptual understanding, as designed by the CCSSM, is not enough to engage students; they must also be motivated.

Studies (Karsenti & Thibert, 1994; Li et al., 2010; Lord & Orkwiszewski, 2006) have shown an increase in mathematical understanding and performance with the use of engaging methods. However, motivation is historically a stronger indicator of impending success than

performance alone (Karsenti & Thibert, 1994). These studies addressed student motivation through the environment of the school, but they did not address the relationship between student motivation and student perceptions of parent attitudes observed in the home.

Many researchers have acknowledged a link between parental influence, attitude, and motivation (Areepattamannil et al., 2015; Bhowmik & Banerjee, 2013; Gottfried et al., 2009; Parsons et al., 1982; Patel & Stevens, 2010). These studies have shown that a positive student attitude and parental involvement can lead to student success. More specifically, parents are instrumental in the development of student interest, skills, confidence, and attitudes in mathematics (Kliman, 1999). Evidence indicates that parents display various attitudes toward mathematics in the home (Bartlo & Sitomer, 2008), and the home environment is a contributor to student motivation (Bhowmik & Banerjee, 2013). With this evidence, it became necessary to assess whether a relationship exists between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics.

**Similar studies.** Parenting behaviors associated with student success, student goal orientation, and motivation are not new to literature circles. Hoang (2007) found a relationship between parenting practices and student motivation. While Hoang (2007) did show that parent behaviors perceived by the child do affect student motivation, the study only incorporated high school students and did not consider parent attitudes toward any specific subject matter—only general parenting styles as perceived by the student. A different study performed by Wiese and Freund (2011) considered specific parent attitudes observed by children regarding gender-related behaviors, such as gender roles in the family and work domains, but the study did not address motivation. Wiese and Freund (2011) did indicate that students observe the attitudes of their

parents and those attitudes are a contributing component to the student's beliefs. Simpkins, Price, et al. (2015) conducted a study like Hoang's investigation with high school students. The intent of Simpkins, Price, et al.'s (2015) study was to determine the path from parents' behaviors to student motivation specific to science disciplines. This study provided a more focused emphasis on a subject area, but similar studies focusing specifically on mathematics and the CCSSM at the middle school level were limited at the time of this literature review.

There are studies that consider student perceptions of parent attitudes and student motivation. A study conducted by Areepattamannil et al. (2015) found student perceptions of their parents' attitudes toward the importance of mathematics as a subject as well as a career relate to student motivation. However, Areepattamannil et al. (2015) conducted their study among students in the United Arab Emirates and results could be different for students in the United States. Madjar et al. (2016) also conducted a study concerning student motivation and the perceptions students have of their parents, but that study looked at parental attitudes from the standpoint of parental goal emphasis comparing student perceptions of parents' goal orientations with parent-reported goal emphasis.

Other studies have focused on factors that influence student success, such as parent involvement. These studies (Bhowmik & Banerjee, 2013; Gottfried et al., 2009; Parsons et al., 1982; Patel & Stevens, 2010) have indicated that greater levels of parental involvement lead to greater levels of student achievement, but they lack a focus on the perceptions the student has of these factors leading to the students' motivation. Jayaratne (1987) conducted a study relative to perceptions of parent attitudes and student motivation, specifically in mathematics. That study examined factors that influence student motivation in mathematics, including student perceptions of parent expectations and parent attitudes toward mathematics. While the Jayaratne (1987)

study found there is a relationship between the attitudes of students and the attitudes of parents, parents' expectations of their children had a greater impact on the students than on their parents' attitudes. This study, however, is over 30 years old and was conducted prior to the development and implementation of the CCSSM.

**Theoretical/Conceptual Framework**

Bernard Weiner, like other attribution theorists, sought to examine how the search for understanding served as a motivational factor (Weiner, 1979). Weiner (1985) discussed the pursuit of "why" in multiple settings, from why a country flourishes, to why a football team has a losing season. In a school setting, Weiner (1979) recognized this search for understanding in students asking themselves why they failed an exam (Weiner, 1979). Perhaps most important, Weiner (1985) recognized that once an individual determined a cause of success or failure, recommendations for future actions could be formulated to produce different results.

Weiner's attribution theory of interpersonal motivation (2000) stemmed from his framework of attribution theory (Weiner, 1979). Attribution theory evaluates the perceived causes of successes and failures and contains implications for motivation among students (Weiner, 1979). Attribution theorists generally agree that the way students assign attributes to their successes and failures can have emotional, behavioral, and motivational implications (Weiner, 1985). These attributes provide people with an optimistic feeling about themselves and help maintain a positive self-image while decreasing the feelings of incompetence when a failure occurs. Motivation theorists believe that factors influence a student's motivation as well (Weiner, 2000, 2005).

Motivational psychologists have long examined what moves individuals to act with the mannerisms they do. Graham and Weiner (1996) described motivation as the driving force

behind human behaviors. Psychologists interested in motivation have examined motivation from multiple perspectives and through the persistence of behaviors as well as the emotional reactions that accompany these behaviors (Graham & Weiner, 1996). Researchers have suggested that social attributions such as reactions to parents, teachers, and peers are worth studying as an influence on motivation and student achievement (Louw & Louw-Potgeiter, 1986; Spittal, Siegert, McClure, & Walkey, 2002). Weiner (2000) drew on these concepts, in addition to the work of other attribution theorists, to develop his attribution theory of interpersonal motivation.

**Background of the theory.** In the late 1960s, six theorists Watson, Hull, Spence, Freud, Lewin, and Atkinson dominated the study of motivation (Graham & Weiner, 1996). Atkinson, who was in search of a grand theory of motivation, received inspiration from drive theory (Hull, 1943; Spence, 1956). According to drive theory, motivation was a result of bodily needs crossed with previously rewarded behavioral patterns. Atkinson, along with Tolman and Rotter, had an expectancy approach to motivation. Tolman (1932), Lewin (1935), and Rotter (1954) contended that behaviors are a result of expectancy and value, whereas Atkinson (1957) added that motivational factors contribute to the repeating of behaviors. These expectancy-value theories of motivation suggest that what an individual expects crossed with the likelihood of obtainment is what establishes motivation (Atkinson, 1957; Rotter, 1954). Through the 1960s, the theories of Rotter, Lewin, Hull, and Atkinson were overshadowed by a focus on human behavior related to achievement needs (Graham & Weiner, 1996).

The works of Rotter, Lewin, Hull, and Atkinson, nonetheless, influenced Weiner, along with the early work of Thorndike (1911). Thorndike indicated in his law of effects (1911) that individuals are likely to repeat rewarded behaviors and avert punished behaviors in the future. From Thorndike's work, Weiner adopted the idea that a motivation sequence exists connecting

the past to the present. This progression of events led to Weiner's claim that the way an individual perceives prior incidences determines the future actions in which that individual will engage (Weiner, 2010b).

Weiner continued to review Atkinson's (1957) work which had varied from the other expectancy value theorists. Atkinson's (1957) perspective on motivation contained three principles: First, individual differences determine motivation. Second, incentive is an affect. Third, incentive is an inverse of an individual's expectation of success—in other words, accomplishing a difficult task results in greater satisfaction than accomplishing an easy task. Weiner attempted to test these principles with a sequence of trials designed to evaluate emotional responses to success or failure, but he ran into difficulties with the participants and was unable to complete the study (Weiner, 2010b).

Weiner reviewed earlier research to explore other possible predictors for motivation. Previously, Rotter (1966) had experimented with the idea of successes and failures influencing the likelihood that an individual would attempt the same task again. Rotter's *locus of control* sparked Weiner's interest. Weiner and Potepan (1970) engaged in a correlational study to evaluate these ideas. Two measures—the Thematic Apperception Test and a locus of control scale—ignited Weiner's research. Weiner used an idea of Heider (1958) that, although not based on motivation, analyzed success and failure. From Heider's work with success and failure, as well as Rotter's expectancy-value findings with locus of control, Weiner proposed that three constructs—locus, stability, and control—along with four determinants—ability, effort, difficulty of task, and luck—shape one's motivation (Weiner et al., 1971).

Weiner continued to modify his theory. He discovered that he had only considered intrapersonal perspectives of causal attributes, yet some of his research incorporated

interpersonal perspectives (Weiner, 2012). This perspective led Weiner to consider social motivation. Weiner's theory of interpersonal motivation expands his attribution theory to include social contexts that affect performance (Weiner, 2000). Among these social contexts are influences from parents, teachers, and peers (Cerezo, 2004).

Weiner maintained some concerns over his theory throughout its development. While empirical evidence supported his findings, Weiner (2012) had concern over links to expectancy. Motivation theorists have expressed conflicting views over what motivates individuals to repeat behaviors, and Weiner (2012) suggested that a low expectancy of a positive outcome or the level of task difficulty may actually be responsible for the greatest effort, as indicated by Locke and Latham (1990). Weiner (2012) considered the possibility that, as Atkinson (1957) claimed, the most motivation could be present when completing tasks that are neither too difficult nor too simplistic. Weiner (2010b) also recognized as Rotter (1954) suggested, that the proximity to reaching a goal could be the cause of increased motivation. However, Weiner found data supported his earlier claim (1985) that there are three characteristics of perceived causality—namely, locus, stability, and control. To ensure all characteristics were included, Weiner examined intentionality as a possible causal attribute because it appeared in much of the empirical investigations. However, as intent is used to describe an action, Weiner (1985) argued that a cause, such as ability, cannot be intentional, and thus, intentionality was not included as a causal attribute.

**Theory constructs.** Weiner's (2000) attribution theory of interpersonal motivation relates perceptions of causal attributes resulting in favorable or unfavorable outcomes to future behavior. The theory indicates individuals will attribute the successes and failures experienced to whatever factors allow them to maintain a positive self-image (McClure et al., 2011; Shores,

2011; Weiner, 1985). Within attribution theory, three constructs initially existed to analyze the explanations provided for successes and failures: locus, stability, and control (Weiner, 1985). The locus construct describes whether the cause is inside oneself—for instance, innate ability—or whether it is outside of oneself, as is the case with a streak of good fortune. The construct of stability is an indication of whether the attribute of success or failure is likely to reoccur in another trial, referred to as stable, or whether it will differ on a separate occurrence, which is considered unstable. Finally, the construct of control is an indication of whether individuals believe they can regulate the attribute or whether the attribute is out of their control (Weiner, 1985). Every attribute for success or failure relates to each of these constructs. The attribute of ability, for example, has internal locus and is stable but uncontrollable, while the attribute of luck is externally located, unstable, and uncontrollable (Weiner, 1985, 2000).

Weiner (2000) later added to his theory an additional construct of perception relative to each of the constructs used to determine success or failure. Weiner's (2000) attribution theory of interpersonal motivation takes into consideration the fourth construct of perceptions within a social setting. Among these social contexts, Weiner (2000) included perceptions by peers, teachers, and parents as contributing factors to a student's motivation. Parents often conclude a causal explanation for the success or failure of a student which may or may not be the same attribute as that concluded by the child (Weiner, 2000). This causal understanding of the involved observer determines responsibility for success or failure (Weiner, 2000). If a parent believes the student had control of the outcome—for instance, the student could have put forth more effort—the adult likely faults the student and generates feelings of frustration toward the student for not trying harder. These feelings of frustration may even result in actions of the observer, such as punishing the child. On the other hand, if the parent perceives the student's

lack of accomplishment is due to a factor outside the child's control—such as poor instruction or low ability—then the parent does not hold the student responsible (Weiner, 2000). When a parent does not place responsibility on the student for negative outcomes, sympathy replaces blame, which in turn prompts pro-social behaviors (Weiner, 2000). Weiner (2000) argued that the student's observation of these parent behaviors initiates a motivational sequence within the student.

***Construct interrelationships.*** The structure of Weiner's theory is a web of interrelatedness among constructs. While many versions of attribution theory account for multiple constructs, Weiner's attribution theory describes how those constructs link together (Weiner, 2012). Like how Hull (1943) and Spence (1956) crossed drive with habit to determine behavior, Weiner (2012) crossed the constructs of locus, stability, and control to determine the attributes for success and failure, as well as motivation. Weiner's continued work with motivation led him to consider also the construct of perception as being interwoven with other constructs.

In Weiner's (1985, 2010b, 2012) attribution theory of motivation, he detected four main determinants of success and failure, including ability, effort, the difficulty of the task, and luck. Each of these determinants has a relationship to the theory's constructs: locus, stability, and control. Individuals may attribute their achievement outcomes to factors that originate either internally or externally, are constant or varying, and controllable or uncontrollable (Weiner, 1985). For instance, ability, which is of internal locus, is stable but out of one's control. Effort, however, while still internal is not a stable factor, but it is able to be controlled (Weiner, 2012). Nonetheless, Weiner (2012) recognized that an individual's perception of an attribute is more important in attribution theory than the reality of the attribute. Because the basis of Weiner's

attribution theory is perception, Weiner (2012) indicated that the determinants of success and failure that ultimately lead to motivation vary with one's perception of the origin.

Attribution theory considers the perceived causal understanding of the constructs of locus, stability, and control and the outcomes of success or failure that lead to motivation (Weiner, 2012). Gendolla and Koller (2001) demonstrated that individuals do not regularly seek causal understanding in situations where they have experienced success. Wolters, Fan, and Daugherty (2013) indicated that the process of determining attributes is more likely to take place after failure or non-attainment of goals. Weiner (2012) examined the perceived causes of failure and decreased motivation in greater frequency than the perceived causes of success and increased motivation. A sequence of the constructs results in an emotional outcome determined by success or failure, which leads to motivation (Weiner, 2012). Weiner (1985) argued that causal attributions guide emotional responses which affect motivational behaviors.

The causal construct of locus relates to emotions of pride and self-esteem (Weiner, 2012). Weiner argued that success due to an internal factor will yield greater pride than success attributed to an external factor. An individual who experiences success in passing an exam after exerting much effort feels more pride than experiencing success after exerting little to no effort, such as in winning a coin toss.

The causal construct of stability relates to expectancy, hope, helplessness, and hopelessness. Weiner (2012) explained how causal stability forms the basis of expectancy shifts. When a cause is stable and likely to reoccur in the future, the expectation is for the same outcome to occur no matter whether the causal attribute originates internally or externally. According to Weiner (2012), if the cause is unstable, such as effort, which is an internal factor, or bad luck, which is an external factor, there is minimal effect on the expectancy of future

success, and hope continues. However, if the causal attribute is stable, such as in the case of internal ability, or external, such as an incompetent teacher, then the same result is expected in future events. In this case, failure would lead to a sense of hopelessness (Weiner, 2012). The stability of a causal attribute is present in Thorndike's (1911) work, although Weiner (2012) tied stability to a cognitive variable rather than a behavioral one.

The causal construct of control relates to shame, humiliation, guilt, and regret (Weiner, 2012). If individuals experience failure due to a controllable cause, such as effort, they will experience high levels of guilt or regret. If failure is due to an uncontrollable cause, such as ability, individuals are likely to feel shame and humiliation. However, Weiner (2012) also noted that high levels of guilt may impede rather than improve performance, and shame may be a source of decreased motivation rather than an instigator for motivation.

Through his extensive research, Weiner (2012) discovered that he had been examining only the causal dimensions from an intrapersonal perspective. As locus is a perception of the participant, it is not necessarily a social construct, nor is stability, according to Weiner (2012), but the dimension of control can be viewed as controllable by others, even if not controllable by oneself. Therefore, Weiner also addressed motivational factors through an interpersonal perspective. Retracing some of his prior work, Weiner (2012) found that failure due to lack of effort, a controllable variable as perceived by others, resulted in greater social disapproval than did failure that others perceive to be due to a lack of ability, an uncontrollable variable. Because the dimension of control in the intrapersonal version of his theory led to either shame and humiliation or guilt and regret, which are self-directed affects, Weiner replaced them with other-imposed affects of anger and sympathy.

Weiner (2012) indicated there is extensive support for emotional consequences stemming from beliefs concerning controllability. In Weiner's (2012) interpersonal theory of motivation, when an individual experiences failure that others perceive to be within that individual's control, such as lack of effort, the observers respond with anger which can increase the individual's motivation. Alternatively, when individuals experience failure due to a cause outside of their control—for example, ability—observers tend to respond with sympathy which decreases motivation (Weiner, 2012) (See Figure 2).

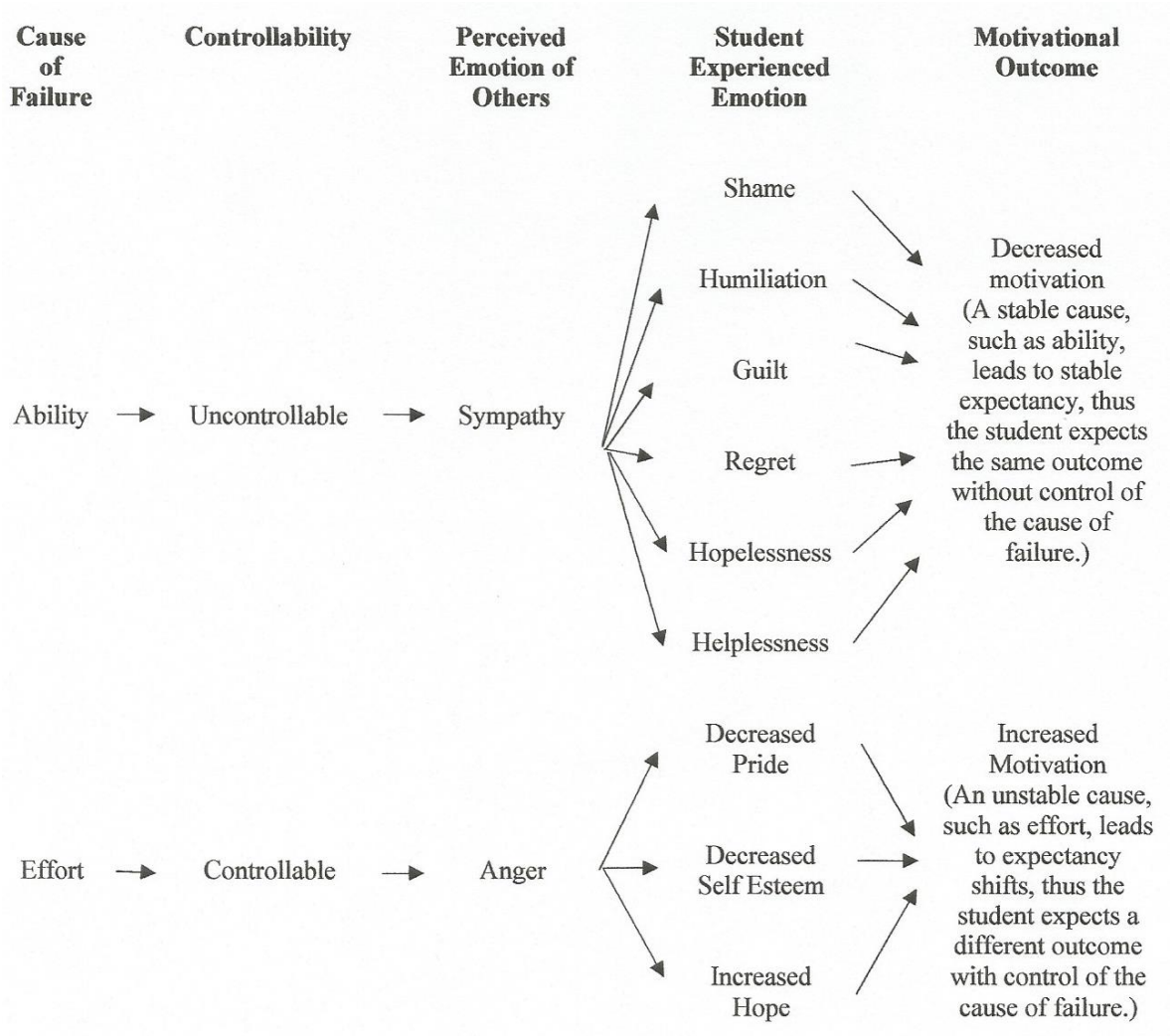


*Figure 2.* Emotional and motivational outcomes from failure due to perceived causes of ability and effort as described by Weiner (2000, 2005)

Combining these causal dimensions in situations of either success or failure results in a sequence of the constructs of attribution leading to motivation. Weiner (2012) explained that when individuals believe their lack of success relates to a factor that is internal, stable, and uncontrollable, they experience a lower self-esteem, a decreased prospect of future success, as well as feelings of shame and humiliation. Weiner (2012) indicated this combination leads to low motivation. In contrast, if individuals experience failure due to negligible effort, viewed as an internal, unstable, controllable cause, they are likely to experience low self-esteem, along with guilt and regret, but not lose hope. Weiner (2012) indicated this combination leads to increased motivation. Each causal dimension pairs with affective outcomes dependent on the experience of success or failure. The affective outcomes then lead to motivation or a lack thereof. Weiner (2012) indicated that the determinants of ability and effort, not the determinants of luck or the difficulty of the task, are the true factors leading to motivation.

**Educational context.** With the recent transition to the CCSSM, the idea of student perceptions of parent attitudes toward this reform effort influencing the motivation of students to learn mathematics at the middle school level is relatively new. Many previous studies examined how students perceive teacher behaviors and how those perceptions relate to student motivation (Chouinard et al., 2007; Gilbert et al., 2014; Sakiz et al., 2012; Smart, 2014; Stipek et al., 1998). However, parents are the first social contact students have, and even though the CCSSM primarily focus on an educational setting, motivation development does not take place exclusively in the classroom (Tuan, Chin, Tsai, et al., 2005; Usher & Kober, 2012). Hwang (1995) indicated that while the foundation of the educational system encompasses the understanding that the home is an extension of the school, this understanding is no longer prevalent in U.S. culture. The current culture in America has evolved into a society so concerned

about its own well-being that its children's education is no longer a priority (Hwang, 1995). Considering Hwang's (1995) findings, parents may not be cautious to guard their children from their own comments or actions reflecting their attitude toward the CCSSM. The student may perceive actions or comments of their parents, and this perception may influence the student's motivation for learning mathematics (Simpkins, Price, et al., 2015).

Identifying how parental involvement and parental attitudes toward learning motivate students is beneficial in education. Morris et al. (2013) conducted a study examining South Korean student motivation to learn English. This study indicated that lack of parental involvement does not correlate to motivation; however, parental displays of disinterest in learning English had negative effects on the students' motivation to learn English. If outward demonstrations of negativity by parents toward learning English negatively influenced student motivation to learn English, as demonstrated by Morris et al. (2013), then the same may be true with student motivation for learning mathematics.

Other research, conducted by McClure et al. (2011), used attribution theory to examine students' perceptions of their own success due to effort. Results indicated that greater success resulted in increased motivation while failure led to decreased effort. House (2006) reviewed the results of several *Trends in International Mathematics and Science Study* (TIMSS) reports to determine the locus of factors leading to success among high-achieving countries. His findings revealed that students holding the belief that their success is due to an outside factor, such as luck, perform lower than those who believe their success relates to an internal factor, such as ability or effort. In a similar study, Zhou and Urhahne (2013) found that students possessing greater self-images academically credit their accomplishments to internal uncontrollable factors, such as ability, or internal controllable factors, such as effort, but they blame their downfalls on

external uncontrollable attributes. These studies suggest that motivated students may exhibit greater academic self-images. Rice et al. (2013) found a parent's perception of a student's ability influences a student's self-image. Weiner (2012) argued this idea as well, claiming that causal attributes of interpersonal relationships affect self-images. This empirical evidence in the educational setting helps explain the social factors that motivate students and confirms Weiner's (2000) attribution theory of interpersonal motivation.

Weiner (2012) pointed out that his attribution theory's underpinning is on a perception of the factors that cause success or failure rather than the true cause. These perceptions can vary by the situation as well as by age, gender, culture, and the focus of the cause; thus Weiner (2010a) warned that perceived causal attributes cannot be generalized. However, Weiner (2010a) also discussed that while perceptions can vary, research has uncovered a set of common causal beliefs across numerous situations, including achievement-related contexts, such as an educational setting. He again identified ability, effort, the difficulty of the task, and luck as the most common attributes of success and failure, but Weiner (2012) further identified ability and effort as the leading attributes of academic motivation. Attribution theory provides a framework in which perceptions of ability and effort, along with the relationship to motivation, emotions, and cognition, can all be analyzed (Weiner, 2010a).

In educational settings, teachers can inadvertently communicate causal determinants of success or failure to their students (Weiner, 2012). Communicating through expressions, emotions, or even praise and blame given to the students can convey causal information (Weiner, 2012). Many teacher practices communicate causal information and lead to students attributing poor performance to low ability which Weiner (2012) indicated is the most detrimental of the attributes leading to failure and results in decreased motivation. When a teacher shows anger

following student failure, the teacher sends the message that the student is to blame and that the failure is controllable, but sympathy following failure sends the message that it is not the student's fault and that nothing could have been changed (Weiner, 2010a). Many practices by teachers inform students indirectly that their inadequate performance is a result of something other than an absence of effort (Weiner, 2012). Praising success on a simple task, failure to punish when a student does not perform a modest task or helping when the student does not request it all send a message of low ability (Weiner, 2010a, 2012). Graham (1990) argued this point as well, indicating that pro-social emotional expressions can have undesirable motivational outcomes.

Applying Weiner's (1985) theory to the academic relationships between parents and their children leads to increased understanding of student motivation. If the parent believes the student had control of an outcome—for instance, the student could have put forth more effort to pass the test—then the parent faults the student and demonstrates feelings of frustration (Weiner, 2010a) which the student may then perceive (Simpkins, Price, et al., 2015). However, if the parent perceives the student's lack of success is a result of a cause outside the child's control, such as ability, the parent does not hold the student responsible (Weiner, 2000). Weiner indicated that when *parents* perceive their child's failure to be due to uncontrollable factors—such as student ability, curriculum, or specific content standards—the parents do not place responsibility on the child. When a child is not held responsible for failure, motivation decreases (Weiner, 2000). This study extends these findings of Weiner (2000, 2012) to determine if *student perceptions* of parent attitudes toward the uncontrollable factor of ability, or the controllable factor of effort, also contribute to student motivation.

Researchers have previously studied student perceptions of social influences as attributions to achievement and motivation. McClure et al. (2011) conducted a study among high school sophomores and juniors determine social attributions of family, teachers, and friends on student success. The study results indicated that social influences were, on average, of greater impact than luck for both success and failure. Students who attributed their success to traditional attributes of ability and effort, which Weiner (2000) believed led to motivation, as well as to social attributes of their family or their teachers, were more inclined to report they were doing their best. At the same time, students who reported doing just enough to get by were more prone to attribute their failures to luck, family, and friends (McClure et al., 2011). In a different study, You, Dang, and Lim (2015) found high levels of correlation between Korean students' perceptions of their teachers' actions and comments concerning motivation and the students' mathematics academic motivation and self-efficacy. Although the students did not perceive their teachers' behavior to influence directly the students' achievement, there were implications for motivation (You et al., 2015). Rice et al. (2013) found that students who perceive increased parental, peer, and teacher support have an increased perception of their own ability and a positive attitude toward mathematics. A positive attitude can lead to greater motivation to learn mathematics. The results of these studies indicate that social influences are factors students attribute their success and failure to, as well as their motivation.

De Haan and Wissink's (2013) study used the concept that attributions result from co-construction through the course of conversations and interactions between multiple individuals, supporting the interpersonal component of Weiner's theory. The study examined attributions for student academic success or failure made by parents and teachers during parent-teacher conferences with a goal of determining the number and type of attributions made between

parents and teachers. Through the course of the study, they found in many cases that the parent-teacher interactions changed the perspective of the parents' determined attributes for the child's achievement. The attributes for the child's success, as identified by the teacher, influenced the parent-identified attributes. While this interaction between the parent and the teacher was short-lived, it was enough to shift causal attributes for the student's success or failure based on what both the teacher and parent observed (De Haan & Wissink, 2013). It is assumed that parents and children engage in more conversation than what takes place at a parent-teacher conference; thus the interactions between parents and children may also influence attributes for the child's success or failure. The De Haan and Wissink (2013) study indicated that attributions form by not only conversations between people and the resulting behaviors, but also by inferences made about another's beliefs supporting the conclusion that attributions can be both self-determined and formed reactively based on interactions with others.

Weiner (2010a) believed there are motivational implications related to causal beliefs based on social interactions and changing the way students perceive causality can increase academic motivation. For many years, attribution theory focused on achievement-related performance (Weiner, 2000), but some have taken the theory a step further to create attribution interventions (Weiner, 2010b). By utilizing interventions to change attributions of failing students, Perry, Hechter, Menec, and Weinberg (1993) found students could improve academic achievement. Wilson, Damiani, and Shelton (2002) confirmed these findings of improving performance by altering causal attributes in the academic setting. Weiner's theory extends beyond academics as well. Attribution interventions were used with the elderly to change their beliefs that failure to exercise was related to their advanced age (Sarkisian, Prohaska, Davis, & Weiner, 2007), indicating that behavioral changes can also occur because of reattribution training

(Weiner, 2010b). While Weiner's (2000) attribution theory of interpersonal motivation is extensive on its own, Weiner envisioned future growth and expansion of his theories as more individuals engage in attribution-guided research.

Weiner welcomed expansions of his work, but his attribution theory has received criticism. Hogg and Vaughan (2008) criticized Weiner's theory for placing too much emphasis on controllability. However, Soric (2009) utilized attribution theory in research concerning learning strategies and personal interests as causal attributions of academic achievements. The research of Soric supported Weiner's theory in terms of causal attributions, but only from the standpoint of controllability, indicating that controllability is crucial to causal attributions. Given the results of the Soric study and controllability being a separate construct from locus and stability (Weiner, 1985), the construct of control as applied in Weiner's theory is appropriate.

Researchers have also criticized Weiner's theory for neglecting culture differences. Miller (1984) argued that Americans have a more personal cultural view than other cultures which could lead to contradicting causal attributions depending on the culture's values. However, Weiner (2000) extended his original theory to encompass perceptions of an individual's reality, thus attribution theory is applicable to multiple cultures, albeit the causal attributions may differ across cultural norms.

Weiner's attribution theory has received criticism concerning perceptions of multiple individuals creating causal attributes for an individual's behavior. However, Weiner (2005) addressed how one individual may identify a causal attribute of another's behavior which is different from the perception of the causal attribute of the individual performing the behavior. Feedback perceived from one individual can contribute to causal attributions of another individual (Weiner, 2005), emphasizing the social aspect of Weiner's attribution theory of

interpersonal motivation (Weiner, 2000). Some researchers view this interaction as a weakness of the theory, but in educational contexts, this contact is a strength of the theory as individuals providing authentic feedback can alter the attributions of another, leading to changes in emotions, motivation, and ultimately academic behaviors (Gilbert et al., 2014; Smart, 2014; Weiner, 2012).

While subject to criticism, Weiner's attribution theory of interpersonal motivation (2000) has proven itself over time. With multiple revisions since inception, Weiner believed he continued to strengthen his theory (Weiner, 2010b). Weiner's (1985, 2000, 2010b) theory continues to help educators understand student attributions and provides an explanation for causal attributions among any age group, gender, and environment.

**Chapter Summary**

The CCSSM are changing the instruction of mathematics (Akkus, 2016; Woolard, 2012). Through what has become one of the most noteworthy educational transformations seen in current U.S. history, educators are incorporating focus, coherence, and rigor into their everyday classrooms (Woolard, 2012). These changes to standards and instruction have caused confusion for parents (Henderson et al., 2015; Margolis, 2005) and mixed responses from the public (Henderson et al., 2015). With the evidence that parents display various attitudes towards mathematics in the home and that the home environment is a contributor to student motivation (Baker, 2003; Gottfried et al., 2009), it became essential to determine whether there exists a relationship between student perceptions of parent attitudes toward student ability and effort following implementation of the CCSSM and student motivation.

Researchers have recognized that there are connections between parental influence, attitude, and motivation (Areepattamannil et al., 2015; Bhowmik & Banerjee, 2013; Gottfried et

al., 2009). The previously discussed studies have shown that a positive student attitude, as well as parental involvement, can lead to student motivation. More specifically, parents have an important role in the advancement of student interest, skills, confidence, and attitudes in mathematics (Kliman, 1999) which can lead to motivation for learning mathematics at the middle school level.

This literature review presented a background of Weiner's (2000) attribution theory of interpersonal motivation which frames the current study. This chapter also provided literary evidence that the home environment is a source of motivation development and that students perceive attitudes of parents in the home. This evidence demonstrates the need for the current study, determining the existence of a relationship between student perceptions of parent attitudes toward student ability and effort following implementation of the CCSSM and student motivation for learning mathematics at the middle school level.

## Chapter 3: Procedures and Methods

In response to continued declines in the United States' international mathematics rankings, the purpose of this quantitative correlational study was to examine whether a relationship exists between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level. Quantitative research is common for determining relationships between variables (Babbie, 2010; Smeyers, 2008). The current study implemented a quantitative cross-sectional design (Kothari, 2004) with survey methodology (Creswell, 2014). Weiner's (2000) attribution theory of interpersonal motivation guided the research which attempts to answer this central question: Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes and student motivation for learning mathematics at the middle school level? To address the primary research question, the researcher developed the following two associated sub-questions and hypotheses relevant to student perceptions of parent attitudes toward student ability and student effort:

**RQ1:** Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level?

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

**RQ2:** Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level?

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

This chapter will describe the research design, including the research site, population, and sample. This chapter also includes discussion concerning the sampling methods, ethical issues and permissions, data sources and the instrumentation for data collection. A discussion of the instrument review procedures, the procedure for data collection, researcher positionality, research validity, and a description of the data analyses utilized concludes the chapter.

**Research Design**

A quantitative research design utilizes numerical data rather than personal interviews, observations, photographs, or other types of qualitative data (Creswell, 2014; Johnson & Christensen, 2008). Quantitative studies are often used to test theories or hypotheses with numerical data and determine statistical relationships between variables (Creswell, 2014; Johnson & Christensen, 2008). The researcher selected a quantitative study based on the correlational nature of the study. Quantitative research designs have several strengths, including the ability to test a theory, and results are independent of the research and generalizable after multiple replications with varied populations (Johnson & Onwuegbuzie, 2004). Quantitative

studies can be completed in less time because data collection can occur with a single survey, as is the case with the current study, and analyses can often be done with the aid of statistics software (Creswell, 2014). Weaknesses of qualitative studies include data being limited to numerical interpretation (Colton & Covert, 2007) and numerical results may prove to be too concise for the context of real-life situations (Johnson & Onwuegbuzie, 2004).

There are several types of quantitative research methods. Quantitative studies can utilize experimental, quasi-experimental, correlational or descriptive designs (Creswell, 2014; Johnson & Christensen, 2008). The researcher used a correlational sub-design for the quantitative study. Correlational studies are common for exploring relationships between uncontrollable variables, or where experimentation is not feasible (Creswell, 2014; Johnson & Christensen, 2008). The correlational design, as used in this study, allows the description of the relationship between variables to be made with numerical precision (Creswell, 2014). Additionally, Creswell (2014) indicated that correlational studies determining relationships between variables are beneficial in determining a need for future research. A weakness of the correlational design is the inability to determine causation between variables (Campbell & Stanley, 1963; Creswell, 2014). Additionally, even if a correlation is determined, a cause for the correlation cannot be determined through a correlational study (Queiros, Faria, & Almeida, 2017). This disadvantage could lead to misinterpretation and misuse of the results (Creswell, 2014). The main reason the researcher selected the correlational sub-design was that correlational research can be used to determine whether a relationship exists between two variables (Warner, 2013). The research questions were designed to determine a relationship between student perceptions of parent attitudes and student motivation.

The researcher used a cross-sectional survey methodology for the study. A cross-sectional design calls for data collection at one moment in time from a group of people who share some characteristics but differ on others (Cherry, 2018). In this case, the participants were all middle school students but differed on their motivation to learn mathematics. Participants did not need to know what caused their motivation. Students may not know whether they attribute their motivation for learning mathematics to their perception of their parents' attitudes; thus the researcher sought to obtain just the viewpoints of the students. Survey methodology is common for obtaining the attitudes or viewpoints of a population (Creswell, 2014). A weakness of the cross-sectional design is the inability to determine causation (Cohen et al., 2007). Because cross-sectional studies occur at one point in time, they cannot be used to determine a sequence of events (Levin, 2006). Additionally, cross-sectional studies only provide a snapshot of the topic in question. Results of a cross-sectional study could vary if a different time frame was selected (Levin, 2006). The strengths of a cross-sectional survey include a relatively short study duration (Creswell, 2014). Additionally, the prevalence of an outcome through cross-sectional studies can usually be estimated as the sample is generally generated from the whole population, and there is no loss of data due to participants not completing a follow up as with longitudinal surveys (Levin, 2006).

The researcher selected a cross-sectional sub-design (Kothari, 2004) with survey methodology (Creswell, 2014) allowing the researcher to collect data at one point in time rather than over the course of an extended time period. This cross-sectional sub-design was desirable to capture the instinctive viewpoints of the participants (Creswell, 2014). The Likert-type survey methodology used here is familiar to most people (Creswell, 2014; Fink, 2015) and is simple for participants to provide responses. Creswell (2014) indicated a survey captures the initial instincts

of individuals which the current study attempted to do in collecting student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics. The quantitative correlational design with cross-sectional survey methodology was the most beneficial and feasible design that met the needs of the researcher for the current study (Giuffre, 1997).

**Site Selection**

The researcher solicited sites from small cities located in an upper Midwestern state of the United States. The researcher identified possible sites based on districts that had implemented the CCSSM and maintained low proficiency rates in mathematics. All sites solicited by the researcher had fully implemented the CCSSM for a minimum of five years. This timeframe allowed parents who had been a part of the district for the previous five years ample time to form opinions and demonstrate resulting behaviors observable by the students.

During the spring preceding the anticipated data collection period, the researcher made initial contact with superintendents from potential sites (see Appendix A) through email with information regarding the current study. The researcher briefly described the study to administrators and solicited participation. Once a school accepted the invitation and granted permission (see Appendix B and Appendix C), the researcher requested suggestions from participating administrators for other schools meeting the criteria that might be willing to participate. This effort by the researcher to increase the number of participating schools to ensure the minimum number of participants ($N = 85$) failed and only one district serving approximately 170 middle school students was selected. A 48% response rate was necessary to ensure an adequate sample size. The pilot study had a 56% response rate, indicating a 48% response rate for the study was possible. As the researcher was a known member of the community in which

the site was located, the researcher expected response rates to be greater than normal. One-hundred-twenty-six responses yielded a response rate of 72% for the study.

The researcher initially obtained two sites based on the criteria, but one district experienced a change in administration and withdrew from the study. The willingness of school districts to participate in the study determined the selection of the actual site the researcher utilized for the study. According to the district's website, the remaining study site consisted of one Grade 6 through Grade 8 middle school serving approximately 175 students. In 2017, just over 10% of this population was bused into the district from outlying rural areas. District demographics included 88.3% Caucasian students and 6.8% Hispanic/Latino. The State Department of Education reported that 48.4% of the school district's students were female and 51.6% were male. Half of the student body reported being economically disadvantaged. The district's mathematics proficiency rate was 33%. Student-to-teacher ratio was 16:1.

**Population**

The population for this study was 175 middle school students in Grade 6 through Grade 8 in a small urban area in an upper Midwestern state of the United States. The population consisted of 76 students in Grade 6, 57 students in Grade 7, and 42 students in Grade 8. The middle school population has an identified mathematics proficiency rate of 42% according to the district's website in 2017. The low mathematics proficiency rate of this population of middle school students provided a population similar to the students in the United States with low international mathematics rankings. Middle school participants were preferred over elementary students due to their increased ability to perceive information (Feinstein, 2003). Students in middle school have a critical need for appropriate guidance as they form their identities (Rice, 1999), and experiences during this time can have a lasting impact (Feinstein, 2003). Students, particularly in

early adolescence, maintain a desire to earn the approval of authority figures, while at the same time striving to earn their place among their peers (Wolters, Denton, et al., 2013). Early-to-mid-adolescence is a critical time for cognitive development, making adolescence a prime time for forming opinions and habits and for research concerning attributes of motivation (Rice, 1999; Wehrspann et al., 2016).

While the results of this study are not generalizable to the population of middle school students due to the cross-sectional design, the results may prove beneficial to the site participating in the study. The results provide information concerning the relationship between student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics at the middle school level specific to the participating site. The results may lead to further studies of similar design for other sites interested in investigating attributions of student motivation following the implementation of the CCSSM which could lead to generalizable results in the future (Johnson & Onwuegbuzie, 2004).

**Sample**

The sample for the study consisted of middle school students from a participating public-school district in a small urban area in an upper Midwestern region of the United States. The decisions of parents, students, and administrators determined the selection of participants, but all middle school students in Grade 6 through Grade 8 enrolled at the selected site who had obtained parental permission had the option to participate in the study. The participants making up the sample were both males and females ages 11 to 14. Participants were required to have parental consent to participate. Students were also required to complete a student assent form and to willfully, and honestly complete the survey.

The researcher utilized the responses of 122 participants for the study. Of the 122 participants, 51 were female, 65 were male, and six participants opted not to identify with a gender. Grade 7 had the largest number of participants at 51, comprising 41.8% of the sample. Another 39 students, or 32% of the respondents, were in Grade 6. The remaining 32 respondents, or 26.2%, were in Grade 8. The responses by grade resembled the composition of the school where Grade 6 made up 43.4% of the school's population with 76 students, Grade 7 made up 32.6% with 57 students and Grade 8 made up 24% of the school's population with 42 students.

For a study to be meaningful, a researcher must adhere to an appropriate size and power. Warner (2013) recommended that correlational studies use sample sizes larger than 30 to provide a realistic relationship between variables, but to achieve an alpha of .05, power of .80, and a medium effect size (.30), Cohen (1992) recommended a sample size of 85. Additionally, G*Power analysis software was utilized to determine that a sample size of 72 was required for regression, $R^2$ deviation from zero, a medium effect size of .15, an alpha of .05, $(1-\beta) = .80$, and two predictor variables. This study followed the recommendation produced by both the G*Power analysis software and Cohen and obtained 122 participants which met the sample size requirements.

**Sampling Method**

The researcher used non-probability, purposive sampling (Etikan et al., 2016) because it was the most efficient way to collect data from the intended population. Purposive sampling allows researchers to work within their means and allows for a sample to be obtained in a relatively efficient manner (Creswell, 2014). Weaknesses of the method include limited response rates and the inability to generalize results (Johnson & Christensen, 2008). Additionally, the use of purposive sampling increases the possibility of bias in which specific groups may be over or

under-represented (Creswell, 2014). The researcher selected purposive sampling as the most effective way to obtain participants that met the needs of the study. The researcher followed the suggestions of Colton and Covert (2007) for selecting the nonprobability sample from a public school district in the upper Midwest region of the United States. First, the researcher identified the site for administering the survey and sent an e-mail to the school superintendent requesting a meeting and permission to utilize the middle school student body for research efforts. Second, the researcher gained access to the site and ensured that the proper permissions were granted for data collection. Third, the researcher ensured that only middle school students were targeted as potential participants. Once all permissions were granted, the researcher invited the entire population of the research site selected—a middle school in the upper Midwest region of the United States consisting of 175 students—to participate in the study. The researcher understood that only a sample of the population would voluntarily participate. Those individuals willing to participate determined the actual sample utilized for the study. The final step was administering the survey.

Non-random, purposive sampling (Etikan et al., 2016) was used to identify schools that (a) were in a city in an upper Midwestern state of the United States; (b) had implemented the CCSSM instruction for a minimum of five years; (c) were willing to participate. One strength of purposive sampling is the ease of use allowing the researcher to obtain a sample within the confines of the researcher' resources (Creswell, 2014; Etikan et al., 2016). Purposive sampling generally has limited response rates, but the current study did not experience that problem. Purposive sampling does not allow generalizations to be made outside of the conducted study (Creswell, 2014; Etikan et al., 2016; Johnson & Christensen, 2008).

Purposive sampling was the basis for the selection of the site within a Midwestern state (Etikan et al., 2016). The criterion of having utilized the CCSSM for a minimum of five years was essential to have allowed parents from the community time to form opinions and develop attitudes toward this reform effort. Many schools met this criterion, as the CCSSM were implemented in all public schools in the selected state, as well as three neighboring states, by 2010 (CCSSI, 2015); however, private schools were excluded from consideration because they had not necessarily adopted the CCSSM. The other criterion of willful participation was also essential to the study. Not only does willful participation provide more accurate data (Creswell, 2014), but the study could not commence without cooperation from those willing to participate.

While purposive sampling is affordable and allows for the convenient attainment of subjects, one disadvantage of purposive sampling is the increased chance of bias among participants (Etikan et al., 2016). Creswell (2014) explained that depending on the viewpoints of individuals who do not respond, there may be an under-representation or over-representation of a group when using purposive sampling. It is possible that the viewpoints of those who did not participate could have significantly changed the results if those responses had been included in the study (Creswell, 2014). The sample obtained was proportionate by grade to the proportion of students in the school. Etikan et al. (2016) indicated, concerning the use of purposive sampling: "the effect of outliers can be more devastating in this kind of subject selection" (p. 2). The researcher had to determine the effects of any outliers prior to data analysis.

**Ethical Issues and Permissions**

To protect all participants in the study, the researcher had to consider ethical issues that could have surfaced during the study. "The Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research" (National Commission for the Protection of

Human Subjects of Biomedical and Behavioral Research, 1979) outlines basic ethical principles that must be adhered to while conducting research involving human subjects, including respect for person, beneficence, and justice. Ethical issues that concern the human subjects for this study relate to the respect for the research site, informed consent, confidentiality, and data recording (Roberts, 2010). The researcher was required to comply with her home university's IRB regulations and report any issues that came about during or after the completion of the study. No known issues resulted from the study. The issues considered prior to commencing the study are discussed below.

**Ethical issues at the research site.** To respect the research site, minimal intrusion was necessary. The researcher requested access to the site and received permission. Administration at the research site did not require approval from an institutional review board other than the approval of the researcher's home university's IRB to conduct the research and the researcher's completion of certification through the National Institutes of Health Office of Extramural Research (NIH) (see Appendix D). The selected site did require the researcher to provide a full description of the intended research to the superintendent and building principals of the site prior to the commencement of the research. Communication with parents and students concerning the study originated from the school, but the actual data collection occurred online and outside of the school day so as not to disrupt the learning environment of the school. The researcher discussed any expectations and answered the questions of the individuals granting permission to utilize the site to ensure that no concerns remained prior to the data collection. Involved parties were informed that recorded data would be stored securely online for three years until the researcher may destroy it as determined by the IRB of the researcher's home university.

To comply with the principle of respect for persons, the researcher had to ensure that vulnerable participants were protected. The current study targeted the general population of middle school students at the selected site, not a marginalized population. Everyone had the option to participate or not in the study. To comply with the principle of beneficence described in The Belmont Report, the researcher reduced harm to participants through a simple survey rather than personal interviews which may have been viewed as intrusive. To limit any unintentional influence on the participant, the researcher was not present with the participants while data were collected online through the survey. There was no foreseen discomfort or harm to the participants by completing the survey. Service of the participants was not required beyond the completion of the survey. Finally, to address the issue of justice at the research site, all middle school students were invited to participate in the study so long as they had parental consent to do so.

**Informed consent and assent.** As discussed in The Belmont Report, the use of human subjects in research required the researcher to inform participants of the potential risks and benefits of their participation. The use of a survey to collect data was of minimal risk and benefit to the participant (Creswell, 2014). Implementation of the study complied with the guidelines for proper treatment of human subjects as approved by the IRB (see Appendix E). Two permissions were necessary prior to administration of the survey: parental consent from the parent or legal guardian because all participants were under the age of 18 (see Appendix F) and child assent from the participant (see Appendix G). The purpose of the current study was articulated to all individuals providing consent and assent. Instructions for the survey explained to both the parent and to the child that the child does not have to participate or may abandon the study at any time without penalty. Instructions in the survey informed students their participation was voluntary,

even if their parents agreed for them to partake in the study, and there was no consequence for non-participation. Participants had the opportunity to opt out of the survey in its entirety or to cease participation at any point while responding to the survey without consequence.

**Confidentiality.** The researcher must protect the confidentiality of all participants in research studies (Creswell, 2014). To protect confidentiality, the data collection process did not record names. Information provided to participants prior to partaking in the study notified them and their consenting parents or legal guardians of how the data would be used for the study, along with how the data would be viewed, stored, and for how long. The researcher maintains the collected data electronically on a password protected computer in the researcher's home.

**Permissions.** Prior to making application to the researcher's home university's IRB, the researcher participated in research ethics training required by the university. This training included completing the requirements for NIH certification. Once permission was granted to utilize the site and access was obtained, the researcher contacted the appropriate administrators, as identified by the superintendent, who would be responsible for granting permission to utilize the middle school student body for research purposes. The researcher followed the chain of permissions from the superintendent to the building principal to ensure that access would not be denied due to lack of procedural order. Once access to the research site was granted and the researcher obtained permission for data collection, an application was made to the researcher's home university's IRB to begin the pilot study. The IRB granted the researcher approval on September 13, 2017.

## Data Sources

The source of data for the current study was an online survey combining perception and motivation items from the Perceived Competence for Learning Scale (PCLS) (Williams, Deci, &

Ryan, 1996), the Perception of Parents Scale (POPS) (Gronlick, Ryan, & Deci, 1991b), and the Attitudes Toward Mathematics Inventory (ATMI) (Tapia, 1996) into one instrument. There are both benefits and disadvantages to using a survey for data collection (Colton & Covert, 2007). Creswell (2014) indicated a major benefit of survey studies is a familiarity to most people. Fink (2015) indicated that online surveys are becoming more popular for collecting data and are now familiar to most young people. Surveys require a limited amount of time for the participant to complete, provide a short turnaround time for data collection, allow for convenient data handling, and can increase response rates as the participant can complete the survey on their own schedule (Sincero, 2012). The disadvantages of conducting an online survey include the absence of the researcher, coverage error (Visser, Krosnick, & Lavrakas, 2000) or the inability to reach certain populations, potential "survey fraud" (Sincero, 2012, p. 1), and data collection being limited to only the questions asked (Colton & Covert, 2007). The survey did not include any open-ended questions; thus the absence of the researcher was not a disadvantage in this study and may have proved beneficial as no possible persuasion could have been made by the researcher during data collection.

The site selected for the research study was a one-to-one school where each student had a computer available to use. Every potential participant had a device; thus coverage error was not a disadvantage in the current study as the entire population was able to access the survey. Participant fatigue was the most likely disadvantage to the research study. Matell & Jacoby (1972) suggested that when surveys require an extended amount of time to complete, the participants may tire from their involvement or get bored with the content resulting in responses that may no longer be authentic. Limiting the length of the survey to under 20 questions reduced

the risk of participant fatigue and the responses should have greater fidelity than those from a longer survey (Matell & Jacoby, 1972).

The use of a survey was critical for data collection in this study. The purpose of the study was to examine variable relationships. Numerical data, as obtained in the Likert-type scale survey utilized in the study, allows for correlational analysis (Warner, 2013). The research questions were designed to determine a relationship between student perceptions and student motivation. Creswell (2014) indicated that surveys are a common method of collecting data concerning viewpoints as this study aimed to do. Additionally, the use of a survey allowed the researcher to collect data in a manner that was comfortable and familiar to the participants (Fink, 2015).

**Description of the Research Protocols/Instrumentation**

The finalized instrument, an online survey (see Appendix H), consisted of 12 questions derived from previously existing instruments to measure student perceptions of parent attitudes toward student ability and effort following implementation of the CCSSM and student motivation for learning mathematics at the middle school level. The items in the survey are those remaining after feedback and validation efforts from the pilot study survey with 15 questions. The instrument is composed of three subscales. The first subscale measured student perceptions of parent attitudes concerning the student ability with the CCSSM; the second subscale measured student perceptions of parent attitudes concerning student effort with the CCSSM. Both subscales contributed to the independent variable of perception. Items from the POPS (Gronlick et al., 1991b; Robbins, 1994) and the PCLS (Williams et al., 1996) used for educational purposes and modified as allowed (see Appendix I and Appendix J), measured these perceptions. The final survey contained seven questions measuring perception. Two of these

questions measured student perceptions of parent attitudes toward student effort and five of the perception questions measured student perceptions of parent attitudes toward student ability following the implementation of the CCSSM. The final subscale measured the student's motivation for learning mathematics. The motivation subscale consists of the items composing the motivation subscale of the ATMI (Tapia, 1996) used with permission from Martha Tapia (see Appendix K). The remaining five items in the survey measured the student's motivation for learning mathematics based on motivation descriptors identified by Weiner (2012). All the questions together comprised a survey expected to take approximately 5-10 minutes to complete. The final instrument is aligned with Weiner's (2010a) theory linking perceptions of ability and effort to cognitions, actions, and emotions in an educational context (see Appendix L). As mentioned previously, some items underwent modifications made with permission to meet the needs of the study, specifically to measure student perceptions of parent attitudes following implementation of the CCSSM, considering student ability and effort, using language clear to middle school students (see Table 1). Following the table is a brief description of each instrument from which items received modification for use in the instrument for the current study.

Table 1

*Modification of Statements for the Instrument's Measured Variables Based on Determinant*

| Theory Determinant of Motivation | Construct | Measured Variable | Question/Statement |
|---|---|---|---|
| Ability<br>Weiner (2005) indicated success due to a perceived high ability leads to increased motivation. | Perception | Student perceptions of parent attitudes toward student ability. | "In my perception, my parents believe I am capable of learning the material in this course."<br><br>Modified from the Perceived Competence for Learning Scale: "I am capable of learning the material in this course." (Williams et al., 1996) |
| Ability<br>Weiner (2012) indicated success due to a perceived high ability leads to increased motivation, while failure due to a perceived lack of ability leads to decreased motivation. | Perception | Student perceptions of parent attitudes toward student ability. | "In my perception, my parents believe I am able to achieve their goals for me in this course."<br><br>Modified from the Perceived Competence for Learning Scale: "I am able to achieve my goals in this course." (Williams et al., 1996) |
| Ability<br>Weiner (2005) indicated that failure due to a perceived lack of ability leads to decreased motivation. | Perception | Student perceptions of parent attitudes toward student ability. | * "In my perception, my parents feel I am unable to meet the challenge of performing well in this course."<br><br>Modified and negatively worded from the Perceived Competence for Learning Scale: "I feel able to meet the challenge of performing well in this course." (Williams et al., 1996) |
| Ability<br>Weiner (2012) indicated success due to a perceived high ability leads to increased motivation, while failure due to a perceived lack of ability leads to decreased motivation. | Perception | Student perceptions of parent attitudes toward student ability. | "In my perception, my parents feel confident in my ability to learn mathematics with the Common Core Standards for Mathematics."<br><br>Modified from the Perceived Competence for Learning Scale: "I feel confident in my ability to learn this material." (Williams et al., 1996) |

Table 1

*Modification of Statements for the Instrument's Measured Variables Based on Determinant* (continued)

| Theory Determinant of Motivation | Construct | Measured Variable | Question/Statement |
|---|---|---|---|
| Ability<br>Weiner (2005) indicated that failure due to a perceived lack of ability leads to decreased motivation. | Perception | Student perceptions of parent attitudes toward student ability. | "In my perception, my parents believe I am able to meet the challenges of the Common Core Standards for Mathematics."<br><br>Modified from the Perceived Competence for Learning Scale: "I feel able to meet the challenge of performing well in this course." (Williams et al., 1996) |
| Effort<br>Weiner (2012) indicated success due to a controllable factor such as a lack of effort leads to pride which will increase motivation. | Perception | Student perceptions of parent attitudes toward student effort. | "In my perception, my parents spend time with me to make sure I try hard to understand my mathematics homework."<br><br>From the Perceptions of Parents Scales: "My mother (father) spends a lot of time with me." (Robbins, 1994) |
| Effort<br>Weiner (2012) indicated success due to a controllable factor such as effort, demonstrated through behaviors such as time spent on task, leads to pride which increases motivation. | Perception | Student perceptions of parent attitudes toward student effort. | "In my perception, my parents never want to know what I am doing in my math class or how hard I work."<br><br>From the Perceptions of Parents Scales: "Some mothers (fathers) never want to know what their children are doing." (Gronlick et al., 1991b) |
| Ability<br>Weiner (2005) indicated success due to a perceived high ability leads to increased motivation. | Motivation | Student motivation to learn mathematics. | "I am confident that I can learn advanced mathematics."<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |

Table 1

*Modification of Statements for the Instrument's Measured Variables Based on Determinant* (continued)

| Theory Determinant of Motivation | Construct | Measured Variable | Question/Statement |
|---|---|---|---|
| Ability<br>Weiner (2005) discussed the perceptions of one's ability in relation to stability of the situation. Successes experienced in a situation viewed as stable (math will always be challenging) will lead to increased beliefs about one's ability, thus increasing motivation. | Motivation | Student motivation to learn mathematics. | "The challenge of math appeals to me. (I like it)."<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |
| Effort<br>According to Weiner (2012), success perceived to be due to effort improves self-esteem and pride which leads to increased motivation | Motivation | Student motivation to learn mathematics. | "I plan to work hard so I can take as much mathematics as I can during my education."<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |
| Effort<br>Weiner (2000, 2010b) described effort as a determinant of motivation. A willingness to put forth effort improves motivation. | Motivation | Student motivation to learn mathematics. | "I am willing to take more than the required amount of mathematics."<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |
| Effort<br>According to Weiner (2012), failure due to internally driven factors will decrease pride and self-esteem, and ultimately motivation if the determinant is controllable, such as choosing to take a course. Avoidance of task is lack of effort for completing the task, thus avoiding taking math classes would indicate low motivation to learn mathematics. | Motivation | Student motivation to learn mathematics. | * "I would like to avoid using mathematics in college."<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |

*Note.* * Reverse score items.

**Perceived Competence for Learning Scale (PCLS).** The Perceived Competence for Learning Scale is comprised of four questions based on the Perceived Competence Scales designed to measured constructs from self-determination theory (Williams et al., 1996). These constructs include maintained behavior change, effective performance, and internalization of values (Williams et al., 1996). When individuals use the PCS, items are typically altered to be specific to the domain under study, thus not all PCS are identical (Williams et al., 1996). Multiple studies, from healthcare (Williams et al., 2006) to education (Gronlick, Raftery-Helmer, Flamm, Marbell, & Cardemil, 2014) utilize perceived competence scales, and the wording of the items reflects the specific concept evaluated. The Cronbach's alpha measure for internal consistency of the PCLS is .80 as determined by Williams et al. (1996). Anderson-Butcher et al. (2016) utilized a perceived competence scale to analyze perceived competence among youth. To increase the variance of responses, Anderson-Butcher et al. (2016) added several items to the instrument for their study. These scholars employed the mean sum score for the comprehensive measure and seven subscales to determine predictive validity. A correlation between the scales indicated a positive relationship (Anderson-Butcher et al., 2016). Test-retest reliability in the medical field has demonstrated an alpha ranging from .89 to .93, and construct validity has been demonstrated through positive correlations of constructs and factor analysis (Williams et al., 2006). The researcher utilized five items from this scale for the current study to measure student perceptions of parent attitudes concerning student ability with the implementation of the CCSSM.

**Perceptions of Parents Scales (POPS).** There are two POPS: one designated as the child scale (Gronlick et al., 1991b) and one based on the child scale but modified by Robbins (1994) and designated as the college-student scale. These scales measure student perceptions of parental

support. Wintre and Yaffe (1991) found the reliability of the child scale to be .94, and a different study conducted by Niemiec et al. (2006) making use of the college-student scale found the alpha reliability to be .89. A study conducted by Kocayoruk, Altintas, & Icbay (2015) utilized the POPS scale and determined reliability to range from .85 to .89. Kocayoruk (2012) previously utilized the scale as a modified version for the Turkish culture and found reliability to range from .91 to .93. Wintre and Yaffe (1991) conducted a factor analysis of the POPS and determined three loadings on the factors of an overall relationship with parents, a relationship with the mother, and a relationship with the father. Kocayoruk (2012) confirmed the loadings through factor analysis of the Turkish version, confirming the instrument measures what it is intended to measure. Two items, one from each of these two scales, comprised the remaining items for the perception subscales of the instrument for the current study.

**Attitudes Toward Mathematics Inventory (ATMI).** The ATMI was developed by Martha Tapia (1996) and is comprised of 40 items to measure attitudes toward mathematics. The instrument is broken into four subscales of self-confidence, value, enjoyment, and motivation. Tapia (1996) found the reliability for the motivation sub-scale was .96. Majeed, Darmawan, & Lynch (2013) tested the validity and reliability of a shortened version of the ATMI with Australian students and found alpha to be .78 for the motivation subscale. Conducting a factor analysis found factor loadings to range from .62 to .90, indicating construct validity (Majeed et al., 2013). Lim and Chapman (2013) tested the validity of the ATMI using inter-correlations between the subscales and determining correlations with measured mathematics anxiety and achievement test scores. The entire motivation subscale, consisting of five questions, measured motivation in the instrument of the current study.

**Data responses.** The survey had a demographics section to collect gender and grade-level data for each participant. The collection of demographic data was only to describe the sample more accurately. The survey was available online through a Weebly webpage. The Weebly site also contained additional information which individuals could access to learn more about the study and where parents could provide their consent and the students could assent to participate.

The study aimed to be appropriate for participation by middle school students. Because students are not likely to be familiar with theoretical terminology, the current study's instrument was modified with language appropriate for middle school students. The researcher designed the instrument to take only 5-10 minutes to complete and the instrument was accessible both online and through a smartphone. These convenient modes of data collection were used to increase the response rate. Measurement of all items, except the demographic information, utilized a 5-point Likert-type scale with common response choices: "strongly disagree," "disagree," "neutral," "agree," and "strongly agree." Although some researchers (Holbrook, Green, & Krosnick, 2003) suggest not including a neutral option because it creates an easy avoidance of the item for hesitant respondents, Matell and Jacoby (1972) indicated that inclusion of a neutral response might ease respondents' anxiety and increase the truth of the responses.

To score the instrument, responses of "strongly disagree" received a score of 1, with response scores increasing incrementally by 1 to responses of "strongly agree" receiving a score of 5. A 5-point Likert-type scale was preferable over a 3-point Likert-type scale because respondents not willing to commit to a simple "agree" or "disagree" may have been more likely to choose the neutral response. A 7-point Likert-type scale may have resulted in too many choices for an adolescent to consider, resulting in respondent fatigue (Matell & Jacoby, 1972).

Holbrook et al. (2003) reported that individuals often avoid the outermost options of a scale due to the negative implications associated with being an "extremist." Even if respondents avoided the extremes of "strongly disagree" or "strongly agree" for this reason, a 5-point Likert-type scale still allowed for responses of agreement or disagreement, making it the most preferable scale for this instrument. The use of assigned numbers allowed for the endorsement responses, which are individually ordinal in nature, to undergo analysis as cumulative interval data (Andrich, 1996).

A breakdown of the responses relevant to the perception variable allowed for differentiation between the determinants of ability and effort. Higher sub-scores indicated whether a student perceived their parents to have a positive attitude concerning the student's effort or ability after implementation of the CCSSM and whether the student possessed a higher motivation for learning mathematics than those who received lower sub-scores. Gul, Qasem, and Bhat (2015) found that item reversal on Likert-type scales does not affect reliability; therefore, the instrument contained negatively worded items to determine if respondents read each item or simply responded without reading. These items required reverse scoring to keep the continuity of the items positively aligned.

The subscales in the instrument measured the variables. The researcher utilized SPSS to determine correlations from the data relating student perceptions of parent attitudes to the student's self-reported motivation for learning mathematics. The items associated with perceived parent attitudes toward student ability and effort following implementation of the CCSSM contributed to the independent variable, whereas those items associated with student motivation contributed to the dependent variable. The researcher examined two individual correlations: one concerning the specific aspects of student perceptions of parent attitudes toward student ability

and another concerning student perceptions of parent attitudes toward student effort. As the researcher found both correlations to be significant, the researcher also conducted a regression analysis to determine which student perception of parent attitudes—ability or effort—has a greater influence on motivation. The instrument does not include a social desirability scale to check for responses due to perception concerns. Concerns over perception should be limited. The instrument instructions indicated to participants that their own perceptions were desired and that their responses were anonymous.

**Instrument review**. As the instrumentation for the current study was a combination of previously developed surveys, the researcher needed to determine the reliability and validity of the new instrument prior to collecting data (Creswell, 2014). The researcher requested permission from the research site to access the academy students as potential participants for the instrument review. These individuals composed a mixture of traditional classroom students and students taking courses both in classrooms and online providing a variety of students with similar characteristics to those utilized in the study. The researcher utilized purposive sampling and soliciting participants for the instrument review followed the same solicitation process as used to obtain participants for the study. Solicitation of participants for the instrument review only occurred within the research site's academy. This practice limited the participants to the upper age limit of the intended population but ensured that no individual received a solicitation to participate in both the instrument review and the actual survey.

Once permission was received, the researcher invited the parents of 60 students to allow their child to participate in the instrument review. While 37 parents provided consent for their child to participate, only 34 students participated in the pilot study, resulting in a 56.0% response rate. The participants in the pilot study consisted of 10 males, 21 females, and three who

declined to identify gender. Of the 34 participants, 19 (55.9%) were age 14, 14 (41.2%) were age 13, and the remaining participant (2.9%) did not provide an age. The instrument review procedure utilized the same permissions as those necessary for the sample population and collected data online through a survey. The survey for the instrument review included 15 questions to collect data with additional questions that solicited feedback concerning the ease of use of the instrument, the identification of any questions that needed clarification or any questions that did not seem to fit with the study, as well as a request for suggestions for additional questions (see Appendix M).

Results of the instrument review advised the modifications needed to finalize the instrument for use in the study. Feedback provided from the participants of the instrument review concerning ease of use of the instrument suggested questions for inclusion, and questions that appeared to the participants to be out of alignment with the rest of the survey were considered in the finalization of the instrument.

**Validity.** Warner (2013) discussed the need to establish validity when variables of interest cannot be directly observed, such as in the case of perception of attitudes and motivation. Creswell (2014) indicated there are three traditional forms of instrument validity. Among these are content validity, predictive validity, and construct validity.

Content validity, as described by Warner (2013), concerns whether the survey items are an accurate representation of the theoretical content areas. It is necessary to determine if the survey instrument measures in whole what it is purported to measure. The solicitation of a panel of subject matter experts is a common strategy to determine content validity (Wilson, Pan, & Schumsky, 2012). The authors of each instrument from which the subscales for the instrument in the current study were derived have validated their respective instruments (Gronlick et al.,

1991b; Robbins, 1994; Tapia, 1996). As the authors of the instruments from which the researcher derived the subscales are experts in their fields, the researcher acknowledges that subject matter experts have validated the content. Previous research studies related to perceptions and motivation have utilized individually the subscales of the current study and found them valid (Lim & Chapman, 2013; Majeed et al., 2013; Slavik, 2015; Wintre & Yaffe, 1991), providing additional evidence of validity for each subscale.

Predictive validity exists when the instrument predicts one variable from another (Colton & Covert, 2007). McGee and Wang (2014) discussed the importance of using balanced instruments to maintain predictive power. Using a rotated component matrix allowed the researcher to verify balance among the constructs measured by the instrument (Warner, 2013). It is important to understand that predictive power cannot be determined, as correlational studies do not determine causation.

Construct validity is determined by how well a construct can be measured (Colton & Covert, 2007). Since students' perceptions are not easily observable, rewording the statements to provide common definitions and easily understood terminology helped to ensure a similar interpretation by the participants and reduced the threat to the instrument's construct validity (Nunnally, 1978). The researcher conducted a principal component analysis as recommended by Warner (2013) to help determine construct validity. A varimax rotation within the principal component analysis helped to determine that the instrument items did conform to specific constructs (Benson, 1998). As suggested by Kelloway (1995), the researcher used orthogonal rotation in the form of a varimax rotation, rather than oblique rotation, to identify items that might lead to unanticipated constructs. Ultimately, construct validity cannot be determined with one measurement procedure. However, based on the validity efforts of the authors (Gronlick et

al., 1991b; Robbins, 1994; Tapia, 1996) and the efforts of the researcher to validate the instrument, it is believed that construct validity exists.

**Validation efforts**. Prior to performing the factor analyses, the researcher needed to verify that the sample size was adequate. Warner (2013) suggested a sample of at least 30 respondents for relational data. There were 34 respondents for the pilot study and the Kaiser-Meyer-Olkin statistic, a measure of sampling adequacy, was .505 which is greater than the recommended .5, thus considered to be adequate sampling and suitable for factor analysis (Warner, 2013). The data should not have been ordinal nor nominal (Warner, 2013), a requirement satisfied by using a Likert scale which allows for analysis as cumulative interval data (Andrich, 1996). Using principal component analysis allowed for the assessment of the dimensionality of the instrument. In utilizing SPSS, a common program used for statistical analysis (Salkind, 2011), retention of components with Eigenvalues greater than one is the recommendation (Warner, 2013). All items from the instrument loaded onto five components, each component with a minimum Eigenvalue of 1.189, explaining 74.73% of the variance.

The principal component analysis indicated the initial 15 items loaded on five components. One of these components consisted of only one item (E11) which did not fit well with the other instrument items, so the researcher removed this item from the instrument. The researcher removed one additional item (E4) due to an unexplainable loading on a component with which it did not fit. After running the principal component analysis on the remaining items, the researcher found the remaining items loaded on four components identified as student perceptions of parent attitudes toward student ability, student perceptions of parent attitudes toward student ability specific to the CCSSM, student perceptions of parent attitudes toward

student effort, and student motivation for learning mathematics. Table 2 shows the loadings of the components after rotation.

Table 2

*Rotated Component Matrix*

| | Ability | Motivation | Ability w/CCSSM | Effort |
|---|---|---|---|---|
| A2-My parents believe I can achieve their goals for me in this class. | **.871** | .001 | .230 | .146 |
| *A7-My parents feel I am unable to meet the challenge of performing well in my math class. | **.732** | .112 | .088 | .130 |
| A1-My parents believe I can learn the material in this course. | **.669** | -.006 | .546 | -.139 |
| M3 – I am confident that I can learn advanced mathematics | **.666** | **.533** | .163 | .110 |
| *M10-I would like to avoid using mathematics in college. | -.264 | **.794** | .196 | .215 |
| M9-I am willing to take more than the required amount of mathematics | .370 | **.769** | .060 | -.099 |
| M14-The challenge of math appeals to me (I like it) | .127 | **.686** | -.076 | -.183 |
| M6-I plan to work hard so I can take as much math as possible during my education. | .566 | **.574** | .096 | .043 |
| A12-My parents feel I am able to meet the challenges of the Common Core Standards for Mathematics | .084 | .053 | **.877** | .027 |
| A8-My parents feel confident in my ability to learn mathematics with the Common Core Standards for Mathematics. | .349 | .105 | **.866** | .092 |
| E13-My parents spend time with me to make sure I try hard to understand my mathematics homework. | .176 | -.040 | .094 | **.794** |
| *E15-My parents never want to know what I'm doing in my math class or how hard I work | .262 | -.369 | .016 | **.780** |
| E5-My parents are disapproving and unaccepting of me when I do not put a lot of effort into learning mathematics. | .103 | -.168 | .031 | **-.741** |

*Note.* Extraction method: Principal Component Analysis; Rotation Method: Varimax with Kaiser Normalization; Rotation converged in six iterations; Factor loadings > .5 are in boldface. *Reverse score items.

Two of the loadings—student perceptions of parent attitudes toward student ability and student perceptions of parent attitudes toward student ability specific to the CCSSM—measured the same factor relative to the current study, as the selected research site had implemented the CCSSM five years ago. Therefore, the researcher combined both components into one component of student perceptions of parent attitudes toward student ability. These three remaining components explained 72.28% of the variance. Warner (2013) indicated items considered valid for inclusion in an instrument must have a factor loading of .5 or greater, although .4 or greater has also been accepted. These remaining 13 items, with factor loadings ranging from .574 to .877, were valid for use in the instrument. Although Warner (2013) indicated a minimum sample of 30 is required for correlational studies, the G*Power analysis software program indicated that a minimum of 72 participants was necessary for valid regression analysis. Therefore, the inadequate pilot sample size of 34 severely decreases the validity of the instrument.

**Reliability.** After establishing validity, the researcher had to establish reliability with the instrument. Although the items found in the survey are reliable within the respective surveys where they originated (Gronlick et al., 1991b; Robbins, 1994; Tapia, 1996; Williams et al., 1996), researchers have not previously joined these subscales together in a single instrument. To determine the internal reliability of the scores collected by the instrument, the researcher utilized Cronbach's alpha which, according to Tavakol and Dennick (2011), has become the most common measure of reliability. Cronbach's alpha is particularly useful when utilizing multiple-item measures, as this instrument does with ability and effort. Cronbach's alpha generates a reliability coefficient for each construct and allows for the determination of the reliability of each item measuring that construct. To be internally reliable, an instrument should possess a

Cronbach's alpha of at least .50 (Warner, 2013), but a Cronbach's alpha of .70 to .90 is preferable (Tavakol & Dennick, 2011).

Conducting a reliability analysis in SPSS following the instrument review determined the reliability of each variable and of the instrument. The researcher found one item in the perceptions of effort subscale that contained a negative correlation to each of the other items, so the researcher removed that item from the instrument, resulting in 12 remaining survey items. The resulting reliability of the instrument was determined to be .790. Table 3 lists the reliability of the independent variables which contains both perception of ability and perception of effort, and the reliability of the dependent variable, motivation, which resulted from the instrument review after removing items found to affect adversely the validity or reliability. The researcher considered the item total Cronbach's alpha for deleting any item. The researcher found that deleting three items would increase reliability, but only by .006. Removal of these items was determined to disrupt the balance of the instrument which McGee and Wang (2014) indicated could affect validity; thus these three items were retained in the instrument.

Table 3

*Reliability of Independent and Dependent Variables in the Current Study*

| | Cronbach's Alpha | Number of Items |
|---|---|---|
| **Independent Variables:** | .796 | 7 |
| Perception of Ability | .822 | 5 |
| Perception of Effort | .734 | 2 |
| **Dependent Variable** | .793 | 5 |
| Motivation | .793 | 5 |

Following the efforts to determine validity and reliability, the researcher modified the instrument to include the items listed previously in Table 1, which included the rewording of some items for clarity. These 12 remaining items comprised the instrument for data collection in the current study. The remaining items measure the constructs of perception and motivation in

terms of the two determinants of ability and effort prevalent in Weiner's (2000) attribution theory of interpersonal motivation. Figure 3 shows the relationship between the constructs of Weiner's theory relevant to motivational outcomes and each item in the finalized instrument.

| Construct | Determinant | Outcome | Motivational Outcome | Instrument Items |
|---|---|---|---|---|
| Perception | Ability | Success | Increased Motivation (Increases expectancy of future success, increases pride and self-esteem) | In my perception, my parents believe I am able to learn the Common Core Standards for Mathematics taught in this class. |
| | | | | In my perception, my parents believe I am able to reach their goals for me in this class. |
| | | | | In my perception, my parents feel I can learn math with the Common Core Standards for Mathematics. |
| | | | | In my perception, my parents feel I am able to meet the challenges of the Common Core Standards for Mathematics. |
| | | Failure | Decreased Motivation (decreases expectancy of future success, lowers pride and self-esteem, increases shame and humiliation) | In my perception, my parents feel math is too hard for me with the new standards in my math class. |
| Perception | Effort | Success | Increased Motivation (Increases pride and self-esteem) | In my perception, my parents spend time with me to make sure I try to understand my mathematics homework. |
| | | Failure | Increased Motivation (Increases pride and self-esteem) | In my perception, my parents never ask what I'm doing in my math class or ask how hard I work. |
| Motivation | Ability | Success | | I am confident that I can learn advanced mathematics. |
| | | | | The challenge of mathematics appeals to me (I like it/am good at it). |
| Motivation | Effort | Success | | I plan to work hard so I can take as much mathematics as possible during my education. |
| | | | | I am willing to take more than the required amount of mathematics. |
| | | Failure | | I would like to avoid using mathematics in college. |

*Figure* 3. Weiner's effects of ability and effort as related to motivation with instrument items.

**Data Collection Procedures**

Prior to data collection, the researcher ensured that all necessary permissions had been granted and visited with school officials to ensure that there were no remaining concerns over the study. Once modifications were made based on the feedback from the pilot study, the final survey was prepared. The researcher cooperated with the participating school site to collect data. Prior to data collection, the researcher worked with school secretaries to invite potential participants to the study. The school district did not release names or addresses associated with

the parents of the middle school students to the researcher to ensure anonymity. The researcher provided the secretaries with the invitation letters (see Appendix N) which were mailed to parents of middle school students with academic report cards for the first term of the school year on November 1, 2017. The site selected met the requirements for purposive sampling relevant to the research questions of the study, particularly that the site had fully implemented the CCSSM for the last five years.

The researcher invited the parents of all 175 students from the selected site to allow their children to participate in the study. Once the invitation letters were sent out, the researcher opened the survey online to begin collecting data. Parents willing to allow their child's participation in the research were instructed to visit a website set up for the study where the parents provided their consent then the child provided assent to participate. The obtainment of parental consent was a required procedure as the participants in the study were all under the age of 18. The online survey format provided a layer of confidentiality as the participant could complete the survey in the privacy of his or her home. Respondents received information about the study's purpose, risks, and benefits prior to participation. Survey completion required approximately 5-10 minutes, although there was no time limit imposed.

During data collection, eligible participants completed a cross-sectional (Kothari, 2004), online survey (Creswell, 2014) to measure student perceptions of parent attitudes toward student ability and effort following implementation of the CCSSM and student motivation to learn mathematics. Administration of the instrument occurred through a Weebly with an embedded Qualtrics survey during the first semester of the 2017-2018 school year. The Qualtrics survey program was utilized to record participant responses numerically with the numbers 1-5 to match the responses of "strongly disagree," "disagree," "neither agree nor disagree," "agree," and

"strongly agree" as data were collected. Once data collection was completed, the researcher transferred the data from Qualtrics into SPSS where data were cleaned and prepared for analysis. The use of a cross-sectional survey met the needs of the researcher to gather the viewpoints of the participants (Creswell, 2014), specifically their perceptions of their parents' attitudes as related to the purpose of the study.

The researcher sought a minimum of 72 responses to have a sufficient sample for analysis as determined by Cohen (1992) and the G*Power analysis software. After three weeks, 126 participants completed the survey yielding a response rate of 72.0%; therefore, no reminder invitations were necessary. The researcher waited another week in which one additional survey had been completed. With the necessary number of participants reached, the researcher closed access to the survey at the beginning of December of 2017.

After data collection occurred, the researcher sent a thank-you letter to the participating school. All individuals were informed in the invitation letter that anyone who completed the survey would receive a small candy bar as an incentive to participate in the study. The researcher provided the incentive to each student who identified themselves as a participant on the auxiliary website designed to only take participant names. Students could only identify themselves as a participant through a link to another website available at the completion of the survey. Students who registered as participants received a candy bar incentive provided by the researcher. The candy bar incentive was distributed in the students' homeroom classroom at the end of the data collection period in early December of 2017. Providing the incentive for the study assisted with achieving a sufficient sample size which was necessary to conduct the correlational research relating student perceptions of parent attitudes to student motivation for learning.

**Researcher Positionality**

As a middle school mathematics teacher, the researcher understands students struggle with motivation to learn mathematics and educators experience difficulties in motivating students. As a supporter of the CCSSM, the researcher believes in the development of conceptual understanding for students. The researcher believes in deep conceptual understanding and the ability to explain thought processes. However, as an individual who has never struggled or lacked the motivation to learn basic mathematics and who does not parent children who struggle with mathematics, the researcher lacks personal understanding of what it is like to battle this issue.

The researcher wanted to understand more about how student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM—whether positive, neutral, or negative—are related to student motivation. With this understanding, the researcher hopes to help parents comprehend the impact their attitude has on their child's motivation. The researcher believes parents should exhibit support toward mathematics instruction, even if their own education did not utilize the same instructional methods or standards that their child's education currently employs.

The researcher potentially could have several of the participants as students in class in the future. The results of this study have a great meaning to the researcher as a potential educator of these participants. To comprehend thoroughly any possible relationship of student perceptions of parent attitudes toward the CCSSM to student motivation and to refrain from interjecting biases, the researcher needed to remain objective for this study.

## Research Validity

**Threats to internal validity.** According to Campbell and Stanley (1963), there is no internal threat of history, maturation, testing, instrumentation, statistical regression, selection, or mortality with a cross-sectional survey because the measurement only occurs one time. However, Onwuegbuzie (2000) claimed that all studies conducted in the field of education face threats to both internal and external validity. Onwuegbuzie argued that some threats ruled out by Campbell and Stanley are indeed still threats. For example, Onwuegbuzie asserted that instrumentation remains a threat to validity even though cross-sectional surveys only collect data at one point in time. He believed outcome scores are never entirely reliable, and thus any description of the study resulting from the survey results could also be invalid. Consequently, the researcher acknowledges the validity of the current study lies solely with the specific population and period to which it applies and is not generalizable.

Additional factors identified by Campbell and Stanley (1963) and Creswell (2014) that may be present in non-experimental research studies include instrument change, history, maturation, and selection bias. The researcher used a cross-sectional survey that did not change throughout the data collection period, thus eliminating the internal threat of instrument change. History refers to the passage of time which can affect participants and therefore their responses (Campbell & Stanley, 1963). Similarly, maturation implies biological, physical, or psychological changes that occur within an individual from the beginning to the end of the study (Campbell & Stanley, 1963). It is unlikely history or maturation were present in the current study as the survey was designed to only take 10 minutes to complete. The most likely potential threat to internal validity in the current study was selection bias as the researcher was not able to control

the sample of participants in the voluntary survey. To address the threat of selection bias, the researcher made efforts to administer the survey to all middle school students at the selected site.

**Threats to external validity.** The possible threats to the external validity of the study included specificity of the variables in which participants are unclear of what is meant by each term, or the participant does not understand what the variable specifies (Haynes & O'Brien, 2000). To minimize this threat, the researcher provided definitions and used common terminology within the survey. Another possible threat to external validity is experimenter bias in which the researcher influences the responses of the participants (Johnson & Christensen, 2008). To minimize the threat of researcher bias, the researcher was not present while data were collected from the participants. Finally, reactive effects could potentially have threatened the external validity of the study. Reactive effects occur when participants respond differently due to being part of a study then they would respond if they were not part of the study (McDermott, 2011). The researcher utilized a simple, brief survey which, according to Johnson and Christensen (2008), helps to minimize the threat of reactive effects.

**Threats to design validity**. To prevent the influences of researcher bias (Shuttleworth, 2009), the researcher was not present with the participants during the online collection of the data. Onwuegbuzie (2000) mentioned that sampling error, whether using random or non-random samples, is a threat to any study conducted in education. This study used purposive sampling (Etikan et al., 2016) to select the site for the sample of participants and is subject to inclusive bias (Shuttleworth, 2009). To answer any possible sampling error due to inclusive bias, conclusions resulting from this research will only apply to the specific sample and are not generalizable to any other population. Onwuegbuzie contended that ecological threats to validity exist in most educational studies due to ethnicity, socioeconomic status, or academic

achievements which can all differ between school districts. The researcher acknowledges using multiple districts to form the participant pool would help reduce this threat to validity; however, the researcher found that all schools within a 100-mile radius of the location of the current study have similar demographics.

Another factor influencing validity relates to protocol bias. Onwuegbuzie (2000) discussed the failure to follow interventions with fidelity as a threat to a study. While this study did not utilize interventions per se, if educators were not teaching the CCSSM, or if parents either were not aware that the research site taught the CCSSM or had recently moved from a location that had not implemented these standards, data collected from the site would potentially compromise the validity of the study. To limit protocol bias, the researcher selected a site that has utilized the CCSSM for multiple years reducing the possibility that a lack of fidelity would compromise the validity.

Measurement bias occurs when participants are reluctant to provide responses viewed as socially unacceptable and is common among quantitative studies (Shuttleworth, 2009). To minimize measurement bias in this study, the researcher used an anonymous questionnaire. Prior to participants engaging in the study, the researcher informed participants that responses could not be traced to them.

Finally, Onwuegbuzie (2000) discussed temporal validity specifically with cross-sectional survey designs. He noted that in collecting data only once, researchers must consider the period of data collection as a possible threat. Campbell and Stanley (1963) indicated that external validity does not extend beyond the limits of the study. For this study, data were collected based on student perceptions of parent attitudes toward the CCSSM, which have been in existence for the last decade. The researcher expected parents of participants had received

exposure to the CCSSM for the last four years. While the current study is timely now, as these standards become more historic and parents themselves have progressed through an educational system utilizing the CCSSM, the specific results will no longer be of such great interest. However, the relationship between student perceptions and parent attitudes will continue to be relevant, making this study worthwhile.

**Data Analysis Techniques**

Coding of survey responses included "strongly disagree," "disagree," "neutral," "agree," and "strongly agree." Through Qualtrics, the researcher recoded these responses with numerical values, 1 for "strongly disagree" to 5 for "strongly agree." The researcher utilized the quantitative analysis software package IBM SPSS Statistics for the data analyses. When the data were imported into SPSS, any negatively worded items' scores were reversed to keep all responses positively aligned. Additionally, data were cleaned by removing the common prefixes from the items for easier readability. Once data were imported, cleaned, and reverse scored in SPSS, mean scores of each subscale—student perceptions of parent attitudes toward student ability, student perceptions of parent attitudes toward student effort, and student motivation for learning mathematics—were calculated for each participant. Mean scores were then utilized for the analyses as discussed below.

The purpose of the study and focus of the research questions were on a relationship warranting correlational analysis (Warner, 2013) thus the researcher utilized the Pearson's product-moment correlation coefficient (Pearson's *r*). Perception scores were identified as the input variables, and the motivation scores were identified as the output variable. Once data were imported to SPSS and cleaned, the researcher utilized Pearson's *r* and Spearman rho (Spearman *r*), to determine if a statistically significant relationship exists between student perceptions of

parent attitudes and student motivation for learning mathematics at the middle school level. Onwuegbuzie and Leech (2006) recommended generating a correlational analysis and then regression when working with independent and dependent variables on a continuum. Warner (2013) indicated that Pearson's *r* analysis is a common measure used to describe the strength of a linear relationship between two variables. Pearson's *r* was an appropriate model for the data analysis as the research questions focused on the strength of a linear relationship, if any, between two variables in the study.

To utilize Pearson's *r* as a statistical measure, Warner (2013) indicated that scores on each variable must be independent of all the other scores on that variable. Each participant should complete the survey only once. Utilizing the Qualtrics survey program allowed the researcher to restrict each IP address to only one response. Parents with multiple students eligible to participate in the study would have needed multiple devices for each child to participate in the study. Another assumption to using Pearson's *r* includes scores on each variable being quantitative. The use of numerical scoring ensured quantitative data.

The researcher inspected the data to confirm that the critical assumptions of Pearson's *r* were satisfied, including linearity, homoscedasticity, and normality. A nearly linear relation should occur between scores on each variable and there should not be any extreme bivariate outliers. A bivariate scatterplot used by the researcher indicated that both conditions were satisfied. The researcher screened the data for homoscedasticity and confirmed it through SPSS for both student perceptions of parent attitudes toward student ability and student motivation, as well as for student perceptions of parent attitudes toward student effort and student motivation. Finally, using Pearson's *r* assumes the data are normally distributed. Normality could not be reasonably assumed for student perceptions of parent attitudes toward student ability through

examination of the Shapiro-Wilk test ($W$ = .830, $df$ = 122, $p$ = .000), skewness (1.720), and kurtosis (4.065). Normality could not be reasonably assumed for student perceptions of parent attitudes toward student effort through examination of the Shapiro-Wilk test ($W$ =.932, $df$ = 122, $p$ = .000), skewness (-.474), and kurtosis (-.364), nor could it be assumed for student motivation through examination of the Shapiro-Wilk test ($W$ =.908, $df$ = 122, $p$ = .000), skewness (-.924), and kurtosis (.167). These results indicated a Spearman rho (Spearman $r$) analysis which does not have an assumption of normality (Warner, 2013) would be the appropriate correlational analysis for the data. However, Warner (2013) indicated it is a common practice for researchers to utilize Pearson's $r$ with Likert-type five-point rating scales. Therefore, the researcher reported both Pearson's $r$ and Spearman $r$.

As part of the data screening, the researcher examined descriptive statistics and frequency histograms to ensure there were no missing values in the data. Prior to performing a regression analysis, the researcher viewed scatterplots and boxplots to determine the possible existence of outliers. Additionally, the researcher utilized SPSS to determine the Cooks and Mahalanobis distances. Cook's distance did not return any entries with values greater than one which would be considered as outliers (Oyeyemi, Bukoye, & Akeyede, 2015). The Mahalanobis statistic returned six outliers, indicated by values exceeding three (Oyeyemi et al., 2015), in two of the subscales. A single extreme outlier can be problematic with a small sample size (Warner, 2013). The current study obtained a sample size of 122 which was enough to meet the adequate sample size assumption as indicated by Cohen (1992) and the G*Power analysis software. The researcher examined the results of removing outliers from each variable to determine whether removal would improve normality as indicated by the Shapiro-Wilk test. Normality could not be reasonably determined by removing four outliers from the variable of student perceptions of

parent attitudes toward student ability as indicated by the Shapiro-Wilk test ($W$ = .886, $df$ = 118, $p$ = .000), skewness (-.855), and kurtosis (-.104). There were no outliers for the variable of student perceptions of parent attitudes toward student effort, so normality could not be improved by removing outliers. Finally, normality could not be reasonably determined by removing two outliers from the motivation variable as indicated by the Shapiro-Wilk test ($W$ = .914, $df$ = 120, $p$ = .000), skewness (-.875), and kurtosis (.099). The cause of the outliers could not be determined from the data set. Etikan et al. (2016) indicated outliers could be problematic given the selected purposive sampling method of selecting participants. However, Oyeyemi et al. (2015) argued that unless substantive information concerning outliers suggests removal, outliers should not be eliminated from data sets. No statistical reason could be determined for removal thus, the outliers were not removed prior to analysis.

Pearson's *r,* acceptable for analysis when using a Likert-type scale (Warner, 2013), is sensitive to outliers; however, Spearman *r* is more robust to the effect of outliers. Conducting Pearson's *r* correlation and the Spearman *r* allowed the researcher to determine the strength of a possible relationship between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation to learn mathematics at the middle school level. The researcher was able to compare the strength of the relationship between variables as determined by each correlation.

The researcher utilized Pearson's *r* as well as Spearman *r* to determine the correlation between student perceptions of parent attitudes toward student ability following the implementation of the CCSSM and student motivation to learn mathematics at the middle school level. The researcher also utilized Pearson's *r* and Spearman *r* to determine the correlation between student perceptions of parent attitudes toward student effort following the

implementation of the CCSSM and student motivation to learn mathematics at the middle school level. To reduce an inflated risk of type 1 error, Warner (2013) suggested limiting the number of correlations to be determined prior to conducting the research. The researcher identified correlations between (a) student perceptions of parent attitudes toward student ability and student motivation and (b) student perceptions of parent attitudes toward student effort and student motivation. A disadvantage of predetermined correlations is the exclusion of unforeseen relationships between variables (Warner, 2013).

After the existence of a statistically significant relationship between both student perceptions of parent attitudes concerning student ability and effort following the implementation of the CCSSM and student motivation was found, the researcher further analyzed the data using simple linear regression. The researcher performed data screening to ensure that the data met the critical assumptions of regression. To utilize simple linear regression, the data had to meet the assumptions for correlation—linearity, homoscedasticity, and normality—with the additional assumption of independence (Warner, 2013). For RQ1, independence between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level was determined by the Durbin Watson statistic to be 1.578, indicating the assumption of independence was satisfied. For RQ2, independence between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level was determined by the Durbin Watson statistic to be 1.756, indicating the assumption of independence was again satisfied. Simple linear regression was then utilized to further examine the relationships between student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics at the middle school level.

To analyze the data further, the researcher used multiple regression analysis. The analysis requires the assumptions of linearity, homoscedasticity, normality, and independence. The assumptions of linearity, homoscedasticity, and normality were previously examined. The assumption of independence for both independent variables of student perceptions of parent attitudes toward student ability and effort and the dependent variable of student motivation for learning mathematics at the middle school level was determined by the Durbin-Watson statistic to be 1.578, indicating the assumption of independence was satisfied. Multicollinearity was not determined to be an issue as tolerance was greater than .10 (.889) and the variance inflation factor was less than 3 (1.124). Interested individuals may use the results of the study to explore additional relationships through future research.

**Limitations**

Limitations to the use of a cross-sectional design were present in this study. The instrument utilized was a self-report survey which by its nature is subjective (Chan, 2008). Any surveys not completed or aborted could potentially represent cluster characteristics and possible unknown bias between responders and non-responders (Levin, 2006). The researcher is a known member of the community where the study took place. Recognition of the researcher's name could have created biased data if participants responded based on their knowledge of the researcher. It is also unknown whether parents were present when students completed the survey, which may have influenced responses.

Moreover, the survey methodology did not allow the researcher to randomly assign participants to groups (Simon & Goes, 2013) which could lead to unequal representations between those students perceiving positive and negative attitudes from their parents. Due to the voluntary nature of the participants, the researcher was unable to control the sample size, limiting

the sample to only those who volunteered to participate (Colton & Covert, 2007). The existence of voluntary response bias is possible. Data may represent only participants who have parents with strong opinions, high levels of education, or positive attitudes toward academics, as these individuals are most likely to voluntarily complete, or allow their child to complete, such a survey (Grosset, 1994).

The response choices and data analysis of the current study may also prove to be limiting. The utilization of a Likert-type scale allows different responses to elicit the same overall averaged scores (Warner, 2013). The researcher created response frequency tables to clarify the frequency of responses. Neither the Pearson Product-Moment Correlation Coefficient (Pearson's *r*), nor Spearman rho (Spearman *r*) as applied in this study, distinguish between independent and dependent variables. However, Pearson's *r* and Spearman *r* do indicate correlation, which Campbell and Stanley (1963) indicated was a necessary first step to conducting an experimental study. Statistical analysis using Pearson's *r* or Spearman *r* does not indicate causation, and it could be that students' motivation affects their perception of their parents' attitudes and not the other way around as hypothesized.

**Chapter Summary**

In response to continued declines in the United States' international mathematics rankings, the purpose of this quantitative correlational study was to examine whether a relationship exists between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level. Specifically, the study investigated the perceptions of middle school students in Grade 6 through Grade 8 in a public school district in an upper Midwestern state of the United States that fully implemented the CCSSM over the last five years.

This study aimed to answer the following research questions: Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes and student motivation for learning mathematics at the middle school level? Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level? Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level? The need to answer these questions is a result of the continued problem of low international academic rankings for the United States (OECD, 2014) along with low motivation for learning mathematics among students (OECD, 2014; Tadayyon et al., 2016). There is a need to determine the influence of student perceptions of parent attitudes on motivation which this study begins.

Implementation of the study utilized proper procedures and methods of data collection that were both ethical and permissible. An instrument created specifically for the study from pre-existing subscales and instruments used with permission was pilot-tested for reliability and validated through principal component analysis prior to use in the study. Data collection occurred electronically to appeal to middle school students, to increase the response rate, and to decrease response time.

Calculations of correlations using Pearson's *r* and Spearman *r* determined a relationship exists between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation to learn mathematics at the middle school level. Additionally, regression analyses indicated that student motivation could be predicted from student perceptions of parent attitudes toward student ability as well as from

student perceptions of parent attitudes toward student effort. The researcher included the researcher's positionality to allow the reader the opportunity to make accurate value judgments concerning the study.

Overall, this study has the potential to add to Weiner's (2000) attribution theory of interpersonal motivation by evaluating student perceptions of parent attitudes. This study extends Weiner's theory which presently discusses the parents' perceptions of the attributes for the child's success or failure leading to the motivation of the student. The result of this study could have practical implications, such as identifying a need for parents to be educated in understanding how children perceive parent attitudes towards educational efforts and how that perception influences the students' motivation to learn mathematics, particularly at the middle school level.

## Chapter 4: Data Analysis and Results

In response to continued declines in the United States' international mathematics rankings, the purpose of this quantitative correlational study was to examine whether a relationship exists between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level. Specifically, the study investigates the perceptions of middle school students in Grade 6 through Grade 8 in a public school district in an upper Midwestern state of the United States that had fully implemented the CCSSM over the last five years. This purpose was aligned with the theoretical framework of the study, Weiner's (2000) attribution theory of interpersonal motivation, with a specific focus on Weiner's construct of perception in relation to motivation. The researcher utilized a quantitative correlational design with survey methodology to collect data related to student perceptions of the attitudes parents display toward student ability and effort following implementation of the CCSSM and the student's motivation to learn mathematics at the middle school level.

Weiner's (2000) attribution theory of interpersonal motivation described ability and effort as the two main determinants of motivation. Utilizing the construct of perception within Weiner's theory led to the following central research question: Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes and student motivation for learning mathematics at the middle school level? The researcher developed two associated sub-questions to investigate the relationship between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation for learning mathematics at the middle school level. The research sub-questions and the corresponding hypotheses are as follows:

**RQ1:** Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level?

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

**RQ2:** Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level?

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

With the research questions focusing on a description of a relationship between two variables, Onwuegbuzie and Leech (2006) recommended a correlational analysis followed by regression when appropriate. Warner (2013) indicated that Pearson's *r* is a common measure used to describe the strength of a linear relationship between two variables. However, as data were not normally distributed, the researcher also described the strength of the correlation with

the Spearman *r* which does not assume normality (Warner, 2013). The researcher performed correlational analyses followed by simple linear regression and multiple regression analyses to determine predictive power. Prior to analysis, and after careful inspection, the researcher determined a reasonable cause for the removal of outliers could not be determined, thus the results are reported with all data included. The results of the data analyses are organized in the same order as the sub-questions of the study.

**Description of Participants**

The collection of demographic data provided a description of the participants. Of the 122 participants, 51 were female, 65 were male, and six participants opted not to identify with a gender. The greatest number of participants were in Grade 7, comprising 41.8% of the participants. Another 32% of the respondents were in Grade 6, and the remaining 26.2% of the participants were in Grade 8. The responses by grade were similar, although not as close as the responses in the pilot study, to the composition of the school, where Grade 6 makes up 43.4% of the school's population, Grade 7 makes up 32.6% and Grade 8 makes up 24% of the school's population. The breakdown by gender between grades is in Table 4.

Table 4

*Gender by Grade of Participants*

| Grade | Male | Female | Prefer Not to Say | Total |
|---|---|---|---|---|
| 6 | 20 | 19 | 0 | 39 |
| 7 | 30 | 17 | 4 | 51 |
| 8 | 15 | 15 | 2 | 32 |
| Total | 65 | 51 | 6 | 122 |

**Data Preparation**

Prior to collecting data for the study, the researcher conducted a pilot study with the same procedures as those utilized for the sample population. The survey used in the pilot study

contained 15 items relevant to the study along with additional questions to solicit feedback concerning usability, clarity, and alignment of the items. The pilot study had 34 respondents. Warner (2013) discussed the need to establish validity when variables of interest cannot be directly observed, such as in the case of perception of attitudes and motivation. Each participant responded to all the items in the survey allowing the researcher to utilize all the data in the pilot study for validation and reliability efforts.

Results of the instrument review helped to inform the final instrument for use in the study. The researcher removed two items following the principal component analysis and one additional item following the assessment for reliability, as described in Chapter 3. After the removal of three test items, the final instrument utilized for the study consisted of 12 items. The researcher administered the 12-item survey to 126 participants. Baruch and Holtom (2008) indicated that an average response rate for survey research is 52.7%. The current study response rate was 72%. This higher rate indicates an increased likelihood that the sample is representative of the population in question (Baruch & Holtom, 2008).

Data were analyzed using SPSS. The researcher cleaned the data titles to allow for easier interpretation. In this process, the wording “In my perceptions, my parents,” which was similar among numerous items, was removed to leave a shortened statement indicative of the initial statement to which participants responded. The researcher recoded each statement with A, E, or M, for Ability, Effort, or Motivation, respectively. This recoding was for easier identification in SPSS. The researcher reversed the score values in SPSS for the three items from the instrument that required reverse scoring.

The researcher conducted a check for missing data. Three participants left six or more responses unanswered, and one participant left all responses blank. The researcher removed the

data from these four participants to ensure that all items had an equal number of responses. Three respondents each left a single item blank, but none skipped the same question resulting in no more than one missing response for each item. Since each item was missing less than 1% of the data, the researcher replaced the missing data with the mean value of the other scores for that item. To find these values, the researcher ran descriptive statistics to determine the mean of the items from which data were missing and then manually replaced the missing data with the mean value. The elimination of the incomplete data of the four participants and the replacing of missing data with the column mean resulted in 122 complete surveys for data analysis.

The researcher used correlational analyses to determine if a statistically significant relationship existed between student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics at the middle school level. The researcher screened the data to determine if it met the assumptions of linearity, normality, and homoscedasticity (Warner, 2013). Prior to conducting the correlational analysis, the researcher examined each variable through a histogram to determine distribution and through a box and whisker plot to determine if there were any outliers, as recommended by Warner (2013). Normality could not be assumed via examination of the Shapiro-Wilks test for student perceptions of parent attitudes toward student ability ($W = .830$, $df = 122$, $p = .000$), skewness (1.720) and kurtosis (4.065); student perceptions of parent attitudes toward student effort ($W = .932$, $df = 122$, $p = .000$), skewness (-.474) and kurtosis (-.364); nor student motivation ($W = .908$, $df = 122$, $p = .000$), skewness (-.924) and kurtosis (.167). These results violate the assumptions necessary for analysis of the data with Pearson's *r* so Spearman *r* was the appropriate analysis (Warner, 2013). Nonetheless, Warner indicated that it is common practice for researchers to utilize Pearson's *r* with 5-point rating scales. Therefore, the researcher chose to

report both the Pearson's *r* and the Spearman *r* to determine correlation. Conducting Pearson's *r* and Spearman *r* allowed the researcher to determine the strength of a possible relationship between student perceptions of parent attitudes toward student ability and effort following the implementation of the CCSSM and student motivation to learn mathematics at the middle school level.

Determining mean scores for each variable was necessary to generate scatterplots of each of the independent variables with the dependent variable. The researcher utilized SPSS to calculate mean scores for each of the independent variables, perception of ability and perception of effort, as well as for the dependent variable, motivation. The researcher recorded these mean values as separate items in SPSS. The researcher then generated a bivariate scatterplot to check for bivariate outliers in a scatterplot of each, perception of ability and motivation, and perception of effort and motivation. No bivariate outliers existed.

Although Etikan et al. (2016) indicated the effect of outliers when utilizing purposive sampling can be devastating, the researcher was not able to determine any viable reason through analysis for the removal of outliers, and therefore, the researcher reported the data without removing outliers. While Pearson's *r* is sensitive to the effect of outliers, Spearman *r* is more robust to the effect of outliers. The researcher reported both Pearson's *r* and Spearman *r* which helps the reader to determine the effects of the outliers on the data set.

At this point, data were ready for correlational analysis. The researcher ran both Pearson's *r* and the Spearman *r* with the mean values of student perceptions of parent attitudes toward student ability and student motivation followed by Pearson's *r* and the Spearman *r* of student perceptions of parent attitudes toward student effort and student motivation. The researcher used simple linear regression to determine if student perceptions of parent attitudes

toward student ability predicted student motivation for learning mathematics at the middle school level. The researcher also used simple linear regression to determine if student perceptions of parent attitudes toward student effort predicted student motivation for learning mathematics at the middle school level. The researcher also employed multiple linear regression to determine the combined effect of student perceptions of parent attitudes toward both student ability and effort on student motivation for learning mathematics. The following section contains the results of the analyses.

**Presentation of Results**

The researcher calculated descriptive statistics for each of the instrument items as presented in Table 5. As was previously indicated, the measurement of each item was on a 5-point Likert scale with a score of 5 representing the most positive perception, or the highest level of motivation, while a score of 1 represented a negative perception or low motivation.

Table 5

*Mean and Standard Deviation for Each Item and the Composite Independent and Dependent Variables*

| | Mean | Standard Deviation |
|---|---|---|
| **Perception of Ability** | 4.32 | .97 |
| My parents believe I can learn the Common Core Standards for Mathematics taught in this class. | 4.42 | .94 |
| My parents believe I can meet their goals for me in this class. | 4.55 | .85 |
| My parents feel math is too hard for me with the new standards in my math class (Reverse Score Item). | 3.98 | 1.19 |
| My parents feel I can learn math with the Common Core Standards for Mathematics. | 4.25 | 1.01 |
| My parents feel I can meet the challenges of the Common Core Standards for Mathematics. | 4.41 | .87 |
| **Perception of Effort** | 3.57 | 1.38 |
| I plan to work hard so I can take as much math as possible during my education. | 4.30 | .94 |
| My parents spend time with me to make sure I try hard to understand my math homework. | 3.58 | 1.41 |

Table 5

*Mean and Standard Deviation for Each Item and the Composite Independent and Dependent Variables* (continued)

| | Mean | Standard Deviation |
|---|---|---|
| **Motivation** | 3.70 | 1.21 |
| I am confident I can learn advanced mathematics. | 3.84 | 1.17 |
| I am willing to take more than the required amount of math. | 3.65 | 1.19 |
| I would like to avoid using math in college (Reverse Score Item). | 3.36 | 1.42 |

*Note.* $N = 122$

Understanding the frequency of responses for each item is important for the clarity of the results. Likert-type scale responses can often elicit similar mean scores with drastically different individual item scores (Warner, 2013). Response frequencies for each item are in Table 6 to provide a better understanding of the data.

Table 6

*Frequency of Responses by Item*

| Item | Response | Frequency | Percent |
|---|---|---|---|
| Q1: My parents believe I can learn the Common Core Standards for Mathematics taught in this class. | Strongly Disagree | 4 | 3.28% |
| | Somewhat Disagree | 2 | 1.64% |
| | Neither Agree nor Disagree | 9 | 7.38% |
| | Somewhat Agree | 31 | 25.41% |
| | Strongly Agree | 76 | 62.30% |
| Q2: My parents believe I am able to meet their goals for me in this class. | Strongly Disagree | 3 | 2.46% |
| | Somewhat Disagree | 1 | .82% |
| | Neither Agree nor Disagree | 8 | 6.56% |
| | Somewhat Agree | 24 | 19.67% |
| | Strongly Agree | 86 | 70.49% |
| Q3: I am confident I can learn advanced mathematics. | Strongly Disagree | 8 | 6.56% |
| | Somewhat Disagree | 11 | 9.02% |
| | Neither Agree nor Disagree | 13 | 10.66% |
| | Somewhat Agree | 50 | 40.98% |
| | Strongly Agree | 40 | 32.79% |
| Q4: I plan to work hard so I can take as much math as possible during my education. | Strongly Disagree | 3 | 2.48% |
| | Somewhat Disagree | 4 | 3.31% |
| | Neither Agree nor Disagree | 11 | 9.09% |
| | Somewhat Agree | 40 | 32.79% |
| | Strongly Agree | 64 | 52.89% |

Table 6

*Frequency of Responses by Item* (continued)

| Item | Response | Frequency | Percent |
|---|---|---|---|
| Q5: My parents feel math is too hard for me with the new standards in my math class. (Reverse Score Item) | Strongly Disagree | 58 | 47.54% |
| | Somewhat Disagree | 24 | 19.67% |
| | Neither Agree nor Disagree | 24 | 19.67% |
| | Somewhat Agree | 11 | 9.02% |
| | Strongly Agree | 5 | 4.10% |
| Q6: My parents feel I can learn math with the Common Core Standards for Mathematics. | Strongly Disagree | 4 | 3.28% |
| | Somewhat Disagree | 3 | 2.46% |
| | Neither Agree nor Disagree | 17 | 13.93% |
| | Somewhat Agree | 33 | 27.05% |
| | Strongly Agree | 65 | 53.28% |
| Q7: I am willing to take more than the required amount of math. | Strongly Disagree | 11 | 9.02% |
| | Somewhat Disagree | 9 | 7.38% |
| | Neither Agree nor Disagree | 21 | 17.21% |
| | Somewhat Agree | 52 | 42.62% |
| | Strongly Agree | 29 | 23.77% |
| Q8: I would like to avoid using math in college. (Reverse Score Item) | Strongly Disagree | 38 | 31.15% |
| | Somewhat Disagree | 21 | 17.21% |
| | Neither Agree nor Disagree | 27 | 22.13% |
| | Somewhat Agree | 19 | 15.57% |
| | Strongly Agree | 17 | 13.93% |
| Q9: My parents feel I am able to meet the challenges of the Common Core Standards for Mathematics. | Strongly Disagree | 2 | 1.65% |
| | Somewhat Disagree | 1 | .83% |
| | Neither Agree nor Disagree | 16 | 13.22% |
| | Somewhat Agree | 29 | 23.77% |
| | Strongly Agree | 74 | 61.16% |
| Q10: My parents spend time with me to make sure I try hard to understand my math homework. | Strongly Disagree | 17 | 13.93% |
| | Somewhat Disagree | 12 | 9.84% |
| | Neither Agree nor Disagree | 19 | 15.57% |
| | Somewhat Agree | 31 | 25.41% |
| | Strongly Agree | 43 | 35.25% |
| Q11: The challenge of math appeals to me (I like it). | Strongly Disagree | 20 | 16.53% |
| | Somewhat Disagree | 7 | 5.79% |
| | Neither Agree nor Disagree | 29 | 23.77% |
| | Somewhat Agree | 40 | 33.06% |
| | Strongly Agree | 26 | 21.49% |
| Q12: My parents never ask what I am doing in my math class or ask how hard I work. (Reverse Score Item) | Strongly Disagree | 41 | 33.61% |
| | Somewhat Disagree | 27 | 22.13% |
| | Neither Agree nor Disagree | 25 | 20.49% |
| | Somewhat Agree | 16 | 13.11% |
| | Strongly Agree | 13 | 10.66% |

*Note.* $N = 122$

**Research question 1.** The researcher performed Pearson's *r* and Spearman *r* correlation to assess whether, following the implementation of the CCSSM, student perceptions of parent attitudes toward student ability relates to student motivation for learning mathematics at the middle school level. The researcher collected data through a self-report survey administered to 122 middle school students currently receiving education in a public school utilizing the CCSSM. The researcher obtained the perception of ability scores by averaging items adapted from the Perceived Competence for Learning Scale (Williams et al., 1996). The researcher obtained the perception of motivation scores from the Motivation Subscale of the ATMI (Tapia, 1996). Scores ranged from 1-5 on a Likert scale where a score of 1 indicated negative perceptions and low motivation, and a score of 5 indicated positive perceptions and high motivation. The researcher examined histograms and found the distribution was not normal for either variable. Both variables displayed scores near the upper end of the scale. The hypotheses for RQ1were as follows:

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

The researcher examined the scatterplot of the two variables, student perception of parent attitudes toward student ability and student motivation, which indicated a slight positive linear relationship; therefore, the researcher conducted Pearson's *r* correlation. The Pearson's *r* correlation between student perception of parent attitudes toward student ability and student

motivation for learning mathematics was statistically significant, $r(120) = .569$, $p < .001$, two-tailed.

The researcher also compared the correlation of Pearson's *r* to Spearman *r*, due to the non-normal distribution of the data. The analysis of students' perception of their parents' attitude toward the students' ability and the students' motivation, Spearman *r,* indicated a significant correlation of $r_s(120) = .469$, $p < .001$, two-tailed. Based on the results indicating statistically significant correlations for both Pearson's *r* and Spearman *r*, the researcher rejected the null hypothesis and concluded that the alternate hypothesis is true at the 95% confidence level. Table 7 contains the results of performing the Pearson's *r* and Spearman *r* for research question one: Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level?

Table 7

*Pearson's r and Spearman r for Mean Ability and Mean Motivation*

| | | Pearson's *r* | Spearman *r* |
|---|---|---|---|
| Mean Ability & | Correlation | .569* | .469* |
| Mean Motivation | Sig. (two-tailed) | .000 | .000 |

*Note.* $N = 122$. * Correlation is significant at the .001 level (two-tailed).

**Research question 2**. The researcher performed Pearson's *r* and Spearman *r* to assess whether, following the implementation of the CCSSM, student perceptions of parent attitudes toward student effort relates to student motivation for learning mathematics at the middle school level. The researcher collected data using a self-report survey administered to 122 middle school students receiving education in a public school that implemented the CCSSM. The researcher obtained effort scores by averaging items adapted from the Perceived Competence for Learning Scale for College Students (Robbins, 1994) and obtained the motivation scores from the

Motivation Subscale of the ATMI (Tapia, 1996). As before, scores ranged from 1-5 on a Likert scale where a score of 1 indicated negative perceptions and low motivation, and a score of 5 indicated positive perceptions and high motivation. The researcher examined histograms and found the distributions were not normally distributed for either variable. Both variables displayed scores near the upper end of the scale. The hypotheses for RQ2 were as follows:

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

The researcher again examined a scatterplot of the two variables, student perceptions of parent attitudes toward student effort and student motivation, which again indicated a positive, linear relationship although appearing weaker than the relationship between student perceptions of parent attitudes toward student ability and student motivation. The researcher again determined Pearson's *r* for the data. The correlation between student perceptions of parent attitudes toward student effort and student motivation was statistically significant, $r(120) = .203$, $p < .05$, two-tailed.

Like research question one, the researcher compared Pearson's *r* to Spearman *r* for the second research question, due to the non-normal distribution of the data. For student perceptions of parent attitudes toward the student effort and student motivation, Spearman *r* indicated a significant correlation of $r_s(120) = .217$, $p < .05$, two-tailed. Again, based on the results indicating statistically significant correlations, the researcher rejected the null hypothesis and

concluded that the alternative hypothesis is true at the 95% confidence level. Table 8 contains Pearson's *r* correlation and the Spearman *r* correlation determined for RQ2: Following implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level?

Table 8

*Pearson's r and Spearman r for Mean Effort and Mean Motivation*

| | | Pearson's *r* | Spearman *r* |
|---|---|---|---|
| Mean Effort & Mean Motivation | Correlation | .203** | .217** |
| | Sig. (two-tailed) | .025 | .016 |

*Note.* $N = 122$. ** Correlation is significant at the .05 level (two-tailed).

**Simple linear regression.** When a statistically significant correlation is determined, a simple linear regression analysis can further explain the relationship (Warner, 2013). Given that both the relationship between student perceptions of parent attitudes toward student ability and student motivation and the relationship between student perceptions of parent attitudes toward student effort and student motivation were found to be statistically significant, the researcher conducted simple linear regression analyses to further explore the relationships.

After ensuring the assumptions for simple linear regression were met as discussed previously, the researcher performed simple linear regression to determine if student perceptions of parent attitudes toward student ability could predict student motivation to learn mathematics at the middle school level. The null hypothesis, that the regression coefficient was equal to zero, was tested. The correlation between student perceptions of parent attitudes toward student ability and student motivation to learn mathematics was statistically significant, $r(120) = .569$, $p < .001$, two-tailed. The results of the simple linear regression suggest that a significant proportion of the total variation in student motivation was predicted by student perceptions of parent attitudes

toward student ability. In other words, student perceptions of their parents' attitudes toward student ability is a good predictor of student motivation to learn mathematics at the middle school level, $F(1, 120) = 57.514$, $p < .001$. Additionally, the researcher found the following:

1. The unstandardized slope (.758) and standardized slope (.569) are statistically significantly different from zero ($t = 7.584$, $df = 121$, $p < .001$). As the student perception of parent attitudes toward student ability increase by one, the student motivation would increase by approximately three-fourths of a point.
2. The confidence interval (CI) around the unstandardized slope does not include zero (.560, .955) further confirming that student perceptions of parent attitudes toward student ability are statistically significant predictors of student motivation.
3. The intercept (or average motivation when student perception of parent attitudes toward student ability is zero) was .518.

The $r^2$ value was .32 indicating 32% of the variance in student motivation to learn mathematics at the middle school level could be predicted from student perceptions of parent attitudes toward student ability. According to Cohen (1992), this variance suggests a moderate effect. Table 9 shows the regression model summary for the first research sub-question. Based on the results, the research hypothesis was accepted, and the null hypothesis was rejected.

Table 9

*Regression Model Summary for Research Sub-question 1*

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| | .569 | .324 | .318 | .79194 |

*Note.* $N = 122$. Predictors: (Constant), student perceptions of parent attitudes toward student ability. Dependent Variable: Student motivation for learning mathematics at the middle school level.

The researcher also performed simple linear regression to determine if student perceptions of parent attitudes toward student effort could predict student motivation to learn mathematics at the middle school level. The null hypothesis tested was that the regression coefficient was equal to zero. The correlation between student perceptions of parent attitudes toward student effort and student motivation was statistically significant $r(120) = .203$, $p < .05$, two-tailed. The results of the simple linear regression suggest that a significant proportion of the total variation in student motivation was predicted by student perceptions of parent attitudes toward student effort. In other words, students' perceptions of their parents' attitudes toward student effort is a predictor of student motivation to learn mathematics at the middle school level, $F(1, 120) = 5.150$, $p = .025$. Additionally, the researcher found the following:

1. The unstandardized slope (.183) and standardized slope (.203) are statistically significantly different from zero at the $p < .05$ level ($t = 10.447$, $df = 121$, $p = .025$). As student perception of parent attitudes toward student effort increase by one, the student motivation would increase by approximately one-fifth of a point.
2. The confidence interval (CI) around the unstandardized slope does not include zero (.023, .343) further confirming that student perceptions of parent attitudes toward student effort are statistically significant predictors of student motivation.
3. The intercept (or average motivation when student perception of parent attitudes toward student effort is zero) was 3.137.

The $r^2$ value was .041 which indicates that 4.1% of the variance in student motivation to learn mathematics at the middle school level could be predicted from student perceptions of parent attitudes toward student effort. According to Cohen (1992), this variance suggests a weak effect. Table 10 shows the regression model summary for the second research sub-question.

Based on the results, the null hypothesis was rejected, and the research hypothesis was accepted with the understanding that the effect was weak.

Table 10

*Regression Model Summary for Research Sub-question 2*

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| | .203 | .041 | .033 | .94318 |

*Note.* $N = 122$. Predictors: (Constant), student perceptions of parent attitudes toward student effort. Dependent Variable: Student motivation for learning mathematics at the middle school level.

When both perception scores (of parent attitudes toward student ability and toward student effort) were zero in their respective regression equations, student motivation was higher for perceptions of parent attitudes toward student effort than it was for perceptions of parent attitudes toward student ability. This outcome of the current study indicates that students have a higher initial motivation concerning their effort rather than their ability. This finding addresses Weiner's (1985) emphasis on controllability: a student can control effort but cannot control ability. The findings from the current study indicated that student perceptions of parent attitudes toward student ability are more impactful on student motivation than student perceptions of parent attitudes toward student effort.

Confidence intervals indicate the likelihood that repeated trials from the same population would result in a mean value that falls within a specific range (Warner, 2013). It is expected, with 95% confidence, that if the study were repeated with the same population, the data relating student perceptions of parent attitudes toward student ability to student motivation would fall between .560 and .955. This interval results in a range of .395. The data for student perceptions of parent attitudes toward student effort related to student motivation would fall between .023 and .343, resulting in a range of .320 with a confidence level of 95%. The larger range of the

confidence interval for perceptions of ability and motivation indicates more variability in the data for student perceptions of parent attitudes toward student ability than for student perceptions of parent attitudes toward student effort. However, this larger range in confidence interval for student perceptions of parent attitudes toward student ability and student motivation compared to student perceptions of parent attitudes toward student effort is expected as student motivation was found to be higher initially for student perceptions of parent attitudes relating to student effort than student perceptions of parent attitudes relating to student ability.

**Multiple regression analysis.** The researcher also desired to know how student perceptions of parent attitudes toward student ability and student perceptions of parent attitudes toward student effort worked together to predict student motivation for learning mathematics at the middle school level. After confirming the assumptions for multiple regression were met, as discussed previously, the researcher conducted a multiple regression to determine if student perceptions of parent attitudes toward student ability and student perceptions of parent attitudes toward student effort could predict student motivation for learning mathematics at the middle school level. The results of the multiple linear regression suggest that a significant proportion of the total variance in student motivation for learning mathematics at the middle school level was predicted by student perceptions of parent attitudes toward both student ability and student effort. In other words, student perceptions of parent attitudes toward student ability and effort are good predictors of student motivation for learning mathematics at the middle school level, $F(2, 119) = 28.544$, $p < .001$. The following results were also found:

1. For student perception of parent attitudes toward student ability, the unstandardized partial slope (.751) and standardized partial slope (.564) are statistically different from zero ($t = 7.060$, $df = 120$, $p < .001$). As the student perception of parent attitudes

toward student ability increases by one, the student motivation for learning mathematics would increase by approximately three-fourths of a point when controlling for student perceptions of parent attitudes toward student effort.

2. For student perception of parent attitudes toward student effort, the unstandardized partial slope (.014) and standardized partial slope (.015) are not statistically different from zero ($t$ = 7.060, $df$ = 120, $p$ =.849). As the student perception of parent attitudes toward student effort increase by one, the student motivation for learning mathematics would increase by approximately one-hundredth of a point when controlling for student perceptions of parent attitudes toward student ability.
3. The confidence interval around the unstandardized partial slopes does not include zero (Ability, .560, .955; Effort, .023, .343) confirming that these variables are statistically significant predictors of student motivation, both individually and collectively, with student perceptions of parent attitudes toward student ability offering the greater contribution.
4. The intercept (or average motivation when student perceptions of parent attitudes toward both ability and effort is zero) was .498, which is not significantly different from zero ($t$ = 1.102, $df$ = 119, $p$ = .273).
5. The multiple regression, provided a correlation value of $r(120)$= .569, $r^2$ = .324 with a moderate effect size, that is, 32.4% of the variance in student motivation for learning mathematics at the middle school level could be determined by both student perceptions of parent attitudes toward student ability and student perceptions of parent attitudes toward student effort. This value is comparable to the correlational value for student perceptions of parent attitudes toward student ability and student

motivation, indicating that student perceptions of parent attitudes toward student effort neither significantly enhances nor significantly detracts from the student perceptions of parent attitudes toward student ability in a combined effect on student motivation.

The $r^2$ was .324 indicating that 32.4% of the variance in student motivation to learn mathematics at the middle school level could be predicted from student perceptions of parent attitudes toward student ability and effort. According to Cohen (1992), this variance suggests a moderate effect. Table 11 shows the regression model summary for the combined effects of both perceptions on student motivation.

Table 11

*Regression Model Summary for the Combined Effects of Perceptions of Ability and Effort on Student Motivation*

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|---|---|---|---|---|
| | .569 | .324 | .313 | .79514 |

*Note.* $N$ = 122. Predictors: (Constant), student perceptions of parent attitudes toward student effort. Dependent Variable: Student motivation for learning mathematics at the middle school level.

**Unexpected results.** The data in every subscale unexpectedly skewed in a negative direction. This skewness indicates the students perceive predominately-positive attitudes from their parents and have higher than expected motivation. It is possible this result is indicative of the researcher being a known member of the community in which the researcher conducted the study. Respondents may have completed the survey with the intent of pleasing the researcher with favorable responses, even though it was clear that responses would remain anonymous.

The difference in significance levels was also unexpected. Weiner (2010a, 2012) determined that ability and effort were both strong determinants of motivation. Based on Weiner's findings, the researcher anticipated that the significance between student perceptions of

parent attitudes toward student ability and student motivation and student perceptions of parent attitudes toward student effort and student motivation would be the same, or at least significant at similar statistical level. A similarity was not found in the current study as the results indicated a statistical significance for student perceptions of parent attitudes toward student ability and student motivation to be at the $p < .001$ level, whereas the statistical significance for student perceptions of parent attitudes toward student effort and student motivation were statistically significant at the $p < .05$ level.

It was also unexpected that individual survey items would reveal more positive perceptions of parent attitudes toward both ability and effort than toward the individual's perception of their own ability and effort. While it cannot be determined, the presence of a parent while the participant completed the survey may have influenced responses. If no influence occurred, the results imply that students are paying close attention to their parents at this stage of development.

**Analysis of Results**

Attribution theory supports studies regarding student motivation in relation to social and contextual influences (Wolters, Fan, et al., 2013). Weiner (2010a) argued that because perceptions can vary within a situation—across gender, age, culture, and the focus of the cause—researchers should be cautious in generalizing. However, Weiner (2010a) also indicated that research has repeatedly surfaced the same causal attributes of ability, effort, the difficulty of the task, and luck as the leading attributes of success and failure leading to motivation, with ability and effort being further identified as the leading attributes of academic motivation (Weiner, 2012). The current study indicates student perceptions of parent attitudes toward student ability

are more influential than student perceptions of parent attitudes toward student effort on student motivation.

As mentioned previously, the data unexpectedly skewed left, indicating a more positive student perception of parent attitudes toward student ability and student effort and more positive student motivation than expected. Weiner (2012) examined the causal dimensions of failure and decreased motivation in greater frequency than the causal attributes of success and increased motivation. Other studies using attribution theories in connection to motivation have focused on attributes of ability and effort as they pertain to failure more so than how those attributes lead to success (Wolters, Fan, et al., 2013). Since the results of the current study indicated higher motivation than expected, the outcomes were not consistent with Weiner's work because he focused more on low motivation than high motivation.

**Research question 1.** The analyses of the data show evidence to not reject the research hypothesis for RQ1; specifically, there is a statistically significant relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level. The study results suggest a positive linear relationship between student perceptions of parent attitudes toward student ability and student motivation. The analysis suggests that as perceptions of parent attitudes toward student ability become more positive, student motivation also increases. Weiner (2012) indicated that students experiencing failure due to the belief that they had a low ability experienced lower self-esteem, leading to lower motivation. The current study found students had a positive perception of parent attitudes toward student ability which then, although not shown to be true by Weiner, would lead one to expect a higher self-image leading to higher motivation. This study indicated higher levels of motivation supporting this claim.

Responses to individual survey items also support previous research efforts. The responses to item one ("*My parents believe I am able to learn the CCSSM taught in this class."*) indicated 62.3% of students strongly agreed with this statement. However, item three ("*I am confident that I can learn advanced mathematics*.") indicated nearly half that number of participants strongly agreed, at only 32.8%. Participants in this study clearly have lower perceptions of their own ability than they perceive their parents to have of their ability. Jayaratne (1987) and Simpkins, Price, et al. (2015) discovered the attitudes and behaviors of a parent tend to influence the attitude of the child and form a foundation for motivation. If a parent's attitude has an impact on the student (Allen & Fraser, 2007), and it appears in this study to be true due to the correlation between student perceptions of parent attitudes toward student ability and student motivation, then a parent's attitude may have some influence to become the student's attitude as well.

Zhou and Urhahne (2013) found students with positive self-images and higher motivation tend to credit their success to their ability. It is possible then that students with higher motivation, as were discovered in the current study, could perceive others to have more confidence in their ability than in their effort. It could be worth considering whether higher motivation predicts a higher correlation to perceptions of ability. While a focus on correlations specifically between high motivation and high perceptions of ability was not the intent of the current study, it is worth examination in future studies.

Also worthy of future consideration is the relationship between student achievement and student motivation with parental influence as a mediator. Herges et al. (2017) found the correlation between motivation and academic achievement to be $r = .552$ at the $p < .001$ level which was similar to the correlation found in the present study between perceptions of parent

attitudes toward student ability and student motivation, $r = .569$ at the $p < .001$ level. However, the study by Herges et al. omitted low-achieving students due to lack of adequate sample size; thus the study is worth repeating with a sample of individuals containing normally distributed achievement levels.

**Research question 2.** The analyses of the data show evidence to not reject the research hypothesis for RQ2; specifically, there is a statistically significant relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level. The study results suggest a positive linear relationship between student perceptions of parent attitudes toward student effort and student motivation. The analysis suggests that as perceptions of parent attitudes toward student effort become more positive, student motivation also increases. Weiner (2012) found that failure due to a lack of effort, a controllable factor as perceived by others, including parents, resulted in greater social disapproval than did failure that others perceive to be due to a lack of ability, an uncontrollable variable. Fan, Williams, and Wolters (2012) found students in Los Angeles had higher achievement and motivation when their parents held positive beliefs about the students' work ethic and effort. This previous finding would lead one to believe that student perceptions of parent attitudes toward student effort would have a stronger correlation to student motivation than would student perceptions of parent attitudes toward student ability. However, this correlation was not the case in the current study.

Specific to research question two, the responses to item four ("*I plan to work hard so I can take as much math as possible during my education."*) indicated 52.9% of participants strongly agreed with this statement. However, only 23.8% of the participants strongly agreed with item seven ("*I am willing to take more than the required amount of math."*). This

discrepancy in the motivation items concerning effort would indicate that participants are not willing to put forth the effort if it is only up to the individual but based on student perceptions of parent attitudes toward student effort, the individual plans to continue to enroll in mathematics courses. This finding indicates a stronger influence on motivation from student perceptions of parent attitudes toward student effort than from the student's perception of their own effort which is consistent with previous research findings (Allen & Fraser, 2007; Simpkins, Price, et al., 2015), and Weiner's theory which indicated interpersonal relations influence motivation.

Results of research by McClure et al. (2011) concerning student perceptions of success and failure suggested that success increased motivation, but failure decreased motivation which then decreased effort. Weiner's (2000) theory addresses the determinant of effort leading to the outcome—in this case, motivation—not the other way around. If, as McClure et al. (2011) found, decreased motivation leads to decreased effort, then perhaps it is worth considering whether decreased motivation can predict a negative student perception of parent attitudes concerning the student's effort.

Weiner's attribution theory received criticism from Hogg and Vaughan (2008), who suggested that Weiner placed too much emphasis on controllability, which in the current study would be the causal attribute of effort. The current study supports the criticism from Hogg and Vaughan (2008), as the current study revealed that student perceptions of parent attitudes toward student effort did not appear to have nearly the same statistical impact on motivation as did student perceptions of parent attitudes toward student ability. However, the current study indicated higher initial motivation resulting from effort than ability. Therefore, one can conclude student perceptions of others' beliefs concerning ability have a greater influence on student

motivation than student perceptions of others' beliefs concerning effort, but motivation is greater when students trust their own effort over their own ability.

Weiner (2012) indicated a student who experiences failure due to a perceived lack of effort might experience lower self-esteem, but not lose motivation. This finding indicates that students could experience a low perception of their parents' attitudes toward their effort and still have high motivation. This finding was true in the current study as initial motivation was higher in the regression analysis for student perceptions of parent attitudes toward student effort than it was for student perceptions of parent attitudes toward student ability. If both high effort and low effort can ultimately lead to high motivation, then students' perceptions of parent attitudes toward student effort should correlate to a higher motivation regardless. However, the current study indicated a lower correlation to motivation from student perceptions of parent attitudes toward student effort than from student perceptions of parent attitudes toward student ability.

**Chapter Summary**

In this chapter, the researcher presented the results of the data analyses pertaining to the research questions. To answer the first research question, Pearson's *r* was calculated, and the researcher was able to determine that a statistically significant relationship exists at the $p < .001$ level between student perceptions of parent attitudes toward student ability and student motivation to learn mathematics at the middle school level. Pearson's *r* was also conducted to determine a statistically significant relationship at the $p < .05$ level between student perceptions of parent attitudes toward student effort and student motivation to learn mathematics at the middle school level.

Given that both relationships were statistically significant, the researcher also ran a regression analysis on both relationships. The results of the regression analysis mirrored that of

the correlation analysis with a statistical significance higher for student perceptions of parent attitudes toward ability and student motivation than for student perceptions of parent attitudes toward student effort and student motivation.

The researcher discussed the results of the current study in relation to Weiner's findings. Weiner's results for effort and ability focused on low motivation rather than high motivation. The results of the current study support Weiner's findings, but they also revealed more positive perceptions for both ability and effort, and higher motivation for learning mathematics than expected.

# Chapter 5: Summary, Conclusions, Implications, and Suggestions for Future Research

The purpose of this chapter is to summarize the conducted study. The chapter will discuss the conclusions drawn from the data presented in Chapter 4 and provide an interpretation of the results. The discussion begins with the study's results concerning student perceptions of parent attitudes toward student ability and student motivation to learn mathematics at the middle school level, followed by the study's results concerning student perceptions of parent attitudes toward student effort and student motivation to learn mathematics at the middle school level. The chapter also presents the implications of the study concerning scholarly literature, policy, and professional practice. Questions raised by the current study lead to suggestions for future research which are presented in this chapter. Finally, the limitations of the design and the reflexivity of the researcher are discussed.

## Summary and Major Results

The United States has long been struggling to stay competitive academically with other nations (NCES, 2000, 2003, 2005, 2007, 2009b) as evidenced by the problematic decline in the Nation's international rankings for mathematics (OECD, 2014). In response to the falling international rankings, in 2009 the CCSSM were created by the Council of Chief State School Officers and the National Governor's Association (CCSSI, 2018; Neuman & Roskos, 2013), raising the bar in terms of rigor, focus, and coherence (Neuman & Roskos, 2013). It is the intent, by implementing these standards, that the United States will once again become a competitive nation mathematically (CCSSI, 2018; Toscano, 2013).

While changing the standards might make the United States' academic requirements themselves more internationally competitive, it may not be enough to increase student motivation to learn mathematics. Without motivation, there is little chance of improved academic

performance (Usher & Kober, 2012). Low motivation leads to fewer students continuing into advanced mathematics, and fewer students entering mathematical career fields (Simpkins et al., 2006).

Student perceptions influence student motivation (Jussim et al., 2009; Wigfield & Cambria, 2010). This study determined that student perceptions of parent attitudes influence motivation. While student perceptions of classroom environments and student perceptions of teachers have received attention in the literature (Jussim et al., 2009; Wigfield & Cambria, 2010), a specific focus on student perceptions of parent attitudes is lacking. This study adds to the existing literature concerning student perceptions of parent attitudes, specifically following the implementation of the CCSSM, and the relationship to student motivation.

With the recent transition to the Common Core State Standards for Mathematics, the issue of student perceptions of parent attitudes towards this reform effort having an influence on the motivation of students to learn mathematics at the middle school level is relatively new. Many previous studies examined how students perceive teacher behaviors and how those perceptions relate to student motivation (Chouinard et al., 2007; Gilbert et al., 2014; Sakiz et al., 2012; Smart, 2014; Stipek et al., 1998). Research indicates student perceptions of teacher behaviors and expectations influence the students' motivation as well as the importance the students place on learning (Gilbert et al., 2014; Smart, 2014). However, parents are the first social contact students have, and even though the CCSSM primarily focus on an educational setting, motivation development does not take place exclusively in the classroom (Tuan, Chin, Tsai, et al., 2005; Usher & Kober, 2012). Interpersonal relations occurring not only in the classroom but at home as well, influence motivation.

This study builds on the framework of Weiner's attribution theory of interpersonal motivation (2000). Weiner (1979, 1985) posited that individuals will attribute their successes and failures to characteristics that provide positive feelings about themselves and maintain positive self-images while decreasing the feelings of incompetency should failure occur.

Most studies that focus on attributions and motivation limit themselves to Weiner's (2000, 2010a, 2010b, 2012) four attributes of ability, effort, the difficulty of the task, and luck. McClure (1985) and Wentzel (1998), however, believed that social influences including family, teachers, and peers influence motivation in a manner extending beyond these initial attributions. Weiner (2000) recognized the social aspect of motivation as well. Weiner's initial work focused on intrapersonal perspectives; however, he later discovered that interpersonal relationships also have an impact on causal attributes resulting in his attribution theory of interpersonal motivation (Weiner, 2000). Weiner (2000) discovered that perceptions of ability and effort have the most influence on motivation in the social realm.

The purpose of this study was to explore whether a relationship exists between middle school student perceptions of parent attitudes toward student ability and effort following implementation of the CCSSM and student motivation for learning mathematics at the middle school level. Weiner's (2000) attribution theory of interpersonal motivation described effort and ability as the two main determinants of motivation. Investigating the construct of perception within Weiner's theory led to the following questions for the current study:

**Primary research question**. Following implementation of the CCSSM, what is the relationship between student perception of parent attitudes and student motivation for learning mathematics at the middle school level?

**Secondary questions and hypotheses.** The research sub-questions and the corresponding hypotheses are as follows:

**RQ1:** Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level?

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level.

**RQ2:** Following the implementation of the CCSSM, what is the relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level?

***$H_0$*:** No statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

***$H_1$*:** A statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level.

In alignment with Weiner's theory, this study placed an emphasis on perceptions. The study utilized a quantitative correlational research design with survey methodology. The researcher used purposive sampling to solicit participants from a small city in the upper

Midwestern region of the United States. Students from a school district that implemented the CCSSM comprised the population from which the participants came. Eligible participants completed a cross-sectional online survey consisting of two subscales to measure perceptions and one to measure motivation. One perception subscale measured student perceptions of parent attitudes toward student ability following the implementation of the CCSSM. The other measured student perceptions of parent attitude toward student effort following the implementation of the CCSSM. The final subscale measured student motivation. Data recording occurred with a Likert-type set of responses.

The three subscales together comprised the survey for the study. The researcher conducted a pilot study utilizing the survey to check for validity and reliability. The researcher modified some items based on the feedback from the pilot study. The survey was administered to middle school students ($N = 122$) after appropriate permissions were obtained. Various data screenings were performed to confirm that the data met the required assumptions for analysis.

The analysis of data with the Pearson's product-moment correlation coefficient (Pearson's $r$) and Spearman rho (Spearman $r$) showed a significant correlation exists between student perceptions of parent attitudes toward both student ability and effort, following the implementation of the CCSSM, and student motivation for learning mathematics at the middle school level. The researcher calculated Pearson's $r$ for the combination of variables. The results suggested a positive linear relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics $r(120) = .569$, $p < .001$, two-tailed. The results also suggested a positive linear relationship between student perceptions of parent attitudes toward student effort and student motivation to learn mathematics at the middle school level, $r(120) = .203$, $p < .05$, two-tailed. Therefore, the researcher ran a simple linear

regression to determine whether student perceptions of parent attitudes toward student ability or student perceptions of parent attitudes toward student effort could predict student motivation. The regression indicated 32% of the variance in student motivation could be predicted by student perceptions of parent attitudes toward student ability, and 4.1% of the variance in student motivation for learning mathematics at the middle school level could be predicted by student perceptions of parent attitudes toward student effort. The researcher also performed multiple regressions to evaluate if student perceptions of parent attitudes toward student ability and effort collectively could predict student motivation to learn mathematics at the middle school level. The regression indicated 32.4% of the variance in student motivation to learn mathematics could be predicted by student perceptions of parent attitudes toward student ability and effort collectively.

Weiner (2010a, 2012) determined that effort and ability are the true factors leading to motivation. The current study supports Weiner's research, as a statistically significant relationship exists between student perceptions of parent attitudes toward student ability and effort and student motivation for learning mathematics at the middle school level. Weiner's work did not prioritize one perception over the other, but the current study advances Weiner's work by indicating student perceptions of parent attitudes toward student ability are more influential than student perceptions of parent attitudes toward student effort on student motivation for learning mathematics at the middle school level.

**Conclusions**

The results of the data analysis suggest that as student perceptions of parent attitudes toward student ability become more positive, student motivation to learn mathematics at the middle school level increases. The relationship between student perceptions of parent attitudes

toward student ability and student motivation for learning mathematics was statistically significant as determined by both the Pearson *r* and Spearman *r* correlations. Based on these findings, the researcher concluded that a statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics.

The analysis of the data from the current study also indicates that as student perceptions of parent attitudes toward student effort become more positive, student motivation to learn mathematics at the middle school level increases. The relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics was statistically significant as determined by both the Pearson *r* and Spearman *r* correlations. Based on these findings, the researcher concluded that a statistically significant relationship exists between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics.

The findings of the current study support Weiner's (2000) claim that perceptions of ability and effort influence motivation. However, Weiner's (2010a) findings indicated lower perceptions of both ability and effort correlated to lower motivation. The current study revealed unexpected positive student perceptions of parent attitudes toward both student ability and student effort correlated to high motivation for learning mathematics. Weiner's results for effort and ability focused on low motivation rather than high motivation, thus the current study extends Weiner's theory to include highly motivated students as well as students with low motivation.

This study revealed a statistical significance between student perceptions of parent attitudes toward both student ability and student effort, and student motivation for learning mathematics at the middle school level. Pearson's *r* was greater for the relationship between

student perceptions of parent attitudes toward student ability and student motivation, ($r$ = .569) than it was for the relationship between student perceptions of parent attitudes toward student effort and student motivation ($r$ = .203). This finding indicates that student perceptions of parent attitudes toward student ability have a stronger correlation to student motivation than student perceptions of parent attitudes toward student effort.

The regression analysis indicated that both student perceptions of parent attitudes toward student ability and student perceptions of parent attitudes toward student effort could predict student motivation; however, perceptions concerning the student ability had a greater contribution than perceptions concerning student effort.

**Interpretation of the Results**

Previous research studies provided evidence that the home environment influences student success and motivation (Bhowmik & Banerjee, 2013). Prior studies also indicate that students perceive the behaviors of others and these perceptions of behaviors influence motivation (Gilbert et al., 2014; Smart, 2014; You et al., 2015). However, these studies have focused primarily on student perceptions of teachers and the classroom. The current study drew from these prior efforts and attempted to bridge the previous research to determine whether a relationship exists between student perceptions of parent attitudes toward student ability and effort and student motivation to learn mathematics at the middle school level.

The results of the current study support accepting the research hypothesis for RQ1 (i.e., a statistically significant relationship exists between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the middle school level). Specifically, the results suggest a positive linear relationship between student perceptions of parent attitudes toward student ability and student motivation for learning mathematics at the

middle school level. The researcher also analyzed responses to individual survey items concerning ability. Student perceptions of their own abilities, as indicated by item three ("*I am confident I can learn advanced mathematics."*) were lower (32.79%) than student perceptions of parent attitudes toward student ability (62.30%), indicated by item one ("*My parents believe I am able to learn the CCSSM taught in this class."*).

These results from the current study indicate a higher perception of parent attitudes toward student ability than the students' beliefs concerning their own ability. These results do not support the findings of Emmanuel et al. (2014) which indicated students' perceptions of their own ability correlated positively to student achievement. Nonetheless, Emmanuel et al. (2014) did not compare student perceptions of their own ability to student perceptions of parent attitudes toward student ability. The student motivation was higher than expected in the current study which may suggest that student perceptions of parent attitudes toward student ability have a greater influence on student motivation than student perceptions of their own ability. This higher than expected motivation correlating to student perceptions of parent attitudes toward ability might indicate strong parental influences or low self-efficacy among students. Simpkins, Price, et al. (2015) indicated that parent attitudes influence student attitudes. The results of this study indicate that the students are not only observing their parents' attitudes but also trusting in their perceptions, as motivation was high among the participants. The current study determined a statistically significant relationship between student perceptions of parent attitudes toward student ability and student motivation to learn mathematics exists with positive perceptions and high levels of motivation.

The results of the data also support accepting the research hypothesis for RQ2 (i.e., a statistically significant relationship exists between student perceptions of parent attitudes toward

student effort and student motivation for learning mathematics at the middle school level). Specifically, the results suggest a positive linear relationship between student perceptions of parent attitudes toward student effort and student motivation for learning mathematics at the middle school level. The researcher also analyzed individual survey items concerning effort. Only 23.8% of participants indicated a strong agreement to item seven ("*I am willing to take more than the required amount of math."*). This item measures participant motivation but also has implications for effort. The responses to this item were the lowest for all items concerning effort. Item 11 received the lowest percentage of participants in strong agreement ("*The challenge of math appeals to me, I like it."*). Based on these two responses, students participating in this study do not have a fondness for mathematics, but based on their perceptions of their parent's attitudes toward their effort, they are still statistically significantly motivated to learn mathematics. This outcome of the study may indicate strong parental influences among this population—or at least a belief that effort leads to positive results.

Analysis of the data indicated a statistically significant relationship between student perceptions of parent attitudes toward student ability and student motivation at the $p < .001$ level, and a statistically significant relationship between student perceptions of parent attitudes toward student effort and student motivation at the $p < .05$ level. Based on significance levels, and the correlating *r*-values, a stronger relationship exists between student perceptions of parent attitudes toward student ability and student motivation than between student perceptions of parent attitudes toward student effort and student motivation. The calculated regressions indicate greater initial motivation among students concerning a perception of effort (3.137) than a perception of ability (.518). Motivation, therefore, has less impact by perceptions of effort than by perceptions of ability. This difference may be due to the observable nature of effort versus ability.

The discovery of a statistically significant relationship between student perceptions of parent attitudes toward student ability and student motivation as well as between student perceptions of parent attitudes toward student effort and student motivation supports Weiner's research. Weiner indicated perceptions of ability and effort influence student motivation from an interpersonal perspective. Therefore, individuals who interact with students, particularly parents, must caution themselves against portraying negative attitudes concerning student ability, as well as student effort, to have a positive influence on student motivation.

**Implications**

Findings from this study add to Weiner's theory by providing an understanding that student perceptions of parent attitudes toward student ability and student effort following the implementation of the CCSSM do correlate with student motivation for learning mathematics at the middle school level. Weiner's theory has already emphasized the role perceptions play on attributes, but the current study extends the construct of the observer's perceptions of the actors' attributes in Weiner's theory to include the individual's perception of the observer's behaviors and attitudes, formed by perceptions. This study supports the findings of Weiner (2005) as well as De Haan and Wissink (2013) which indicated feedback from one individual contributes to perceptions of causal attributes of another individual.

The current study indicated that student perceptions of parent attitudes toward student ability have a stronger correlation to student motivation than student perceptions of parent attitudes toward student effort. Weiner's work did not prioritize determinants based on perceptions; his research only indicated that ability and effort were the determinants most likely to influence motivation. This study determined an order for determinants, indicating student perceptions concerning ability are more influential than student perceptions concerning effort on

student motivation. Weiner's (2012) work focused primarily on students exhibiting low motivation and indicated perceptions of low ability led to low motivation. The current study results indicated high levels of motivation among the participants. If students believe their parents feel they have a high ability level, they exhibit a higher motivation.

The current study also supports previous research and extends the literature by providing an understanding of interpersonal influences on motivation at the middle school level. The current study confirms the work conducted by Zhou and Urhahne (2013) which showed high motivation was related to beliefs about high ability. The current study also supports the research of Gilbert et al. (2014) which determined student perceptions of others' behavior influenced motivation. However, prior to this study, research concerning student perceptions focused primarily on students' perceptions of teachers in the classroom (Gilbert et al., 2014; Smart, 2014; You et al., 2015). The current study provides the literature with an extension beyond the classroom to encompass student perceptions in the home environment.

This current study brings increased attention to the understanding of parent attitudes as a factor to which students attribute their own motivation for learning mathematics. A De Haan and Wissink (2013) study confirmed Weiner's findings that attributions are both self-directed and formed reactively based on interactions with others. McClure et al. (2011) examined the social aspect of family, teachers, and friends and found students experiencing success attributed it to their ability and effort, but they blamed their failure on luck, family, and friends. However, the researchers did not distinguish between the attributes of ability and effort as the current study does. Wolters, Fan et al. (2013) examined cognitive constructs and student motivation in relation to social and contextual influences to help understand student beliefs about ability and effort but did not address student perceptions of parent attitudes. Therefore, the current study adds to the

literature by bridging previous research conducted concerning attributes for motivation. Parent attitudes toward student ability and effort and the relationship to student motivation have not been studied together under the current focus of student perceptions, therefore this study provides a unique contribution to the existing literature.

Hogg and Vaughan (2008) suggested that Weiner placed too much emphasis on effort. The relationship between student perceptions of parent attitudes toward student effort and student motivation was weaker than the relationship between student perceptions of parent attitudes toward student ability and student motivation. However, based on the results of the study, student perceptions of parent attitudes toward student effort may have a greater influence on student motivation than student perceptions of their own effort have on their motivation for learning mathematics. This finding confirms the social aspect of motivation as described by Weiner. Adolescents tend to have a need for structure and boundaries from their parents, even though they tend to demonstrate rebellion and challenge the rules (Cripps & Zyromski, 2009). Considering the students' needs and the results of the study, parents should continue to encourage student effort, as it is more influential on motivation than the students' beliefs in their own effort.

With the understanding that parents influence student motivation, policy-makers will benefit from this study as it has the potential to change policy concerning parent communication. Communication between schools and parents is essential to increase both student motivation and achievement (Usher & Kober, 2012). While education has long focused on communicating learning with the student, this study demonstrates a need for communicating with the parents of middle school students regarding how their attitudes could influence student motivation. Maehr and Midgley (1991) discussed several policies and practices that must be reviewed when a

school seeks to improve motivation—among these was parent communication. Undeniably, what happens in the classroom is important, but ultimately, kids go home to their parents and they need support at home for their learning to be meaningful (Usher & Kober, 2012). Parent involvement relates to increased motivation (Dweck, 2010), so implementing a parent communication policy could increase student motivation. Parent involvement may depend on how much a parent knows about the CCSSM. Future studies could survey parents to learn what they know and understand concerning the CCSSM. Gottfried, Fleming, and Gottfried (1998) found that a home environment providing intellectual stimulation is a better predictor of student motivation than socioeconomic status. When parents have high academic expectations, provide opportunities for learning, encourage their children to be curious, and endure through tribulations, children are more likely to develop motivation for learning (Usher & Kober, 2012). Communicating to parents the importance of home support and demonstrating high expectations for students can influence student motivation. Parents who believe in their child's ability and encourage perseverance help their children increase their motivation (Gottfried, Fleming, & Gottfried, 1994).

While parents can influence student motivation, they may feel uncomfortable collaborating with schools on their child's education. Some parents may feel they can have no role in their child's education due to their own education level or that they lack the time necessary to be involved (Usher & Kober, 2012). If parents are either unwilling or unable to be active participants in their child's education, then schools must fill that role. Policy may dictate that schools identify students with low motivation, particularly at the middle school level when students are solidifying their interests (Rice, 1999), and assign those students to adult mentors who guide and encourage them until graduation. Wentzel (1997) found that the level to which a

student believes an adult cares about their education affects their motivation. Effective preparation for adults to serve as mentors in this program would include the skills necessary to engage parents in the child's education. Caspe, Lopez, Chu, & Weiss (2011) found teachers adequately prepared to engage parents in a child's education were better able to increase student motivation than teachers who were not able to engage parents. The results of the study indicate that parents may need to participate in a mentoring program to help them understand how to help their child in terms of influencing motivation for learning mathematics. Policy might dictate that teachers communicate with parents to provide the opportunity for the parent to become more involved in their child's education. Through an adult mentoring program, schools and parents will be able to work together to improve student motivation.

Finally, school policy may dictate that parents become involved in the selection of curricular materials. Administrators may seek feedback on the curriculum selection from a parental advisory board. As this study indicated that student perceptions of parent attitudes relate to student motivation for learning mathematics, policy may need to dictate that parents take a substantial responsibility in selecting curriculum at the local level. Epstein (1989) and Marjoribanks (1979) indicated decades ago that parental involvement in a child's education is of great importance. Parental involvement continues to be a topic of discussion many years later, as Truesdell and del Prado Hill (2015) advised that developing strong partnerships with parents can increase the success of the implementation process. The more agency parents have in selecting the curriculum, the more familiar they will be with the content their children are learning. The more familiar parents are with the content their children are learning, the more involved they will become with implementation. Sheldon and Epstein (2005) indicated the more involved parents are in a child's education, the less likely the student is to lose interest, thus preventing

motivational decline. Given the high motivation among middle school students in this study, it could imply a need for additional high school mathematics course offerings as this collective group moves into high school, due to the high motivation to learn mathematics found in this study.

This study specifically collected student perceptions of parent attitudes and not parents' self-reported attitudes. The implications this perspective creates for classroom practice are noteworthy. Understanding student perceptions concerning ability and effort also allows educators the opportunity to influence student motivation. Finn (1989) indicated that teacher involvement has a greater effect on students who come from non-supportive families. This study did not collect data concerning the level of parental involvement, but a teacher can use the results concerning perceptions of ability and effort to emphasize the belief in a student's ability as well as the importance of effort. Therefore, it is beneficial for educators to understand student perceptions to develop activities linking practice and motivation in the classroom.

Educators who strive to motivate students in the classroom may use the information from the current study to incorporate homework activities into practice involving parents to ease anxiety or clarify what the standards entail. Sheldon and Epstein (2005) and Drummond and Stipek (2004) indicated that educators need to provide parents with an opportunity to become involved. Sheldon and Epstein (2005) further argued that parental involvement in a child's education decreases the chance of a decline in the student's attitude toward the subject. With student perceptions of parent attitudes toward student ability having a stronger correlation than student perceptions of parent attitudes toward student effort, homework needs to allow for student success to lead to a positive perception of ability rather than just effort. Teachers, however, need to be cautious to communicate appropriate successes to students.

Weiner (2010a) indicated that parents and teachers inadvertently communicate causal determinants of success or failure to their students based on ability or effort. Many teacher practices, according to Weiner (2012), led to students attributing poor performance to low ability. Based on the results of this study, student perceptions of parent attitudes toward student ability relate to motivation, so parents and teachers need to be cognizant of the attitudes they portray, especially concerning a student's ability.

Findings from this study are not limited to educators. As previously indicated, parents, administrators, and other stakeholders benefit as well. This study increases the understanding of influences on student motivation for learning mathematics at the middle school level. Motivation is a key component leading to mathematical success and ultimately to students choosing a career in mathematics (Wang, 2012). With middle school being a time when students are choosing their paths (Rice, 1999) and equating ability with intelligence, teachers and parents must be aware of strategies to help adolescents manage this stage of their life. Increased motivation at the middle school level could potentially increase the number of students enrolling in upper-level mathematics classes and ultimately entering careers in mathematics. With a greater understanding of how student perceptions of parent attitudes contribute to student motivation, parents, teachers, and administrators can become more aware of the influencing factors faced by students. Schools can reach out to parents to increase awareness of this critical developmental period in a child's life. Parents should receive information concerning the perceptions students form at this stage of development to promote positive experiences leading to motivation. While teachers may plan classroom activities that define learning purposes related to ability and effort in the classroom (Maehr & Midgley, 1991) based on the motivational needs of their students, for the activities to be successful, parents need to support these activities at home.

Finally, administrators or other stakeholders may use the information from this study to create opportunities for parents to receive information concerning what comprises the CCSSM to allow parents to form their attitudes based on facts rather than assumptions. Administrators may create such opportunities through informational meetings, a letter sent home to parents, social media, or a website or blog entries where parents are encouraged to learn about the CCSSM and take an active role in their child's education, as suggested by Truesdell and del Prado Hill (2015).

**Suggestions for Future Research**

The results of this study indicated high motivation and positive perceptions which may not be the case in all geographical areas. Given the statistically significant relationship between student perceptions of parent attitudes toward both student ability and student effort and student motivation for learning mathematics at the middle school level, the researcher suggests conducting additional studies with a more diverse population. To evaluate Weiner's theory further, additional studies may determine if student perceptions of parent attitudes toward determinants of external locus—namely, those identified by Weiner (2000) as luck and difficulty of the task—also have a significant relationship to student motivation.

Individual survey items comparing perceptions of parent attitudes toward student ability and student effort to student self-beliefs opened a new topic for exploration. The researcher suggests it could be worthwhile to investigate the following question: "*How do student perceptions of parent attitudes compare to student perceptions of their own ability and effort? Which is a stronger influence on motivation?*" The current study indicated the perceptions of parent attitudes concerning ability and effort are stronger, but there were limited items to address this question, as it was not a focus of the current study.

DiPerna and Elliot (1999) and Smart (2014) found that student motivation correlates to academic achievement. This study did not collect academic marks from participants; but given the high motivation found in the study, it would be worthwhile to explore whether student perceptions of parent attitudes toward student ability correspond to student achievement. Investigating whether student motivation derived from student perceptions of parent attitudes toward student ability correlates to achievement would also be worthwhile. If a correlation is found to exist, then an additional question is worthy of investigation within this population: "*What other factors contribute to student success?*" After all, according to the district data available, the mathematical proficiency level of this population is low (33%).

Zhou and Urhahne (2013) found students who believe themselves to be capable of and who have higher motivation for learning mathematics tend to credit their success to their ability. It is possible, then, that students with higher motivation, as were discovered in the current study, could perceive others to have more confidence in their ability than in their effort. It could be worth considering whether higher motivation predicts a higher correlation to perceptions of ability. While this correlation was not the intent of the current study, it is worth examination in future studies.

**Limitations and Reflexivity**

The current study had several limitations. The researcher was unable to control the sample size. The study relied on parents to provide consent and students to provide assent for participation. The results of the study are not applicable to all populations of middle school students; they apply only to the site where the data were collected.

Another limitation of the study identified earlier included the educational level of the parents. It is unknown whether a parent's educational level influences beliefs concerning the

CCSSM. Opara and Agbakwuru (2014) presented an argument that the education level of a parent is among the major influences on student motivation. The researcher did not collect data concerning the education levels of parents, as the researcher did not expect the students to know this information. It was also unknown how familiar the parents were with the CCSSM. Based on the unexpectedly positive perceptions students had of parent attitudes toward both student ability and student effort and the mixed reviews concerning the implementation of the standards nationwide (Henderson et al., 2015), the researcher made two inferences: either the parents of the participants are uneducated about the implementation of the standards, or they have a high level of trust in the education system where data collection occurred.

There is also the possibility that the data do not adequately reflect the entire spectrum of parent attitudes. As Mohr-Schroeder et al. (2017) found in their study concerning parental attitudes toward mathematics, the parents who try to participate in the study are likely to have a more positive attitude toward mathematics compared to those who do not try to participate. It is possible that parents who granted permission for their child to participate in the study did so due to a positive attitude toward mathematics and those parents who did not grant permission for their child to participate have negative attitudes toward mathematics. However, as previously indicated, the sample likely provided an adequate representation of the population as the response rate was 72% in the current study.

As the study evolved, the researcher reflected on what might have improved the study. The researcher determined it would have been a good idea to collect academic grades each participant had earned in mathematics. The results of the study indicated that students do not perceive their parents to believe mathematics to be too difficult for them after the implementation of the CCSSM. If academic grades follow a normal distribution, then there may

be significant gaps between students' perceptions of their parents' attitudes toward student ability and the students' perceptions of their own ability. If academic grades follow the same skewed pattern as the perceptions, then it would be worthwhile to determine the strength of the relationship between student perceptions of parent attitudes toward student ability and student achievement in mathematics at the middle school level.

The researcher believes the development of a more efficient tool for collecting perceptions of parent attitudes toward student ability and effort than that utilized for the current study is possible. The instrument used in the study was a compilation of previously used subscales of existing instruments, so it is not valid for general use. However, a more effective tool must undergo extensive testing for validity and reliability. Utilizing existing instruments for this study only required reliability and validity testing due to the combination of instruments, each of which previously had been found to be valid and reliable separately.

Cronbach's alpha for all the items measuring student perceptions of parent attitudes toward student ability (.82) was higher than Cronbach's alpha for all the items measuring student perceptions of parent attitudes toward student effort (.73). The results of the study indicate a stronger relationship between student perceptions of parent attitudes toward student ability and motivation ($r$ = .569) than between student perceptions of parent attitudes toward student effort and motivation ($r$ = .203). It is possible that a different instrument with more equitable reliability for both student perceptions of parent attitudes toward student ability and effort would yield different results.

Another limitation of the study identified earlier included an inadequate sample size for the pilot study. Although Warner (2013) indicated a minimum sample of 30 is required for correlational studies to run the regression analyses, G*Power indicated a minimum of 72

participants was necessary. Only 34 participants were used in the pilot study. Conducting the pilot study without an adequate sample size decreases the validity of the instrument.

Previous studies indicate student perceptions of teacher support and expectations have an influence on student motivation. The current study examined student perceptions of parent attitudes in relation to student motivation, but the study did not collect data concerning parental involvement. Parental involvement likely influences the perception students have of their parents' attitudes. The absence of this data in the current study proved to limit the conclusions that could be drawn from the results. Collecting data on parental involvement would be worthwhile for further analysis of student perceptions.

The researcher determined that it would have been advantageous to utilize a mixed-methods design. Once the statistically significant relationships were found between student perceptions of parent attitudes toward student ability and effort and student motivation to learn mathematics, the researcher wanted to know more about the relationship which could have been discovered through interviews with students. This would have required a QUAN-QUAL study as described by Creswell (2014).

Through this study, the researcher gained insight into not only how student perceptions influence student motivation, but also education in general. For most educators, teaching students is a passion. Educators are in the profession to make an impact on students. Although previous research indicates student perceptions of teachers are influential on student motivation (Jussim et al., 2009; Wigfield & Cambria, 2010), the current study indicates a need for teachers to develop partnerships with parents, as student perceptions of parent attitudes toward student ability and student effort are also a significant influence on motivation. Education is no longer a stand-alone profession. Education continues to evolve, and student needs continue to change.

Because of conducting this study, the researcher gained specific insights into parental influence on student motivation from the perspective of the students. As an educator, the researcher is inundated with strategies for "best practice" but seldom do these practices consider the students' perspective. In response to conducting this study, the researcher is continuously asking, not only of the results of the current study but also of other research-based findings, "What does this mean for my students?" Whether this practice of reflection on implications benefits the current study or not, the researcher believes she is a better educator because of it, and ultimately, to be a better educator was the reason this journey began.

The researcher has personally learned to exhibit a greater amount of patience with her students and to provide increased acknowledgments of her students' abilities. The results of the study indicated that students have greater motivation resulting from their perceptions of their parents' attitudes toward student ability than from student effort. As a result, the researcher recognizes a need to place more emphasis on student ability than student effort. Although the study focused on student perceptions of parent attitudes and not student perceptions of teacher attitudes, the researcher recognizes students may not spend a lot of time at home with parents, thus teacher attitudes may take the place of parent attitudes.

The researcher learned through research that student motivation has many contributing factors, and the topic may never fully be understood. The literature review provided the researcher with a greater understanding of and appreciation for how practice relates to theory. As students and education continue to change, the researcher fully believes student motivation is worthy of continued research and investigation. The researcher views student motivation to be a scholarly opportunity for future investigations.

While the current study was beneficial for determining the relationship between student perceptions of parent attitudes toward student ability and student effort and student motivation for learning mathematics at the middle school level, it raised additional questions. Utilizing a population who had access to computers worked well to collect online data; however, the data indicated the sample population had a relatively high motivation to learn mathematics which the researcher had not observed. Furthermore, the district's website did not indicate a high mathematics proficiency, creating a discrepancy between motivation and achievement. Selecting a population of limited size did not work well for the study. Obtaining a larger sample size would have provided more statistical power and validity to the study; however, the researcher was working with a limited population. Offering the participants an incentive to partake in the study worked well to obtain an adequate sample size. Had an incentive not been offered, the researcher believes the number of participants needed to conduct correlation and regression analyses would not have been met.

Through the journey this researcher undertook, much was learned through self-reflection that was not relevant to the specific study. By engaging in the process of obtaining a doctoral degree, the researcher has learned a considerable amount about persistence. The researcher learned how to take criticism and to improve clarity in her writing. As a self-supported adult, the researcher learned how to balance the demands of teaching and two part-time jobs with the requirements of the doctoral program. The researcher has made numerous sacrifices throughout this journey but believes it has been worth it. The researcher has concluded that her stubbornness and determination, while criticized by others, have been the qualities needed for her to partake in this journey.

**Chapter Summary**

This chapter presented the summary and major results of the study along with the conclusions and interpretations of the data presented in Chapter 4. Implications and suggestions for future research were also presented. The researcher also discussed the limitations due to the design of the study. Finally, the researcher presented personal reflections from both the process of conducting the study and the journey of obtaining a doctoral degree.

The findings of this study were consistent with previous research. Weiner's (2000) attribution theory of interpersonal motivation provided a framework for this study. In addition to supporting the previous findings of Weiner, this study extends Weiner's theory to span the upper levels of motivation. This study also provided an order for the influence of ability and effort on student motivation. The results indicated that student perceptions of parent attitudes toward student ability have a stronger correlation to student motivation than student perceptions of parent attitudes toward student effort.

The current study supports findings of previous research concerning student perceptions and expands the research to extend beyond the classroom to the student's home, taking into consideration perceptions of parent attitudes toward student ability and effort—not just student perceptions of teacher behaviors. This study also confirmed the interpersonal aspect of Weiner's theory with the report of more positive perceptions of parent attitudes toward student ability and effort than the reported perception of the student's own ability and effort, implying a greater influence from social factors than from internal factors.

The significance of the study includes a greater understanding of influences on student motivation. This knowledge will allow the participating school district the opportunity to meet the needs of its students more adequately. While the results of this study are not generalizable

but rather are specific to the district where data were collected, other school districts may see similar characteristics among their students or apply similar policies to those suggested from this study to benefit their student population.

The findings in this study provided an insight into student motivation from the student perspective. The intention of this study was not to be conclusive, only to open the discussion on student perceptions of parent attitudes toward student ability and effort in relation to student motivation for learning mathematics. Additional research with varied populations is necessary to understand fully the influence parents have on student motivation based on student perceptions—specifically concerning student ability and effort. The recommendations for educational stakeholders are provided with the intent of helping to increase student motivation.

The current study did fulfill the intended purpose, but conducting the study raised several more questions concerning student perceptions and influences on student motivation. Aristotle's saying, "The more you know, the more you know you don't know" appears to be true with education. Perhaps this discovery is also the ultimate purpose of any research—to realize there is more to know. Research, as with education, is most effective when it leaves you aching to know more.

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# Appendices

# Appendix A: Initial Site Solicitation Letter

## Initial Site Solicitation Letter

March 10, 2017

Wendy Schamber
736 Pavillion St.
Lead, SD 57754

Attn: Superintendent
XXXXX School District

Hello, my name is Wendy Schamber. I am a middle school mathematics teacher. I am also a graduate student pursuing my doctoral degree and preparing to conduct a research project through the University of West Florida. I am interested in learning about how middle school students perceive their parents' attitudes toward the Common Core Math Standards and how that perception relates to student motivation. I am currently seeking sites for my research study and am seeking permission to invite your middle school parents and students to participate in my study. I hope to have approval this summer from the Institutional Review Board at the University of West Florida to begin my research in the fall and I plan to have data collected by the end of November.

I am requesting assistance in accessing your students and their parents. I would like to send them some information regarding my study along with a website address where they may go to participate. This may be done through a letter I provide to you, or you may disseminate the information through a medium of your choosing, such as your school's webpage, an email, or a School Reach phone message.

You will have no responsibilities beyond this distribution. You will not be responsible for collecting any data. No identifying information will be collected from any students or parents.

Participation requires completing a short minimal risk survey that should only take about 5-10 minutes for students to complete. Additionally, all those completing the survey will have the opportunity to register for a random drawing to win one of six $25 gift cards as a "thank you" for their time.

My research complies with all ethical and legal guidelines and will not commence prior to approval from the University. The information you provide will be used strictly for the purpose of recruiting participants for the study. This information will not be shared with any other party, will be stored in a secure locked location, and will be destroyed once data collection is complete and the research is accepted by the university.

If you would be willing to assist me in this research project, I would be extremely grateful. If your school district has an Institutional Review Board (IRB) to which I must apply, please allow me to make application by sending me information or a link to where the information might be obtained. If specific procedures for collecting data within your school district would not allow me to collect data as outlined above, please advise me of proper procedures so that I may alter my study to be in compliance with the protocol you require.

I will be seeking IRB approval from the University of West Florida this summer. Once approval has been granted, I will be prepared to conduct my research, however, I would like to have my sites lined up ahead of time. Results and findings from the study will be provided to your district upon completion of my study at your request. If you would like more information concerning my study, please let me know and I will be happy to provide more details.

Please let me know if you would be willing to assist me with this endeavor by confirming permission to obtain such information after institutional IRB approval. Thank you for your time and consideration.

Sincerely,
Wendy Schamber

## Appendix B: School District Permission

# School District Permission

UNIVERSITY of WEST FLORIDA
STUDENTS

**Wendy Schamber <ws11@students.uwf.edu>**

## FW: Request

**Schamber, Wendy** <Wendy.Schamber@k12.sd.us> Fri, Mar 31, 2017 at 2:17 PM
To: "ws11@students.uwf.edu" <ws11@students.uwf.edu>

**From:** Leikvold, Dan
**Sent:** Friday, March 31, 2017 9:54 AM
**To:** Schamber, Wendy <Wendy.Schamber@k12.sd.us>
**Subject:** RE: Request

I'm fine with it.

**From:** Schamber, Wendy
**Sent:** Friday, March 31, 2017 9:46 AM
**To:** Leikvold, Dan
**Subject:** Request

Dr. Leikvold-

Thank you for allowing me some time to visit with you last week concerning my research study. With your permission, I would like to ask Jay Beagle, middle school principal, if he might be willing to send out a letter on my behalf, to parents inviting their middle school aged children to participate in this study. As a reminder, the school would not be responsible for data collection. Additionally, the letter will indicate that the school does not endorse the content, but distribution is provided as a community service.

I am attaching a draft of the letter that I am requesting be sent out, I will cover any postage necessary. The link to the information concerning the study is provided in the letter, however the survey will not be opened until after IRB approval has been granted. If you would like to see the specific statements students will be asked to respond to, I can provide that information to you. Additionally, the letter will not be sent out until after IRB has been granted from the University of West Florida.

Thank you again for your time and consideration

Wendy Schamber

# Appendix C: Building Principal Permissions

# Building Principal Permissions

UNIVERSITY of WEST FLORIDA
STUDENTS

**Wendy Schamber <ws11@students.uwf.edu>**

## Request

**Beagle, Jay D** <Jay.Beagle@k12.sd.us> Tue, Apr 4, 2017 at 7:43 AM
To: Wendy Schamber <ws11@students.uwf.edu>

Ms. Schamber,

I give you permission to use our students and parents for your research study.

Let me know how I may help you in the future.

Mr. Beagle

**From:** Wendy Schamber [mailto:ws11@students.uwf.edu]
**Sent:** Friday, March 31, 2017 2:43 PM
**To:** Beagle, Jay D <Jay.Beagle@k12.sd.us>
**Subject:** Request

[Quoted text hidden]

UNIVERSITY of WEST FLORIDA
STUDENTS

**Wendy Schamber <ws11@students.uwf.edu>**

## Research participation request

**Biesiot, Tony R** <Tony.Biesiot@k12.sd.us> Wed, Jul 12, 2017 at 8:48 PM
To: Wendy Schamber <ws11@students.uwf.edu>

Ms. Schamber,

As principal of [redacted] School you have my full support with this research.

Sent from my iPhone
[Quoted text hidden]

<ParentLetter.docx>

# Appendix D: NIH Certification

**NIH Certification**

## Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Wendy Schamber** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 06/03/2015

Certification Number: 1776031

# Appendix E: Institutional Review Board Approval

# Institutional Review Board Approval

University of West Florida

Research and Sponsored Programs
11000 University Parkway, Bldg. 11
Pensacola, FL 32514-5750

Ms. Wendy Schamber

September 13, 2017

Dear Ms. Schamber:

The Institutional Review Board (IRB) for Human Research Participants Protection has completed its review of your proposal number IRB 2018-032 titled, "Relating Student Perceptions of Parent Attitudes Toward Mathematics Standards to Student Motivation," as it relates to the protection of human participants used in research, and granted approval for you to proceed with your study on 09-13-2017. As a research investigator, please be aware of the following:

* You will immediately report to the IRB any injuries or other unanticipated problems involving risks to human participants.
* You acknowledge and accept your responsibility for protecting the rights and welfare of human research participants and for complying with all parts of 45 CFR Part 46, the UWF IRB Policy and Procedures, and the decisions of the IRB. You may view these documents on the Research and Sponsored Programs web page at http://research.uwf.edu. You acknowledge completion of the IRB ethical training requirements for researchers as attested in the IRB application.
* You will ensure that legally effective informed consent is obtained and documented. If written consent is required, the consent form must be signed by the participant or the participant's legally authorized representative. A copy is to be given to the person signing the form and a copy kept for your file.
* You will promptly report any proposed changes in previously approved human participant research activities to Research and Sponsored Programs. The proposed changes will not be initiated without IRB review and approval, except where necessary to eliminate apparent immediate hazards to the participants.
* **You are responsible for reporting progress of approved research to Research and Sponsored Programs at the end of the project period 04-30-2018. If the data phase of your project continues beyond the approved end date, you must receive an extension approval from the IRB.**
* If using electronic communication for your study, you will first obtain approval from the authority listed on the following web page: http://uwf.edu/offices/marketing/resources/broadcast-distribution-standards/.

Good luck in your research endeavors. If you have any questions or need assistance, please contact Research and Sponsored Programs at 850-474-2824 or 850-474-2609 or irb@uwf.edu.

Sincerely,

Dr. Mark Roltsch, Assistant Vice President for Research and Director of the Office of Research and Sponsored Programs

Dr. Ludmila Cosio-Lima, Chair, IRB for Human Research Participant Protection

Phone 850.474.2824 Fax 850.474.2802
Web research.uwf.edu

# Appendix F: Parental Consent Form

# Parental Consent Form

**Title of Research:** Relating Student Perceptions of Parent Attitudes Toward Mathematics Standards to Student Motivation
Researchers: Wendy Schamber

**Parent Directions:** Your child is invited to participate in a short survey concerning student perceptions of parent attitudes following the implementation of the Common Core Standards and student motivation. Please read the following section providing information concerning this study. Once you have read this form and your questions about the study are answered, you will be asked to provide your consent for your child to participate and "sign" it by clicking the appropriate button.

I. Federal and university regulations require us to obtain signed consent for participation in research involving human participants. After reading the statements in section II through IV below, please indicate your consent by clicking the "I agree" button.

II. **Statement of Procedure**: Thank you for your interest in this research project being conducted by Wendy Schamber, a teacher in the Lead-Deadwood School District and a doctoral student at the University of West Florida. Please make sure to read through the information regarding this study provided on this webpage for an explanation of the research project. This stage of the research project involves the administering of a perception and motivation survey to your child. This will be done online at your convenience. The major aspects of the study are described in the statements below, including the risks and benefits of having your child participate. Your child's information will be kept in strict confidence with only the researcher having access to the results of the instrument, and none of the results will be traceable to the individual completing the survey.

I understand that:

(1) My child is being asked to complete a survey based on pre-existing instruments designed for the purpose of gathering information related to my child's perceptions of my attitude toward his/her effort and ability and my child's motivation to learn mathematics.
(2) The time your child will spend on completing the survey is approximately 5 to 10 minutes.
(3) No identifying information will be collected and my child's responses will remain anonymous. To receive the candy bar incentive, after completing the survey, my child will be redirected to a different site where my child may indicate he or she has participated in the study. At no time will my child's name be referenced in the study results and/or reports.
(4) I or my child may discontinue my child's participation in this study at any time without penalties or repercussions.

III. **Potential Risks of the Study:**

(1) There are no foreseeable risks involved in the study.

IV. **Potential Benefits of the Study:**

(1) Data obtained from this study may provide educational professionals information that would allow them to better facilitate learning experiences for study participants.
(2) Information obtained from this study may provide parents with an understanding of how their child perceives behaviors and attitudes in the home and enable parents to become stronger advocates for their child's educational experiences.

(3) Data from the study should give educators additional information about students' motivational needs.

V. **Statement of Consent:** I certify that I have read and fully understand the Statement of procedure given above and agree to have my child participate in the research described therein. Permission is given voluntarily and without coercion or undue influence. It is understood that I may discontinue participation at any time. I may print a copy of this page if I desire a copy of the consent form.

If you have any questions or concerns please call Wendy Schamber, the researcher, at (605) 584-2400 or email at ws11@students.uwf.edu.

By clicking "I agree" and continuing on, I consent to allow my child to participate in today's survey. If I do not provide consent, I understand I must exit the site.

- o I agree

## Appendix G: Child Assent Form

## Child Assent

### Student Perceptions of Parent Attitudes and Student Motivation

A researcher from the University of West Florida Teacher Education and Educational Leadership program is trying to learn about how what your parents say and do concerning math affects your motivation to learn math. You have been asked to participate because your school uses the Common Core Standards for Mathematics. If you decide to participate in this study, you will be asked to respond to survey questions. You will be asked about behaviors you observe from your parents, things you hear your parents say, and how motivated you are to do math. Some things may make you uncomfortable such as describing your motivation or talking about your parents. However, your name will not be attached to the survey, so no one will ever know who you are. This study will take place on your own time and can occur in the privacy of your own home. It should take about 10 minutes of your time.

The researchers hope this study will help teachers understand how your parents might be motivating you. It will help principals implement plans to help your parents understand math instruction. When you finish the survey, you will be directed to a webpage where you may indicate that you have participated, and you will then receive a fun-sized candy bar delivered to you at school within a few days of the survey closing.

You do not have to be in this study if you don't want to and you can quit the study at any time. If you don't like a question, you don't have to answer it and, if you ask, your answers will not be used in the study. No one will get mad at you if you decide you don't want to participate. Other than the researchers, no one will know your answers, including your teacher, principal, parents, and friends. If you have any questions, you may e-mail the researcher, Wendy Schamber, at ws11@students.uwf.edu.

This research study has been explained to me and I agree to be in this study. You may print this page if you'd like a copy of this document to take with you.

I am aware that my participation in this survey is voluntary. I understand the intent and purpose of this research. If for any reason, at any time, I wish to stop the survey, I may do so. I understand the individual and social benefits and risks of this project. I am aware the data will be used for educational research. I have the right to review, comment on, and/or withdraw information prior to submission. The data gathered in this study are anonymous with respect to personal identity. I have read the above and by clicking "I agree" I am choosing to participate in today's survey.

- o I agree

## Appendix H: Instrument

**Instrument**

Directions:
Please respond to each of the following statements with your level of agreement. You may think of just one parent as you respond, or you may think of both parents. Please respond thinking about your **math** class. Circle the number to indicate your agreement with each statement. Use the following as a guide:

1-Strongly Disagree 2- Agree 3- Neutral 4- Agree 5-Strongly Agree

There are no wrong answers.

| # | Statement | Circle Appropriate Response |
|---|---|---|
| 1 | In my perception, my parents believe I am able to learn the Common Core Standards for Mathematics taught in this class. | 1 2 3 4 5 |
| 2 | In my perception, my parents believe I am able to reach their goals for me in this class. | 1 2 3 4 5 |
| 3 | I am confident that I can learn advanced mathematics. | 1 2 3 4 5 |
| 4 | I plan to work hard so I can take as much math as possible during my education. | 1 2 3 4 5 |
| 5 | In my perception, my parents feel math is too hard for me with the new standards in my math class. | 1 2 3 4 5 |
| 6 | In my perception, my parents feel that I can learn math with the Common Core Standards for Mathematics. | 1 2 3 4 5 |
| 7 | I am willing to take more than the required amount of math. | 1 2 3 4 5 |
| 8 | I would like to avoid using math in college. | 1 2 3 4 5 |
| 9 | In my perception, my parents feel I am able to meet the challenges of the Common Core Standards for Mathematics | 1 2 3 4 5 |
| 10 | In my perception, my parents spend time with me to make sure I try hard to understand my math homework. | 1 2 3 4 5 |
| 11 | The challenge of math appeals to me (I like it) | 1 2 3 4 5 |
| 12 | In my perception, my parents never ask what I am doing in my math class or ask how hard I work. | 1 2 3 4 5 |

| | **Demographic Questions** | |
|---|---|---|
| | What grade are you in? | $5^{th}$ $6^{th}$ $7^{th}$ $8^{th}$ |
| | What gender do you identify with? | Male Female<br>Prefer not to say |

Perception of ability items: 1, 2, 5*, 6, 9
Perception of effort items: 10, 12*
Motivation items: 3, 4, 7, 8*, 11

*Negatively scored items

# Appendix I: Permission to Use and Modify the POPS

# Permission to Use and Modify the POPS

UNIVERSITY of WEST FLORIDA
STUDENTS

**Wendy Schamber <ws11@students.uwf.edu>**

**POPS**
5 messages

**Wendy Schamber** <ws11@students.uwf.edu> Sat, Sep 15, 2018 at 9:54 PM
To: Richard.Ryan@acu.edu.au, deci@psych.rochester.edu

Hello!

My name is Wendy Schamber. I am a graduate student at the University of West Florida. I am working on research concerning student perceptions of parents and student motivation. I understand that according to the self-determination theory website, I may use the questionaires for academic research. I would like to have your permission to use, print, and if possible, slightly modify the items for the specific purpose of my research. For example, the item that reads, "Some mothers (fathers) never want to know what their children are doing" would become, "In my perception, my parents never want to know what I am doing in my math class."

Please let me know if this is acceptable and if permission is granted. Thank you for your consideration.

Wendy Schamber

**Deci, Edward** <deci@psych.rochester.edu> Sun, Sep 16, 2018 at 7:39 AM
To: Wendy Schamber <ws11@students.uwf.edu>, "Richard.Ryan@acu.edu.au" <Richard.Ryan@acu.edu.au>

You have our permission to use the POPS Questionnaire for your research, and to make small modifications to the wording as needed to fit your situation.

Ed Deci

Edward L. Deci
Professor of Psychology and
Helen F. & Fred H. Gowen Professor in the Social Sciences
University of Rochester
P.O. Box 270266 (for US Mail)
355 Meliora Hall (for Couriers)
Rochester, NY 14627
Office Phone: 585-275-2461
Email: deci@psych.rochester.edu
Web site: selfdeterminationtheory.org

CSDT
Center for SELF-DETERMINATION THEORY

## Appendix J: Permission to Use and Modify the PCSL

# Permission to Use and Modify the PCSL

UNIVERSITY of WEST FLORIDA
STUDENTS

Wendy Schamber <ws11@students.uwf.edu>

## (no subject)

**Wendy Schamber** <ws11@students.uwf.edu> Wed, May 24, 2017 at 10:37 PM
To: Geoffrey_Williams@urmc.rochester.edu

Dr. Williams-

My name is Wendy Schamber, I am a graduate student at the University of West Florida. I ran across the Perceived Competence Scales on the self-determination theory website, and I am wondering if I might obtain permission from you to use the Perceived Competence for Learning Scale as part of a measurement for a study I would like to conduct concerning student perceptions and student motivation?

I am also requesting permission to modify the stems from "I feel..." to "My parents feel..." as I am interested in students' perceptions of their parents.

Please let me know if this permission is granted and any specifications you might have for the use fo the scale.

Thank you inadvance!

Wendy Schamber

**Williams, Geoffrey** <Geoffrey_Williams@urmc.rochester.edu> Thu, May 25, 2017 at 8:00 AM
To: Wendy Schamber <ws11@students.uwf.edu>

Hi Wendy,

Yes you have my permission to use the perceived competence scale. I have attached articles to reference for it.

I am not sure I understand the adaptation – we can use students assessment of parents competence support – but I don't think it has been used to measure students perceptions of what they feel their parents feel about the students competence.

We also have assessed parents support of psychological needs in the Adolescent Medicine paper and in the validation of Important other Needs support scale.

Please cite the various paper as the origins of the scales you use- Important other support , parental autonomy support, perceived competence scale.

Let me know what you have found

Cheers Geof Williams

UNIVERSITY of WEST FLORIDA
STUDENTS

Wendy Schamber <ws11@students.uwf.edu>

**(no subject)**

**Williams, Geoffrey** <Geoffrey_Williams@urmc.rochester.edu>
To: Wendy Schamber <ws11@students.uwf.edu>

Mon, Sep 10, 2018 at 7:42 PM

Hi Wendy,

You are welcome to adapt the scale as you say. However, as you describe- it becomes a perceived competence support scale- as it isn't measuring their perception of their own experience of competence- just be sure that fits into what you are trying to capture.

Cheers Geof

Sent from my iPhone

On Sep 10, 2018, at 7:28 PM, Wendy Schamber <ws11@students.uwf.edu> wrote:

> Dr. Williams-
>
> I previously requested permission to utilize the Perceived Competence for Learning Scale as part of my graduate studies, which you granted. Thank you so much! As my dissertation is focussed on student perceptions of parent attitudes toward the students' competence in terms of ability and effort, I would like have your permission to modify the items to meet the specific needs of the study. The items would only be modified to collect data from the students' perception of their parents' thoughts on the original stem or to clarify specific content. For example, the original stem might read, ""I feel confident in my ability to learn this material" but the modified stem would read, "In my perception, my parents feel confident in my ability to learn this material." Or the original stem, "I feel able to meet the challenge of performing well in this course" might change to "In my perception, my parents feel I am able to meet
> the challenges of performing with the Common Core Standards for Mathematics taught in this course."
>
> I understand that the PCLS has been used in multiple scenarios and has been catered to the specific need, however, I want to make sure that your permission is granted for this modification. Also, may I have permission to print the instrument and incorporate it into my dissertation?
>
> Again, thank you for your time and I will be sure to pass along my findings once I am done!
>
> Wendy Schamber
> UWF Graduate Student

## Appendix K: Permission to Use the ATMI

**Permission to Use the ATMI**

UNIVERSITY of WEST FLORIDA
STUDENTS

Wendy Schamber <ws11@students.uwf.edu>

## Motivation Instrument

**Tapia, Martha** <mtapia@berry.edu> Tue, Mar 14, 2017 at 9:47 PM
To: Wendy Schamber <ws11@students.uwf.edu>

Dear Wendy,

You have permission to use the Attitudes Toward Mathematics Inventory (ATMI) in your study. If you have any question, please do not hesitate to ask me.

Please let me know of the findings in your study.

Sincerely,

Martha Tapia

Martha Tapia, Ph.D.

Associate Professor

Department of Mathematics and Computer Science

Berry College

P.O. Box 495014

Mount. Berry, Georgia 30149-5014

# Appendix L: Instrument Alignment

## Instrument Alignment

| Item number | Theory Determinant of Motivation | Measured Variable | Question/Statement |
|---|---|---|---|
| 1 | Ability<br>Weiner (2005) indicates success due to a perceived high ability leads to increased motivation. | Perception | In my perception, my parents believe I am to learn the Common Core Standards for Mathematics taught in this class.<br><br>Modified from the Perceived Competence for Learning Scale. Original stem: "I am capable of learning the material in this course" (Williams, Deci, & Ryan, 1996). |
| 2 | Ability<br>Weiner (2012) indicates success due to a perceived high ability leads to increased motivation, while failure due to a perceived lack of ability leads to decreased motivation. | Perception | In my perception, my parents believe I am able to reach their goals for me in this class.<br><br>Modified from the Perceived Competence for Learning Scale. Original stem: "I am able to achieve my goals in this course" (Williams et al., 1996). |
| *5 | Ability<br>Weiner (2005) indicates that failure due to a perceived lack of ability leads to decreased motivation. | Perception | * In my perception, my parents feel math is too hard for me with the new standards in my math class.<br><br>Modified and negatively worded from the Perceived Competence for Learning Scale. Original stem: "I feel able to meet the challenge of performing well in this course" (Williams et al., 1996). |
| 6 | Ability<br>Weiner (2012) indicates success due to a perceived high ability leads to increased motivation, while failure due to a perceived lack of ability leads to decreased motivation. | Perception | In my perception, my parents feel that I can learn math with the Common Core Standards for Mathematics.<br><br>From the Perceived Competence for Learning Scale. Original stem: "I feel confident in my ability to learn this material" (Williams et al., 1996). |
| 9 | Ability<br>Weiner (2005) indicates that failure due to a perceived lack of ability leads to decreased motivation. | Perception | In my perception, my parents feel I am able to meet the challenges of the Common Core Standards for Mathematics.<br><br>Modified from the Perceived Competence for Learning Scale. Original stem: "I feel able to meet the challenge of performing well in this course" (Williams et al., 1996). |
| 10 | Effort<br>Weiner (2012) indicates success due to a controllable factor such as a lack of effort leads to pride which will increase motivation. | Perception | In my perception, my parents spend time with me to make sure I try hard to understand my math homework.<br><br>Modified from the Perceptions of Parents Scales. Original stem: "My mother (father) spends a lot of time with me" (Robbins, 1994). |
| *12 | Effort<br>Weiner (2012) indicates success due to a controllable factor such as effort, which can be demonstrated through time spent | Perception | In my perception, my parents never ask what I am doing in my math class or ask how hard I work.<br><br>Modified from the Perceptions of Parents Scales. Original stem: "Some mothers (fathers) never want to |

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|---|---|---|---|
| | on task, leads to pride which increases motivation. | | know what their children are doing" (Gronlick et al., 1991b). |
| 3 | Ability<br>Weiner (2005) indicates success due to a perceived high ability leads to increased motivation. | Motivation | I am confident that I can learn advanced mathematics.<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |
| 11 | Ability<br>Weiner (2005) discusses the perceptions of one's ability in relation to stability of the situation. Successes experienced in a situation that is seen to be stable (math will always be challenging) will lead to increased beliefs about one's ability, thus increasing motivation. | Motivation | The challenge of math appeals to me (I like it).<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |
| 4 | Effort<br>According to Weiner (2012), success perceived to be due to effort improves self-esteem and pride which leads to increased motivation | Motivation | I plan to work hard so I can take as much math as possible during my education.<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |
| 7 | Effort<br>Weiner (2000, 2010b) describes effort as a determinant of motivation. A willingness to put forth effort improves motivation. | Motivation | I am willing to take more than the required amount of math.<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |
| *8 | Effort<br>According to Weiner (2012), failure due to internally driven factors, such as effort, will decrease pride and self-esteem, and ultimately motivation if the determinant is controllable, such as choosing to take a course. Avoidance of task is lack of effort for completing the task, thus avoiding taking math classes would indicate low motivation to learn mathematics. | Motivation | *I would like to avoid using math in college<br><br>From the Attitudes Toward Mathematics Inventory © 1996 Martha Tapia, used with permission. |

*Reverse score items

Weiner (2010a) indicates that linking the perceptions of ability and effort to cognitions, emotions, and actions is the very heart of the contribution that attribution theory makes to education.

# Appendix M: Additional Questions for Pilot Study

## Additional Questions for the Pilot Study

*Multiple Choice Question*

1. How would you rank the ease of use of the survey? Easy, Average, or Difficult

*Short Answer Questions*

2. Were there any questions you did not understand? Please list the question number.
3. Were there any questions that did not seem to fit with the other questions?
4. What other questions do you think should be asked in this survey?

## Appendix N: Parent Letter

**Parent Letter**

November 2, 2017

Dear Parent/Guardian,

I would like to invite your child to participate in a short survey concerning student perceptions of parent attitudes toward the Common Core Standards and student motivation. If you agree to allow your child to participate, he/she will be asked to respond to some statements about feelings, beliefs, and experiences. Your child should not participate in this study if he/she is uncomfortable providing any of the answers. Participation in the study should take between 5 and 10 minutes. Every student completing the survey will receive a fun-sized candy bar as an incentive to participate in the study.

No risks or discomforts are anticipated from participation in this study. Your child's participation has the potential to benefit parents, educators, and students in understanding the relationship between student perceptions and student motivation. Information provided will be kept confidential. No identifying information will be collected and responses will be kept in a secure location.

Additional information and the link to the survey is located online for your convenience at http://studentperceptionsmotivation.weebly.com/

If you agree to allow your child to participate, you will be asked to "sign" a consent by clicking the appropriate box. This will allow your child to then provide his/her assent (agreement to participate), and allow access to the survey.

If you have any questions regarding this study, please contact the researcher, Wendy Schamber at ws11@students.uwf.edu, or the committee chair, Dr. Giang-Nguyen Nguyen at gnguyen@uwf.edu. If you have any questions regarding your rights as a research participant, please contact the Institutional Review Board University of West Florida, (850) 474-2824. Thank you in advance for your assistance!

Wendy Schamber