ACHIEVEMENT GOALS, MOTIVATIONAL SELF-REGULATION, AND ACADEMIC
ADJUSTMENT AMONG
ELITE CHINESE HIGH SCHOOL STUDENTS

A DISSERTATION
SUBMITTED TO THE GRADUATE SCHOOL
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE
DOCTOR OF PHILOSOPHY

BY
CEN WANG

DISSERTATION ADVISOR: DR. SUNGOK SERENA SHIM

BALL STATE UNIVERSITY
MUNCIE, INDIANA

July 2013
DEDICATION

To my dear mom and dad. Thank you for modeling conscientious effort and persistence, for instilling in me a passion for learning, for your endless love and for always being my backbone.
ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to God, who provides me with an incredible advisor, a rigorous graduate program, a team of accomplished and supportive professors, a loving family, and sweet friends. “You make known to me the path of life; you will fill me with joy in your presence, with eternal pleasures at your right hand” (Psalms 16:11).

My very special appreciation goes to Dr. Sungok Serena Shim, who is not only my advisor, but also my cheerleader, friend and family! Thank you so much for your inspirational feedback, unwavering support and endless guidance to make possible the successful completion of this work. I am very grateful for having you in my academic career and in my life! You are a great model for kindness, enthusiasm as well as innovation, intellectual curiosity and professionalism. Thank you for making this arduous journey fun and productive!

My heartfelt gratitude also goes to my committee members: Dr. Jerrell Cassady, Dr. Holmes Finch, Dr. Winnie Mucherah and Dr. Jason Yang. Thank you so much for caring about me as a person and a student. I greatly appreciate your patience, tireless guidance and insightful feedback to make me a strong scholar.

I would also like to extend my sincere gratitude to Dr. Sharon Paulson and Dr. Laurie Mullen. It is always such a pleasant experience talking with you. Thank you so much for your support, encouragement and remarkable advice.

Thank you Linda for sharing with me your inspirational thoughts and perspectives on life. Thank you Penny for always being quick to respond to our needs. Thanks to both of you for making the life of a graduate student so much easier.
I also want to thank Cheng-tai Dong, the vice principal of Benxi No. 1 High School for facilitating the data collection. This work will not be possible without your cooperation and involvement.

Thank you to my best friends Rob, Sunny, Shuangli and Chong for always being there for me and supporting me. Thank you for always believing in me!

Finally, thank you to my grandparents, mom, dad, uncles, aunts, and cousins in China for your ardent love, unending support, generosity and understanding. No matter what happens, I know that you always have my back. Thank you to my American parents Leslie and Doug, grandma & grandpa Lambert and Baim, uncles, aunts and cousins. Thank you for embracing me as part of this amazing family. I could not imagine a life here without you.
ABSTRACT

The current study investigated the mediating role of motivational self-regulation (MSR) strategies (i.e., mastery self-talk, performance/extrinsic self-talk, performance/relative ability self-talk, interest enhancement, relevance enhancement, efficacy enhancement) in the relationships between achievement goals and cognitive and behavioral engagement (i.e., involved engagement, withdrawal in the face of difficulties, avoidance of challenges, rehearsal and elaboration) among 1096 Chinese gifted high school students (43% male).

Structural equation modeling partially supported the mediating role of MSR strategies. Mastery goals positively predicted all six MSR strategies with medium to large effects whereas performance approach goals positively predicted five out of six MSR strategies with small to medium effects. While all six MSR strategies positively predicted involved engagement, rehearsal and elaboration, interest enhancement and efficacy enhancement showed additional benefits. Theoretical and practical implications are discussed.
TABLE OF CONTENTS

CHAPTER I INTRODUCTION ................................................................. 1
   Purpose of the Current Study .......................................................... 5
   Research Questions ............................................................................ 6
   Definitions of Terms .......................................................................... 7
   Significance of the Study .................................................................... 9
   Assumptions ....................................................................................... 10

CHAPTER II LITERATURE REVIEW ...................................................... 11
   Achievement Goals ........................................................................... 11
      Definition ......................................................................................... 11
      Theoretical Framework ...................................................................... 12
   Research on the Role of Achievement Goals on Cognitive and Behavioral
      Engagement ..................................................................................... 15
   Self-Regulated Learning ..................................................................... 17
      Theoretical Framework ...................................................................... 17
      The Importance of MSR .................................................................. 19
   Phases of Self-Regulation of Motivation ............................................. 20
   Introduction of Specific MSR Strategies ............................................ 23
   Research on MSR Strategies .............................................................. 30

Chinese Education System and Research Among Chinese Students ........... 36
   Background Information of China’s Education System ...................... 36
   Achievement Goals Research Among Chinese Population ................. 38
CHAPTER III METHODOLOGY ........................................................................................................ 42
  Participants and Procedure ........................................................................................................ 42
  Measures .................................................................................................................................. 42
  Statistical Analyses .................................................................................................................. 52

CHAPTER IV RESULTS .................................................................................................................... 55
  Descriptive Statistics for Achievement Goals and MSR Strategies ..................................... 55
  Confirmatory Factor Analysis for Assessing Measurement Models of Achievement
    Goals, MSR Strategies and Outcomes ..................................................................................... 57
      Achievement Goals ............................................................................................................ 57
      Motivational Self-Regulation Strategies ............................................................................ 61
      Cognitive and Behavioral Engagement ............................................................................ 61
  Structural Equation Modeling Analysis Plans ................................................................. 62
  Main Analysis Using Structural Equation Modeling ............................................................ 63
    Model with Mastery Self-Talk as a Mediator ................................................................. 67
    Model with Performance/Extrinsic Self-Talk as a Mediator ......................................... 71
    Model with Performance/Relative Ability Self-Talk as a Mediator ............................... 74
    Model with Interest Enhancement as a Mediator ............................................................ 77
    Model with Relevance Enhancement as a Mediator .......................................................... 80
    Model with Efficacy Enhancement as a Mediator ............................................................. 83
  The Effects of MSR Strategies on Outcomes ........................................................................ 86
  The Effects of Achievement Goals on MSR Strategies ....................................................... 86
  Total Effects of Achievement Goals on Outcomes ............................................................... 87
  The Role of MSR Strategies as Mediators ........................................................................... 88
CHAPTER V DISCUSSION ........................................................................................................ 90
The Relationships Between MSR Strategies and Outcomes ............................................. 91
Achievement Goals and MSR Strategies........................................................................... 95
Achievement Goals and Cognitive and Behavioral Engagement ................................. 98
MSR Strategies as Mediators........................................................................................... 99
Additional Findings About the Relationships Among Achievement Goals................. 101
Limitations and Future Directions ............................................................................... 104
Conclusion ....................................................................................................................... 106
REFERENCES .................................................................................................................. 108
APPENDIX A ..................................................................................................................... 131
APPENDIX B ..................................................................................................................... 132
APPENDIX C ..................................................................................................................... 134
**LIST OF TABLES**

Table 1: Examples for Motivational Self-Regulation Strategies ........................................ 24

Table 2: Means, Standard Deviations, Correlations and Reliability Among Variables ... 56

Table 3: Model Fit Statistics and Model Chi-square Comparisons for the Direct
Path Model and the Partial and Full Mediation Models With All MSR Strategies as
Mediators Simultaneously .................................................................................................. 66

Table 4: Model Fit Statistics and Model Chi-square Comparisons for the Direct
Path Model and the Partial and Full Mediation Model 1: Mastery Self-Talk as
a Mediator ......................................................................................................................... 69

Table 5: The Total, Direct and Indirect Effects Between Achievement Goals and
Outcomes for Model 1: Mastery Self-Talk as a Mediator ................................................. 70

Table 6: Model Fit Statistics and Model Chi-square Comparisons for the Direct
Path Model and the Partial and Full Mediation Model 2: Performance/Extrinsic
Self-Talk as a Mediator ....................................................................................................... 73

Table 7: The Total, Direct and Indirect Effects Between Achievement Goals and
Outcomes for Model 2: Performance/Extrinsic Self-Talk as a Mediator ...................... 73

Table 8: Model Fit Statistics and Model Chi-square Comparisons for the Direct
Path Model and the Partial and Full Mediation Model 3: Performance/Relative
Ability Self-Talk as a Mediator .......................................................................................... 76

Table 9: The Total, Direct and Indirect Effects Between Achievement Goals and
Outcomes for Model 3: Performance/Relative Ability Self-Talk as a Mediator ...... 77

Table 10: Model Fit Statistics and Model Chi-square Comparisons for the Direct
Path Model and the Partial and Full Mediation Model 4: Interest Enhancement as a Mediator

Table 11: The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 4: Interest Enhancement as a Mediator

Table 12: Model Fit Statistics and Model Chi-square Comparisons for the Direct Path Model and the Partial and Full Mediation Model 5: Relevance Enhancement as a Mediator

Table 13: The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 5: Relevance Enhancement as a Mediator

Table 14: Model Fit Statistics and Model Chi-square Comparisons for the Direct Path Model and the Partial and Full Mediation Model 6: Efficacy Enhancement as a Mediator

Table 15: The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 6: Efficacy Enhancement as a Mediator

Table 16: The Total Effects of Achievement Goals on Outcomes and the Effects of MSR Strategies on Outcomes

Table 17: The Effects of Achievement Goals on MSR Strategies
LIST OF FIGURES

Figure 1. The conceptual figure depicting the relationships among the variables examined in the current study. ................................................................. 7

Figure 2. An illustration of the conceptual history of achievement goals. .......... 12

Figure 3. Phases of MSR ................................................................................. 20

Figure 4. Confirmatory factor analysis for mastery goals and combined performance goals. ........................................................................ 59

Figure 5. Confirmatory factor analysis for mastery goals and performance avoidance goals. ........................................................................ 60

Figure 6. Confirmatory factor analysis for mastery goals and performance approach goals. ........................................................................ 60

Figure 7. Confirmatory factor analysis for MSR strategies....................... 61

Figure 8. Confirmatory factor analysis for cognitive and behavioral engagement........ 62

Figure 9. Direct path model depicting the relationships between achievement goals and outcomes ........................................................................ 64

Figure 10. Partial mediation model with both mediation paths and direct paths from achievement goals to outcomes ......................................................... 65

Figure 11. Full mediation model with mediation paths but without direct paths from achievement goals to outcomes ......................................................... 66

Figure 12. Partial mediation model 1: Mastery self-talk as a mediator................. 68

Figure 13. Full mediation model 1: Mastery self-talk as a mediator ....................... 69

Figure 14. Partial mediation model 2: Performance/extrinsic self-talk as a mediator..... 72

Figure 15. Full mediation model 2: Performance/extrinsic self-talk as a mediator........ 73
Figure 16. Partial mediation model 3: Performance/relative ability self-talk.................. 75
Figure 17. Full mediation model 3: Performance/relative ability self-talk....................... 76
Figure 18. Partial mediation model 4: Interest enhancement as a mediator ..................... 78
Figure 19. Full mediation model 4: Interest enhancement as a mediator ......................... 79
Figure 20. Partial mediation model 5: Relevance enhancement as a mediator ................. 81
Figure 21. Full mediation model 5: Relevance enhancement as a mediator ...................... 82
Figure 22. Partial mediation model 6: Efficacy enhancement as a mediator .................... 84
Figure 23. Full mediation model 6: Efficacy enhancement as a mediator ....................... 85
CHAPTER I

INTRODUCTION

In our everyday classrooms, we see large individual differences among students when it comes to learning. Some students show high involvement, persistence, and engage in cognitive strategies such as rehearsing learned materials, elaborating on materials at hand and making connections to materials already learned. Others, however, are mind wandering, lacking the initiative to use cognitive strategies, avoiding challenging tasks and resorting to withdrawal when strategies are most needed to solve a difficult problem. Investigating the factors related to students’ cognitive (e.g., rehearsal, elaboration) and behavioral engagement (e.g., engagement, persistence, choice of challenging tasks) is important as they promote or hinder students’ learning (Pintrich & De Groot, 1990).

One important explanatory factor for students’ cognitive and behavioral engagement is motivation, given its influential role in students’ active engagement, effective learning and optimal performance (Schunk, Pintrich, & Meece, 2008). Students are more likely to engage cognitively and behaviorally when they are eager to learn and do well. Without motivation, even students with high intellectual abilities fail to perform at a commensurate level (Beckman & Kuhl, 1984). Among many research studies investigating important motivational factors, considerable research has been conducted to investigate the role of students’ achievement goals (i.e., reasons and purposes for academic learning) in exploring and understanding students’ learning process and outcomes. Whether students are focusing on learning and developing competence (i.e., a mastery goal), demonstrating competence (i.e., a performance approach goal) or avoiding demonstrating incompetence (i.e., a performance avoidance goal) has been related to
a wide array of educationally important outcomes (e.g., learning strategies, engagement, task choice, persistence, interest, values, affect, achievement) (see Elliot, 2005 for a review).

Another important motivational factor that has been gaining increasing attention is students’ deliberate and active use of motivational self-regulation (MSR) strategies. Research has shown that students do engage in strategies (e.g., mastery self-talk, performance/extrinsic self-talk, interest enhancement, relevance enhancement, efficacy enhancement, self-consequeating, environmental structuring) to boost their motivation for task engagement and goal attainment (e.g., McCann & Garcia, 1999; Wolters, 1998). For example, students who feel bored may add varieties to a certain task to make it more interesting (e.g., Sansone, Weir, Harpster, & Morgan, 1992). More importantly, the strategies that students use in amotivating situations (e.g., difficult, boring and irrelevant situations) have important implications for students’ usage of cognitive and metacognitive strategies, effort and performance (e.g., Schwinger, Steinmary, & Spinath, 2012; Wolters, 1999).

One obvious weakness of the current literature is that most studies have examined the impact of students’ achievement goals and MSR strategies on students’ educational outcomes independently. However, the social-cognitive model of self-regulated learning posits that students’ self-regulation may mediate the relationships between personal factors (e.g., achievement goals) and students’ learning (Pintrich, 2000a, 2004). In other words, students’ achievement goals may orient students to endorse certain strategies to enhance their dwindling motivation. Such a theoretical postulation has been supported by empirical research that students’ choice of MSR strategies has the origin in their overarching achievement goals (Wolters & Benzon, 2013; Wolters & Rosenthal, 2000). That is, students are likely to engage in MSR strategies that are in alignment with their reasons and purposes for learning and instrumental for
the attainment of their goals (Wolters, Pintrich, & Karabenick, 2005). However, none of the existing studies have investigated the intriguing question of how people operationalize their overarching achievement goals into tangible behaviors to tackle low motivation in order to carry out cognitive and behavioral engagement; in other words, the potential role of MSR as a mediator between achievement goals and engagement. This is an important question to investigate because although different achievement goals may lead to students’ unique engagement profiles without much deliberation in certain situations, this may not always happen naturally. Cognitive and behavioral engagements are usually effortful, challenging and time-consuming; in addition, the academic situations in which cognitive and behavioral engagement are required can be quite amotivating (e.g., difficult, boring and irrelevant situations) (Boekaerts, 2011; Wolters, 1999). In these situations, students may need to utilize certain strategies to keep themselves engaged.

In addition, there are other limitations in the scarce literature on MSR strategies that need to be addressed. First, the few existing studies have so far studied Western samples only. In countries such as China, where learning is characterized by long school days, intensive schoolwork, high competition and external pressure (Salili, 1996), it is essential for students to be skilled at regulating their motivation to get through each day over an extended period of time (i.e., at least two years of intensive study). In addition, students’ goal endorsement may differ as a result of the educational environment (e.g., high endorsement of performance approach goals) (Mucherah, 2008), which may have different implications for their choice of MSR strategies. Therefore, one cannot assume the pattern found with Western samples can hold true for other cultures (e.g., China).
Secondly, the existing studies have examined only a limited set of MSR strategies. Strategies that have been proposed and identified in prior research such as performance/relative ability self-talk and efficacy enhancement (McCann & Garcia, 1999; Wolters et al., 2005) have yet to be examined empirically. In addition, the available studies made it hard to draw any definitive conclusion regarding the nature and effectiveness of specific strategies. For example, only one extant study has studied the role of specific MSR strategies on students’ educational outcomes (i.e., Wolters, 1999). Two other studies have studied the composite constructs of intrinsic regulation vs. extrinsic regulation strategies (i.e. Wolters, 1998) or investigated the effect of latent profiles that are the composite of several motivational strategies (i.e., Schwinger et al., 2012).

Third, the existing studies have examined the role of MSR strategies on only limited indicators of students’ learning (e.g., rehearsal, elaboration, planning, monitoring, effort, performance). However, given that MSR is defined as students’ active regulation of motivation for enhanced effort and persistence to achieve goal completion (Wolters, 2003), a broader range of outcomes, especially other forms of behaviors such as engagement, avoidance of challenge and withdrawal in the face of difficulties, should be included to capture a full picture of the nature and effectiveness of MSR strategies.

Fourth, only two existing studies have been done to investigate whether achievement goals serve as important antecedents for MSR strategies (i.e., Wolters & Benzon, 2013; Wolters & Rosenthal, 2000). These two studies, however, only included mastery goals and performance approach goals, leaving the question of whether performance avoidance oriented students utilize strategies to motivate themselves unanswered. On one hand, it is likely that performance avoidance oriented students do not engage in MSR strategies. This is because the worry, anxiety
and fear associated with a focus on masking incompetence (McGregor & Elliot, 2002) will orient them towards the possibility of failure and steer them away from the task at hand to find enjoyment in and usefulness of the task (Elliot & Church, 1997). On the other hand, performance avoidance oriented students may still use some strategies so that they can avoid looking incompetent in front of others. However, no research so far has attempted to answer such a question.

**Purpose of the Current Study**

Consistent with the social-cognitive model of self-regulated learning (Pintrich, 2000a, 2004), this study intends to delineate the process in which MSR strategies mediate the relationships between students’ motivational beliefs (i.e., achievement goals) and students’ cognitive and behavioral engagement. While pursuing the main research question, the present study is further strengthened by examining the following three aspects. First, this study broadened the outcome variables to include students’ persistence, engagement, and task choice that have not been investigated in prior research. In particular, negative forms of behavioral engagement (i.e., avoidance of challenges and withdrawal in the face of difficulties) were included because the presence of positive behaviors does not suggest the absence of negative behaviors or vice versa (Shim, Cho, & Wang, 2013).

Second, this study also examines whether students’ reasons and purposes for academic engagement guide their selection of various MSR strategies. In particular, this study selects MSR strategies that are primarily focused on the regulation of various motivational beliefs such as achievement goals, interest, value and efficacy (i.e., mastery self-talk, performance/extrinsic self-talk, performance/relative ability self-talk, interest enhancement, relevance enhancement and efficacy enhancement).
Third, the current study investigates these intriguing questions among Chinese elite high school students, a population that is under pressure for academic excellence for whom, MSR is essential.

**Research Questions**

The current study seeks to address three questions:

1. **What are the relationships between MSR strategies and students’ cognitive and behavioral engagement among Chinese elite high school students?** Variables for investigation included involved engagement, withdrawal in the face of difficulties, avoidance of challenges, rehearsal and elaboration. (see Figure 1; Panel B → Panel C)

2. **What are the relationships between achievement goals and MSR strategies among Chinese elite high school students?** (see Figure 1; Panel A → Panel B)

3. **Do MSR strategies mediate the relationships between achievement goals and students’ cognitive and behavioral engagement among Chinese elite high school students?** (see Figure 1; Panel A → Panel B → Panel C)
Figure 1. The conceptual figure depicting the relationships among the variables examined in the current study.

Definitions of Terms

Motivation

Motivation is generally defined as the impetus to activate, direct and sustain behaviors (Schunk et al., 2008). That is, motivational force not only initiates a certain behavior; it also orients the behavior to a certain direction (i.e., goal-directed) and maintains the behavior for an extended period of time.

Achievement Goals

Achievement goals are defined as the purpose and reasons for engaging in academic tasks and achievement behaviors (Ames, 1992; Kaplan & Maehr, 2007; Urdan, 2001), which bring “different cognitive, affective, and behavioral consequences” (Elliott & Dweck, 1988) (p. 11).
Three types of achievement goals have been conceptualized based on their different focuses, concerns, evaluation criteria for success or failure and attributions.

**A mastery goal.** This type of goal, undergirded mainly by a need for achievement, focuses on learning, understanding, and developing competence in academic situations (Ames, 1992; Elliott & Dweck, 1988; Schunk et al., 2008).

**A performance approach goal.** This type of goal, undergirded by both a need for achievement and a fear of failure, focuses on demonstrating and validating one’s competence (Ames, 1992; Elliot & Church, 1997).

**A performance avoidance goal.** This type of goal, undergirded mainly by a fear of failure, focuses on masking incompetence; in other words, performance avoidance oriented students try to avoid being seen as incompetent (Elliot & Church, 1997; McGregor & Elliot, 2002).

**Motivational Self-Regulation Strategies**

MSR strategies refer to students’ deliberate and active control over their level of motivation or motivational processing by using a variety of strategies to maintain or enhance motivation for goal completion (Wolters, 2003).

**Master self-talk.** This is one type of goal-oriented self-talk students engage in that highlights their pre-established purpose to learn as much as possible and work hard for the sake of learning (Wolters, 1998; Woltes, 2003; Wolters et al., 2005).

**Performance/extrinsic self-talk.** This strategy involves students’ engagement in the self-talk that makes salient the importance of doing well and the desire to achieve a better grade (Wolters, 1998; Woltes, 2003; Wolters et al., 2005).
**Performance/relative ability self-talk.** This strategy invokes students’ thoughts of doing better than others.

**Interest enhancement.** This is the strategy that students use to make the task more interesting.

**Relevance enhancement.** This is the strategy that students engage in to enhance the relevance or the instrumental value of the task at hand to bolster their motivation (Wolters, 1998).

**Efficacy enhancement.** This strategy is to enhance individuals’ self-efficacy in task engagement. In difficult and challenging learning situations, students have been reported to engage in self-talk that helps reassure and enhance their efficacy (McCanne & Garcia, 1999; Wolters, 2003).

**Significance of the Study**

As previously mentioned, although MSR is important to students’ learning and performance (e.g., McCann & Garcia, 1999; Pintrich, 2000a, 2004; Vukman & Licardo, 2013; Wolters et al., 2005), researchers still know little about MSR. The current study intends to fill this gap in the literature. Specifically, the current study has two major theoretical contributions to the field of motivation and learning. First, this is the first study that examines MSR using a sample of elite high school students from China, a country in which students are subject to high demands and pressure and MSR is imperative for success. Second, this is the first study that investigates the role of MSR as a mediator by examining how students’ motivational beliefs (i.e., achievement goals) lead to the selection and usage of different MSR strategies, which in turn affect the quality of students’ cognitive (i.e., rehearsal and elaboration) and behavioral engagement (i.e., involved engagement, withdrawal in the face of difficulties, avoidance of challenges).
The current study also offers practical implications for educators. This study will provide more information for parents and educators about the nature of specific MSR strategies. Parents and educators can foster more adaptive MSR strategies directly by providing students with the declarative (i.e., knowing what they are), procedural (i.e., knowing how to perform them) and conditional knowledge (i.e., knowing when and where to do certain things) about strategy usage. They can also indirectly influence students’ choice of MSR strategies by promoting adaptive achievement goals through their interactions with students, instructional method and by building adaptive classroom climate and peer community.

Assumptions

There are several assumptions for the current study. First, the current study is a survey study based on students’ self-report. It is assumed that due to the anonymous nature of the study and that students were assured of the confidentiality of their responses, the participants responded to the self-report measures accurately and honestly. However, this study is still subject to all the limitations that self-report studies will bring. Second, it is assumed that the data collected from the current sample is representative of high achieving Chinese high school student population. However, it is still possible that the current sample has certain unique characteristics.
CHAPTER II

LITERATURE REVIEW

As indicated in the introduction, the current study aims to generate a better understanding of MSR strategies by incorporating them into the social-cognitive framework of self-regulated learning. Specifically, this study investigates the important antecedents (i.e., achievement goals) and outcomes (i.e., engagement, withdrawal in the face of difficulties, avoidance of challenges, rehearsal and elaboration) of MSR strategies and its role as mediators (see Figure 1) among a sample of Chinese elite high school students. The literature regarding achievement goals, MSR, and the research among Chinese students are presented in the following sections.

Achievement Goals

As discussed previously, achievement goals (see Panel A in Figure 1) are the overarching cognitive representation of competence striving (Elliot, 2005). Such a superordinate framework has proved to be the most prominent motivational construct in the field of achievement motivation over the past few decades (Senko, Hulleman, & Harackiewicz, 2011) and serves as an important factor in explaining students’ cognition, affect, and behavior (Maehr & Zusho, 2009; Wigfield & Cambria, 2010). Presented in the following sections are the definition and historical theoretical frameworks of achievement goals and the major research findings associated with achievement goals.

Definition

Achievement goals are defined as the purpose and reasons for engaging in academic tasks and achievement behaviors (Ames, 1992; Kaplan & Maehr, 2007; Urdan, 2001), which bring “different cognitive, affective, and behavioral consequences” (Elliott & Dweck, 1988; p. 11).
Elliot and Thrash (2001) also emphasized the “competence-related” nature of achievement goals that “the focal end state or result is competence” (p.144). Due to this lack of focus on competence, goals such as work avoidance goals (a goal of exerting minimum amount of effort in academic tasks), extrinsic goals (a goal of doing work to win external rewards and incentives), and social goals (a goal of engaging in tasks for their interpersonal relations) are not generally included in the achievement goals framework.

**Theoretical Framework**

There are three theoretical frameworks in the conceptual history of achievement goals. Achievement goals theory has witnessed the development from the dichotomous framework (mastery vs. performance goals), to the trichotomous framework (mastery goals, performance approach goals, performance avoidance goals) and to the 2 * 2 framework (mastery approach goals, mastery avoidance goals, performance approach goals and performance avoidance goals) (Keys, Conley, Duncan, & Domina, 2012; Maehr & Zusho, 2009)(see Figure 2).

![Diagram of achievement goals frameworks](image)

*Figure 2. An illustration of the conceptual history of achievement goals.*

Most early research in achievement goals literature has utilized the dichotomous framework by contrasting task-involved with ego-involved goals (Maehr & Nicholls, 1980),
learning-oriented with performance-oriented goals (Dweck & Leggett, 1988; Elliott & Dweck, 1988), or mastery with performance goals (Ames & Archer, 1987, 1988). The conceptual overlap of these terms is enough to allow us to treat these terms in a similar way (Schunk et al., 2008), although most researchers now have mainly adopted the term of mastery versus performance in their work.

Mastery goals, undergirded by a need for achievement, focus on learning, understanding, and developing ability or competence. Performance goals, undergirded by a fear of failure on the other hand, focus on demonstrating one’s ability or competence and being judged as capable by others (Ames, 1992; Elliott & Dweck, 1988; Schunk et al., 2008). Students with a mastery goal are concerned about the task itself instead of their self-presentation compared to others. Students’ evaluation for goal progress is intrapersonal in that their success is based on the improvement of competence and the mastery of material compared to themselves. Setbacks and failures are not threatening; instead, they are opportunities for improving and further developing competence (Elliott & Dweck, 1988).

Performance goal orientated individuals, on the other hand, are mainly concerned about their self-presentation compared to others. These individuals use interpersonal standards to evaluate their performance in that their success is determined with other people as referents. Demonstrating competence, outperforming others and garnering favorable judgments are signs of success and meeting their goals. For these students, their ability evaluation is constantly on the line. Setbacks and especially failures are very threatening and suggest a lack of ability (Elliott & Dweck, 1988).

In contrast to the dichotomous framework of achievement goals that focused mainly on the definitional distinction of achievement goals (i.e., mastery goals vs. performance goals), the
trichotomous model incorporated the valence differentiation (i.e., approach vs. avoidance) addressed in the classic achievement goal orientation framework (McClelland, 1951). During the late 1990s, Elliot and Church (1997) formulated the trichotomous framework by partitioning performance goals into performance approach goals (focus on being judged favorably by others, outperforming others, demonstrating ability or competence) and performance avoidance goals (focus on avoiding demonstrating low ability or incompetence). This distinction between approach and avoidance goals has brought a considerable amount of new research and helped explain some of the inconsistencies in the performance goal literature (Murayama, Elliot, Yamagata, 2011).

A two by two achievement goal framework was proposed (Elliot & McGregor, 2001) based on the empirical support of the trichotomous framework, partitioning mastery goals into mastery approach goals and mastery avoidance goals. Mastery avoidance goals, as counterintuitive as it seems, were supported statistically by this study. Similar to mastery approach goal oriented individuals, people with mastery avoidance goals resort to intrapersonal standard for self-evaluation; however, instead of focusing on improving and developing competence, they want to avoid doing worse than they did before. However, the prevalence of mastery avoidance goals has been questioned. It has been suggested that mastery avoidance goals are not commonly pursued among students (Elliot & Pekrun, 2007) and are argued to be “low-incidence phenomena” (Brophy, 2005). In addition, much less empirical research including mastery avoidance goals has been conducted (Hulleman, Schrager, Bodmann, & Harackiewicz, 2010; Murayama, Zhou & Nesbit, 2009) for evidence of its ecological validity. Therefore, the current study adopted the most contemporary and widely accepted trichotomous framework,
namely mastery approach, performance approach and performance avoidance goals (Keys et al., 2012; Linnenbrink-Garcia, Tyson, & Patall, 2008).

**Research on the Role of Achievement Goals on Cognitive and Behavioral Engagement**

The current review of the literature is based on the trichotomous model of achievement goals. In the following section, literature regarding mastery goals, performance approach and performance avoidance goals are reviewed.

Individuals with different achievement goals approach, perceive, and engage in achievement situations differently (Ames, 1992). In general, research consistently showed the positive role of mastery goals. Mastery goals have been in general, consistently related to deep learning strategies such as elaboration, organization and making connections (e.g., Elliot & McGregor, 2001; Elliot, McGregor, & Gable, 1999; Harackiewicz, Baron, Tauer, Carter, & Elliot, 2000; Kaplan & Midgley, 1997; Liem, Lau, & Nie, 2008; Vrugt & Oort, 2008), use of self-regulatory strategies (e.g., Wolters, Yu, & Pintrich, 1996) and higher cognitive engagement (Meece, Blumenfeld, & Hoyle, 1988; Wolters et al., 1996). Mastery goals are also found to predict students’ behavioral and emotional engagement (e.g., Gonida, Voulala, & Kiosseoglou, 2009; Meece et al., 1988; Wolters et al., 1996), higher levels of adaptive help seeking and lower levels of avoidant help seeking (Newman, 1990; Ryan & Pintrich, 1997), higher levels of persistence (Pintrich, 2000a; Wolters, 2004) and choice of challenging tasks (Dweck & Leggett, 1988). Also, students’ involvement in mastery-oriented classroom tends to be of quality and sustained over time (Elliott & Dweck, 1988).

In addition to cognitive and behavioral outcomes, mastery goals have also been related to intrinsic motivation (e.g., Ames & Archer, 1988), positive affect (Kaplan & Maehr, 1999), higher academic efficacy, interest, task value (e.g., Harackiewicz et al., 2000; Harackiewicz,

In contrast, students with performance avoidance goals are more likely to engage in surface learning strategies such as rote memorization (e.g., Elliot & McGregor, 2001), self-handicapping strategies (Urdan, 2004), disruptive behavior (Kaplan, Gheen & Midgley, 2002) and avoidance help seeking (Elliot & McGregor, 2001). Performance avoidance goals are also related to task disengagement (Liem, Lau & Nie, 2008). In addition to cognitive and behavioral outcomes, performance avoidance goals are also found to predict lower intrinsic motivation (Elliot & Church, 1997), lower hope, pride, interest and higher test anxiety, boredom, and anger (e.g., Deemer, Martens, & Podchaski, 2007; Pekrun, Elliot, & Maier, 2006; 2009; Zusho et al., 2005), and lower grades (e.g., Durik, Lovejoy & Johnson, 2009).

Unlike research findings associated with mastery goals and performance avoidance goals, prior research investigating the effects of performance approach goals has not yielded consistent findings. Performance approach goals have been related to maladaptive outcomes such as superficial cognitive strategies or no strategy usage (e.g., Elliot et al., 1999; Elliot & McGregor, 2001; Harackiewicz et al., 2000; Meece & Holt, 1993; Wolters, 2004), avoidant help seeking (e.g., Newman, 1990; Ryan & Pintrich, 1997), cheating (Anderman, Griesinger, & Westerfield, 1998), self-handicapping strategies (Midgley & Urdan, 2001), lower self-efficacy (Skaalvik, 1997), and higher anxiety (e.g., Daniels, Stupnisky, Pekrun et al., 2009). Others, however, found positive relations between performance approach goals and adaptive outcomes such as deep learning strategies, self-regulation, cognitive engagement (e.g., Meece et al., 1988; Vrugt & Oort, 2008; Wolters et al., 1996), effort (Urdan, 2004), hope and pride (Pekrun et al., 2006, 2009), higher competence perceptions, interest, and achievement (e.g., Durik et al., 2009; Elliot &
Research on achievement goals has been extensive. However, little research has examined how this overarching mental representation of competence is related to students’ self-regulation of motivation in amotivating situations. In the following section, an important aspect of students’ learning process---self-regulation is discussed.

**Self-Regulated Learning**

As discussed in the introduction (see panel B in Figure 1), student’s self-regulation of motivation is another important factor for explaining students’ learning process and outcomes. A general introduction of self-regulated learning, a detailed elaboration on the self-regulation of motivation and research findings related to MSR strategies are presented in the following sections.

**Theoretical Framework**

An important role of education in school is to help students become competent individuals who are equipped with skills to plan, monitor, control and reflect on their own cognitions, motivation and behaviors when there is no external regulation; in other words, self-regulated learners (Zimmerman, 2002). However, it is not uncommon that students who seem to possess high intellectual abilities fail to perform at a commensurate level (Beckman & Kuhl, 1984). This lack of match between students’ cognitive abilities and performance has captured the attention of researchers, teachers and parents and triggered much research in self-regulation (Hofer, Yu, & Pintrich, 1998; Schunk, 2005; Wolters, Benzon, & Arroyo-Giner, 2011).

Self-regulated learning refers to students’ active participation in their own learning by setting goals, monitoring and controlling their cognition, motivation and behavior to
appropriately transform their mental abilities into actual performance for goal attainment (Pintrich, 2000a; Zimmerman, 2002, 2008; Zimmerman & Schunk, 2011). In general, self-regulated learners have been characterized as reflective individuals, who possess a repertoire of strategies and have the ability to deliberately implement needed strategies with ease (Wolters, 2003). Research has shown that self-regulation has a positive influence over students’ achievement and motivation (Pintrich, 2000a; Pintrich & De Groot, 1990; Zimmerman & Martinez-Ponz, 1986, 1990).

There are several models of self-regulation with different theoretical perspectives and different focuses (Boekaerts, 2011; Corno, 1993; Kuhl, 1985; Winnie, 2011). Winnie (2011) focused on the cognitive and metacognitive self-regulation. Boekaerts (2011)’s self-regulation model is a dual processing self-regulation model that depicts three purposes of self-regulation, namely expanding knowledge and skills, preventing threat and loss and protecting one’s commitments. It is primarily concerned with volitional and emotion regulation strategies. Corno (1993) and Kuhl (1985)’s research are focused on volition, which encompasses various strategies such as cognitive (i.e., attention, encoding, information-processing control), emotional (e.g., reducing anxiety), environmental control (Corno & Kanfer, 1993; Kuhl, 1985) and self-consequating strategies (i.e., provide oneself with tangible rewards) that can contribute to the action implementation.

The current study, however, takes the conceptual framework of social cognitive self-regulated learning (Pintrich, 2000a, 2004; Zimmerman, 2000). Within this framework, self-regulated learning refers to the multi-dimensional learning process in which learners intentionally and actively monitor, regulate, control and reflect upon aspects related to learning.
such as cognition, motivation, behavior and context (Pintrich, 2000a, 2004). This study focuses on the area of motivation self-regulation (MSR).

The Importance of MSR

As one of the four areas of self-regulation, MSR refers to the process in which learners use a variety of strategies deliberately and actively to initiate and control their level of motivation or motivational processing in order to achieve optimal motivation for goal completion (Wolters, 2003). Most of the previous studies on self-regulation have mainly focused on cognitive and metacognitive regulation although sustaining one’s motivation for goal attainment has been incorporated in many self-regulation models (Boekaerts, 1996; Pintrich, 2000a; Zimmerman, 2000), discussed in theoretical work (Corno, 1993; Kuhl, 1985; Wolters, 2003; Wolters et al., 2005) and examined in empirical research (Sansone & Thoman, 2005; Wolters, 1998, 1999; Wolters & Rosenthal, 2000).

However, MSR is a very important aspect of self-regulation for the following two reasons. First, cognitive self-regulation (e.g., engaging in strategies such as elaboration and rehearsal) and behavioral self-regulation (e.g., engagement, choice of tasks, persistence) are inherently effortful, challenging and time-consuming processes, which require students to engage actively in monitoring and using self-regulatory strategies (Pintrich & Zusho, 2002). It is not uncommon that students do not use self-regulatory strategies even though they have the knowledge about them (Pintrich & Zusho, 2002). It can be that students do not have the interest, see the value or feel self-efficacious to engage in using these strategies.

Second, students’ motivation may change over the time of task engagement (Wolters, 1999). The academic situations in which cognitive and behavioral self-regulation are required are not always naturally engaging and motivating. More often than not, students encounter situations
or activities that challenge their motivation (Wolters et al., 2011). Students might start with a relatively high motivation but find the tasks too difficult, too irrelevant or too boring (Boekaerts, 2011; Wolters, 1999) as they engage. These situations will inevitably take a toll on students’ motivation if the students are not aware of their level of motivation or that no effective and adaptive MSR strategies are at their disposal to regulate their willingness to provide effort and persist. Students who are good at regulating their motivation are likely to stay engaged and fare better than those who are not good at regulating motivation (Wolters, 1999).

**Phases of Self-Regulation of Motivation**

Due to the essential role of MSR in students’ academic learning, especially in amotivating situations (i.e., difficult, boring and irrelevant) (Pintrich, 2000a, 2004; Zimmerman & Schunk, 2008), it is necessary to understand MSR and examine its impact on learning. According to the social cognitive model of self-regulation (Pintrich, 2000a), for each area of self-regulation, there are four phases (see Figure 3). The following section will provide a detailed explanation of MSR using the social cognitive model of self-regulation.

![Phases of Motivational Self-Regulation](image)

**Figure 3.** Phases of MSR.

**Motivational forethought, planning and activation phase.** During the forethought, planning and activation phase of the area of motivation, self-regulated learners activate important
motivational beliefs such as achievement goals, self-efficacy beliefs, task values and task interest (Pintrich, 2000a; Schunk, 2005). Achievement goals refer to individuals’ purposes and reasons for engaging in academic tasks. For example, individuals may set the same goal such as reading 10 pages of the textbook for different purposes. Some people read 10 pages with the purpose of learning as much as possible (mastery goal oriented) while others do the same thing with the purpose of showing others they are smart or not stupid (performance goal oriented) (Pintrich, 2000a).

Learners also make judgments of their self-efficacy before doing a certain task. Self-efficacy refers to individuals’ belief that they can perform a certain task at a designated level (Bandura, 1997). Research has shown that students’ self-efficacy beliefs have been related to the use of self-regulatory strategies and performance (Pintrich, 1999; Pintrich & De Groot, 1990).

Another important motivational belief activated is the value that learners associate with the task. Learners make judgments regarding the importance of doing well in the task (attainment value), the enjoyment that one will gain from doing the task (intrinsic value), the usefulness of the task (utility value), especially its long-term utility beyond the immediate situation (Eccles, 2005; Hulleman, Durik, Schweigert, & Harackiewicz, 2008), as well as the effort needed and the potential psychological toll involved (i.e., anxiety and failure)(cost) (Eccles, Adler, Futterman et al., 1983). Research has consistently found task values to predict motivational outcomes in both academic and sport domain, such as choice, persistence, engagement, effort, interest, camp satisfaction, course enrollment decisions, intentions to attend graduate school and even achievement as well as adaptive self-regulatory strategies (e.g., Battle & Wigfield, 2003; Eccles, et al., 1983; Greene, DeBacker, Ravindran, & Krows, 1999; Hulleman et al., 2008; Meece, Wigfield, & Eccles, 1990; Pintrich & Zusho, 2002; Wigfield & Eccles, 1992).
Similar to intrinsic value, interest is also an important area to activate before doing a certain task. Interest has been distinguished into two types: situational interest and personal interest. Situational interest refers to the state interest indicated by focused attention and affective reactions as a result of the environmental stimuli (Hidi, 1990). Personal interest refers to the trait like interest that is enduring and predisposes individuals to engage and/or reengage in certain activities (Renninger, 2000). Research has found interest to be related to attention, level of learning, task choice, elaboration, help seeking, persistence, time and effort expenditure and adaptive self-regulatory strategies (Lepper & Henderlong, 2000; Pintrich & Zusho, 2002; Schiefele, 1992; also see Hidi & Renninger, 2006 for a review).

Motivational monitoring. This phase refers to learners’ awareness of their level of self-efficacy, values and interest, etc (Pintrich, 2000a; Schunk, 2005). Self-regulated learners need to be aware that, for example, their self-efficacy is low, that they are not seeing the purpose of doing the task, or that their interest in the task is dwindling. Such awareness will then make active motivational control and regulation possible.

Motivational control and regulation. Self-regulation of motivation during this phase involves students’ active selection and implementation of strategies towards maintaining an optimal amount of motivation. Building on the social cognitive self-regulation models and volitional research, several researchers have identified a series of MSR strategies by providing students with hypothetical scenarios, conducting structured interviews or administering surveys. Given the extensive elaboration in the next section, an in-depth discussion of MSR strategies will not be provided here.

Learners can control and regulate their motivation by promising themselves some appealing rewards after the completion of a certain task (i.e., self-consequating), by activating
negative self-perceptions depicting low self-efficacy and low competence which leads to individuals’ effort to avoid fulfilling this negative self-schema (i.e., defensive pessimism), through self-talk that highlights the reasons they are engaging in doing the task (i.e., goal oriented self-talk such as mastery self-talk, performance/extrinsic self-talk, performance/ability self-talk), by other positive self-talk that aims at enhancing self-efficacy (i.e., efficacy enhancement), and by strategies that help students experience interest (i.e., interest enhancement) in and see the utility value (i.e., relevance enhancement) of doing a certain task (e.g., Benbun nutty, 1999; McCann & Garcia, 1999; McCann & Turner, 2004; Sansone, Weir, Harpster, & Morgan, 1992; Sansone, Wiebe, & Morgan, 1999; Wolters, 1998, 1999; Wolters et al., 2005; Wolters & Ronsenthal, 2000; Zimmerman & Martinez-Pons, 1986; 1990).

**Motivational reaction and reflection.** Motivational reflection involves students’ judgments of their level of motivation during task performance and evaluation of whether their efforts and strategies aiming to maintain/enhance motivation are effective. Motivational reaction can involve students’ emotional reactions as a result of their attribution beliefs (Pintrich, 2000a), which influences their activation of motivational beliefs in the next circle of performance.

As discussed in the introduction, the current study focuses on the control and regulation phase of MSR. In addition, the present study seeks to understand how students’ motivational beliefs (i.e., achievement goals) activated in the forethought, planning and activation phase influence the control and regulation phase of MSR (i.e., MSR strategies). A discussion of a series of MSR strategies and the associated research findings are presented in the following sections.

**Introduction of Specific MSR Strategies**

MSR strategies can be numerous (Wolters & Benzon, 2013). Among several MSR strategies (e.g., mastery self-talk, performance/extrinsic self-talk, performance/relative ability
self-talk, interest enhancement, relevance enhancement, efficacy enhancement, self-consequating, defensive pessimism, environmental control) identified in research studies building on the social cognitive model of self-regulation and volitional research, the current research is particularly interested in six MSR strategies (i.e., mastery self-talk, performance/extrinsic self-talk, performance/ability self-talk, interest enhancement, relevance enhancement, efficacy enhancement) (see Table 1). These strategies have a clear focus on the regulation of motivational beliefs (i.e., achievement goals, interest, value and self-efficacy). Although self-consequating, defensive pessimism and environmental control are important MSR strategies, they do not fit the purpose of the current study. For example, self-consequating strategies do not indicate learners’ effort toward the task at hand. Students may reward themselves with a break for simply finishing the task without any quality engagement. Defensive pessimism and environmental control are not purely motivational but involving emotional (i.e., anxiety provoking) and contextual factors.

Table 1

*Examples for Motivational Self-Regulation Strategies*

<table>
<thead>
<tr>
<th>Motivational Self-Regulation Strategies</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery self-talk</td>
<td><em>I try to persuade myself to learn for the sake of learning.</em></td>
</tr>
<tr>
<td>Performance/Extrinsic self-talk</td>
<td><em>I would think about how I wanted a good grade.</em></td>
</tr>
<tr>
<td>Performance/Relative Ability self-talk</td>
<td><em>I would remind myself how I wanted to do better than others.</em></td>
</tr>
<tr>
<td>Interest enhancement</td>
<td><em>If an activity gets boring, I can usually find a way to make it fun again</em></td>
</tr>
<tr>
<td>Relevance enhancement</td>
<td><em>I would try to relate it to my experiences or how I would feel in certain situations</em></td>
</tr>
<tr>
<td>Efficacy enhancement</td>
<td><em>I tell myself &quot;You are doing a good job. You will be successful if you just keep at it&quot;</em></td>
</tr>
</tbody>
</table>
**Goal-oriented self-talk.** Goal oriented self-talk refers to MSR strategies invoked that make salient their pre-established reasons and purposes for academic engagement to bolster their motivation in amotivating situations (Woltes, 2003; Wolters et al., 2005). In other words, students have their reasons and purposes for approaching a task (i.e., achievement goals). Therefore, by emphasizing and articulating such already accepted reasons for engagement, goal oriented self-talk serves to make students “more immediately cognizant of the reasons” (Wolters, 1999, p.3; Wolters et al., 2005).

Empirical research has provided evidence for students’ engagement in goal-oriented self-talk. By giving 115 introductory psychology college students scenarios (i.e., attending a lecture, reading a textbook chapter, writing a paper, and studying for an exam) describing academic situations that usually elicit dwindling motivation (i.e., materials are boring, materials are irrelevant and materials are difficult), Wolters (1998) asked students to write their specific strategies to deal with diminishing motivation. Fifteen percent of the responses reflected performance/extrinsic self-talk in that students reminded themselves of the importance of doing well and the desire of getting a good grade. For example, in order to tackle motivational problems, students responded such as “I would think about how I wanted a good grade” and “I would remind myself about how important it is to get good grades in college”. Results have also shown students’ endorsement of mastery self-talk, although to a lesser extent. One percent of students’ responses reflected mastery self-talk (i.e., “Try to persuade myself to learn for the sake of learning.”), which highlights their purpose to learn as much as possible and work hard for the sake of learning. Similarly, Wolters (1999) found the usage of performance/extrinsic self-talk and mastery self-talk among 88 high school students (9th and 10th graders). High school students in this study were also found to use performance/extrinsic self-talk, $M=5.53$, $SD=1.30$, more
frequently than mastery self-talk, $M=3.90$, $SD=1.38$, and use mastery self-talk more than interest enhancement, $M=3.33$, $SD=1.38$.

In addition to performance/extrinsic self-talk, another sub-category of performance self-talk is performance/relative ability self-talk. Students who use this self-talk stress the importance of doing better than others. Although this type of self-talk has been proposed theoretically (Wolters et al., 2005), it has not been investigated in empirical studies.

**Interest enhancement.** Not all tasks are inherently interesting; thus, it is unrealistic for someone to be interested in all the content areas encountered (Renninger, Ewen, & Lasher, 2002). Yet, more often than not, performing these seemingly uninteresting tasks can be important and necessary (Green-Demers, Pelletier, Stewart, & Gushue 1998; Sansone et al., 1992). For example, many basic skills require repeated practices to achieve automaticity for effective learning to happen later on and practicing these basic skills repeatedly can become tedious and boring.

Given the importance of interest in students’ learning and performance and the fact that boredom is stressful (Sansone, Wieb, & Morgan, 1999), actions that can regulate individuals’ affective state of interest should be taken to ensure continued behavioral and emotional engagement in doing these inherently uninteresting but necessary tasks or skills. Regulating interest is especially important when abandoning the task together is not an optimal avenue and that the tasks require individuals to engage over an extended period of time for which extrinsic rewards alone without intrinsic satisfaction is no longer sufficient (Sansone et al., 1992; Sansone & Harackiewicz, 1996; Sansone & Thonnann, 2005).

Empirical studies have shown that individual learners engage in strategies that aim for making the tasks more enjoyable. Wolters (1998) found college students to report that they would make studying into a game as a strategy to boost motivation. In their series of three
experimental studies among introductory psychology college students, Sansone et al. (1992) gave students three different tasks: a hidden-word puzzle, a lettering task (copying a letter matrix in the corresponding required styles of scripts) and a copying task (copying a letter matrix). Students reported the hidden-word puzzle as an interesting task, followed by the lettering task. The copying task was considered as the least interesting task. When asked if they were to do the tasks on a regular basis, what they would do to make the task more interesting, the students reported strategies such as making the tasks more challenging, increasing the artistic aspect of the task (i.e., intentionally changed the script of the letter while doing this repetitive copying task), changing the environmental context and adding variety in the task procedure. In addition, students were more likely to use interest enhancement strategies for the least interesting task (i.e., the copying task) than the interesting task (i.e., the hidden-work puzzle task), suggesting students’ conditional knowledge to regulate motivation through enhancing the interest aspect of the task.

Similarly, Green-Demers et al. (1998) have found some interest enhancement strategies frequently used among 120 recreational and competitive figure skaters. The most frequently used strategy to enhance interest was introducing variety within the task such as adding diversity or switching the order of training tasks to avoid boredom. The next most frequently used strategy was enhancing challenge to make the task slightly above their current ability level. The third strategy was providing themselves with self-relevant rationales to enhance the instrumental value of the task so that the relevance of the task outweighs the uninteresting aspects of the task. This can be considered as relevance enhancement and will be discussed in the next section.

They also found that the usage of introducing variety within the task and challenge enhancement positively predicted interest in interesting tasks (e.g., footwork, artistic components, jumps, spins, solos, competitions). Using the strategy of introducing variety within the task and
provision of self-relevant rationales positively predicted interest in less interesting tasks (e.g., stroking, stretching, weight training, figures, dance, test days).

**Relevance enhancement.** Expectancy-value researchers have shown in the past research that students are more likely to engage, exert effort and persist when they see the material as useful and relevant (e.g., Wigfield & Eccles, 2000). As a way to enhance motivation, some students purposefully connect the learning material to things in their life to make the task more personally meaningful or convince themselves of the instrumental value of the materials being taught (Wolters et al., 2005). When asking students about their strategies to fight for diminishing motivation, Wolters (1998) found students providing statements such as “I would find ways that it relates to my life” as well as “I would try to relate it to my experiences or how I would feel in certain situations”.

There is no known research study to the author’s best knowledge that examines relevance enhancement specifically. Relevance enhancement is often mentioned in studies that focus on interest enhancement and considered as one way to lead to increased interest. For example, Green-Demers et al. (1998) identified provision of self-relevant rationales for performing the activity as one of the interest enhancement strategies. In addition, in their experimental study on interest enhancement strategies, Sansone et al. (1992) found that students who were given the information regarding the health benefit of the copying task retained more words in memory than those who were not given such information, suggesting the importance of relevance to individuals’ performance. They also argued that relevance enhancement promotes students’ motivation to engage in interest enhancement strategies.

**Efficacy enhancement.** Efficacy enhancement is in nature one form of self-talk; only its purpose is to enhance individuals’ self-efficacy in task engagement. Research has reported that in
amotivating situations, students were found to engage in self-talk that help enhance their efficacy so that they can have heightened motivation for continuing the task (McCanne & Garcia, 1999; Wolters, 2003). For instance, students may tell themselves “You are doing a good job. You will be successful if you just keep at it.” (Wolters, 2003).

Most of the research that touches upon efficacy enhancement has been conducted among athletes. This line of research in sport area did not specifically study efficacy enhancement but study how self-talk, as a frequently used strategy, influences athletes’ performance. Research on self-talk among athletes defined self-talk as verbalizations and statements addressed to oneself and has generally divided it into two major types of functions: instructional self-talk and motivational self-talk (Hardy, 2006; Zinsser, Bunker, & Williams, 2006).

Instructional self-talk serves as cognitive guidance for athletes to increase attention on the technical aspects of athletic movements and has been found to be more advantageous when it comes to precision performance (e.g., Hatzigeorgiadis, Zourbanos, Goltsios, & Theodorakis, 2008; Latinjak, Torregrosa, & Renom, 2011). Motivational self-talk, or efficacy enhancement in most cases, on the other hand, aims for creating positive moods and building confidence and has been found to enhance individuals’ performance on tasks related to power, strength and endurance (e.g., Hatzigeorgiadis et al., 2008; Latinjak et al., 2011).

Motivational self-talk has been related to motivational outcomes such as higher self-efficacy beliefs, confidence, effort and performance (e.g., Hatzigeorgiadis, 2006; Zinsser et al., 2006). For example, in their experimental study in a water polo game, people who used motivational self-talk showed significantly higher improvement in the power task performance (Hatzigeorgiadis, Theodorakis, & Zourbanos, 2004). Van Raalte et al. (1995) found that people who used motivational self-talk in a positive way (praise and encouragement) did better in a dart-
throwing task than people who used it in a negative way (criticism) and those who did not use any self-talk. Similarly, participants who used positive self-talk had significantly greater improvement in their cycling performance than those who used negative self-talk (Hamilton, Scott, & MacDougall, 2007).

**Research on MSR Strategies**

In general, limited studies have examined the nature and effectiveness of MSR strategies. Also, limited research has been done to examine what motivational beliefs are linked to the enactment of MSR strategies. Existing studies related to MSR strategies are reviewed in the following sections.

**MSR strategies and outcomes.** Wolters (1998) found that students who used intrinsic regulation strategies (the composite of mastery self-talk, relevance enhancement, interest enhancement and efficacy enhancement) were more likely to engage in deeper level cognitive strategies such as elaboration, critical thinking, metacognitive strategies even after accounting for learning goals. However, intrinsic self-regulation strategies were not related to course grade (Wolters, 1998). Extrinsic regulation strategies (the composite of performance/extrinsic self-talk and self-consequating), however, did not relate to any of the cognitive strategies studied (rehearsal, organization, elaboration, critical thinking, metacognition) but were related to course grade (Wolters, 1998).

Schwinger et al. (2012) used another approach (i.e., latent profile analysis) to examine the effect of motivational regulation strategies on effort expenditure and achievement among 231 German high school students (11th & 12th graders) in study 1 and 600 college students in study 2. In study 1, they found that among eight motivational regulation strategies (i.e., interest enhancement, relevance enhancement, mastery self-talk, performance approach self-talk,
performance avoidance self-talk, self-consequating, proximal goal setting and environmental control), five latent profiles were identified. These profiles were low frequency profile (low usage on all the strategies)(5.6%), medium frequency profile (medium usage on all the strategies)(32.4%), high frequency profile (high usage on all the strategies)(16.8%), interest focused profile (higher report on interest and relevance enhancement strategies)(13.4%) and goal focused profile (higher report on goal-oriented self-talk)(31.6%). Goal-focused profile and high frequency profile showed significantly higher effort expenditure than interest-focused profile and medium frequency profile whereas low frequency profile showed the least effort. Although there were no significant differences on achievement among different profiles, interest-focused profile had the lowest mean of performance. In addition, low frequency profile students had similar mean of performance as goal-focused group. Such an interesting finding might be due to the fact that students who were highly motivated and achieved may not be actively using motivational regulation strategies.

In study 2, Schwinger et al (2012) conducted another latent profile analysis using the same battery of motivational regulation strategies among 600 college students. The results yielded more profiles of different shape than just different levels. For example, the profiles included low frequency profile (7.3%), high frequency profile (15.9%), goal-focused profile (31.7%), interest-focused profile (30.5%) and performance self-talk profile (14.3%). They found that high frequency profile was related to both the highest effort and highest performance followed by goal-focused profile. Low frequency profile and performance self-talk profile showed the lowest effort and performance level. The fact that performance self-talk profile scored lower than goal-focused profile on effort and performance seemed to indicate the
maladaptive nature of performance self-talk (approach & avoidance) and that mastery self-talk
buffered this maladaptive effect.

It is interesting to note that in this study (Schwinger et al., 2012), mastery self-talk
grouped together with performance approach self-talk and performance avoidance self-talk in
both study 1 and study 2, although they were tapping different approaches to learning. Schwinger
et al. (2012) argued that these motivational strategies were distinguished more based on content
instead of method. Therefore, mastery self-talk was clustered with performance approach and
avoidance self-talk because of the similar content regarding to goal related messages. However,
having different self-talk grouped together makes it difficult to interpret the implications of goal-
focused profile’s impact on effort and performance.

In another study conducted by the same research group among 231 German high school
students (11th & 12th graders), Schwinger, Steinmary and Spinath (2009) used the same battery of
motivational strategy as studied in Schwinger et al. (2012). They created one latent variable—
MSR strategies including all eight motivational regulation strategies. They proposed that
motivational regulation strategies did not aim for enhancing performance directly but through
managing effort. The results confirmed their hypothesis in that MSR strategies facilitated effort
management, which in turn related to GPA.

Although Wolters (1998) and Schwinger et al. (2009, 2012) made contribution to the
MSR literature, using the sum of strategies makes it impossible to understand the role of specific
strategy and decipher the nature and effectiveness of each strategy. By far, Wolters (1999) was
the only study that provided some preliminary evidence of how specific motivational regulation
strategies are related to students’ cognitive, metacognitive strategies, effort and performance.

Wolters (1999) examined five specific regulation strategies (i.e., performance self-talk, mastery
self-talk, interest enhancement, self-consequating and environmental structuring) among 88 high school students (9th & 10th graders). The results showed that mastery self-talk was a significant positive predictor for planning and monitoring and effort whereas performance/extrinsic self-talk significantly predicted rehearsal, metacognition and course grade positively. Interest enhancement on the other hand, did not significantly predict any of the outcomes.

Among the few studies that examined MSR strategies, it seems that mastery self-talk is consistently adaptive whereas performance self-talk has a mixed pattern. It has been related to both adaptive cognitive self-regulation strategies and higher course grades (Wolters, 1999) and low effort expenditure and low performance (Schwinger et al., 2012).

With regard to interest enhancement, it has been related to either none of the cognitive self-regulation strategies (Wolters, 1999) or lowest performance (Schwinger et al., 2012). However, research studies conducted by Sansone and colleagues found interest enhancement to be adaptive. For example, Sansone et al. (1992) found that the usage of interest enhancement strategies lead to sustained interest beyond the experiment session. Students who used interest enhancement strategies voluntarily asked for more tasks to take with them. Interest enhancement strategies have also been related to increased persistence. Sansone et al. (1999) found that when students were given open-ended time, those who engaged in interest enhancement strategies copied more letters than those who did not. Adding more support to the adaptive role of interest enhancement strategies, Gropel and Steel (2008) found that interest enhancement (e.g., If an activity gets boring, I can usually find a way to make it fun again) was related to lower procrastination.

However, regulating interest is associated with potential drawbacks as well (Sansone & Thoman, 2006). Attempt to make a boring task more interesting is much more effortful than
students reminding themselves of their motivational beliefs (i.e., goal-oriented self-talk). It takes up students’ limited working memory capacity that may be needed otherwise. Therefore, individuals’ performance over a short term may suffer as a result of using interest enhancement strategies (Schwinger et al., 2012). For example, when given a fixed period of time, students who used interest enhancement strategies copied fewer letters than those who did not (Sansone et al., 1992). Although interest is important and it is ideal to have enhanced interest when doing academic tasks, it is not as easy for interest enhancement strategies to have beneficial impact on important educational outcomes because of the delicacy involved in utilizing interest enhancement strategies. Students need to be sophisticated users to reap the benefits from interest enhancement strategies. They not only need to be aware of interest enhancement strategies, but also have to know how to use these strategies. Without intelligent selection and implementation, interest enhancement strategies can easily lead students astray. This potential drawback provides an interpretation as to why interest enhancement strategies fail to show any adaptive profile in some of the studies.

Schwinger et al. (2009) provided further evidence by showing that the effect of the sum of strategies of interest enhancement, relevance enhancement, self-consequating, environmental control and proximal goal setting on effort management was moderated by students’ intelligence, suggesting that students’ ability to effectively and efficiently apply these strategies are important for them to reap the benefits from these strategies. In contrast, the effect of the sum of three goal-oriented self-talk strategies (i.e., mastery self-talk, performance/extrinsic self-talk, performance/avoidance self-talk) on effort management was not moderated by intelligence because using these strategies is less effortful and requires less quality usage.
Achievement goals and MSR strategies. As discussed in the introduction, MSR strategies have important implications for students’ learning but also have their origin in students’ motivational beliefs (e.g., Wolters & Rosenthal, 2000). Among many motivational beliefs, achievement goals have been the most prominent factor in the field of achievement motivation. Prior study has provided some preliminary evidence of the effect of achievement goals on MSR strategies.

Wolters and Rosenthal (2000) examined whether students’ motivational beliefs (i.e., learning goals, performance approach goals, task value and self-efficacy) can explain students’ usage of MSR strategies (i.e., mastery self-talk, performance/extrinsic self-talk, interest enhancement, self-consequating and environmental structuring). They found that even after accounting for students’ academic achievement, students’ motivational beliefs still explained students’ usage of MSR strategies. Specifically, learning goals positively predicted all of the five MSR strategies with the strongest relationships with mastery self-talk. Performance approach goals positively predicted performance/extrinsic self-talk, self-consequating, and interest enhancement with the strongest relationships with performance/extrinsic self-talk. However, performance approach goals were not related to mastery self-talk.

Wolters and Benzon (2013) also examined the relationships between achievement goals and MSR strategies (i.e. mastery self-talk, performance/extrinsic self-talk, interest enhancement, relevance enhancement, self-consequating, environmental structuring) among 215 college students in the US. Results indicated that mastery goals were positively related to all the strategies except for performance/extrinsic self-talk. They argued that the comprehensive relationships between mastery goals and MSR strategies suggested that mastery oriented students were more likely to take actions to maintain their motivation. Performance approach goals were
only positively related to performance/extrinsic self-talk and environmental structuring. This finding indicated the alignment between motivational beliefs and choice of MSR strategies.

In addition, Wolters (1998) found that intrinsic regulation strategies (i.e., mastery self-talk, relevance enhancement, interest enhancement, efficacy enhancement) were positively related to learning goals whereas extrinsic regulation strategies (i.e., performance/extrinsic self-talk and self-consequating) were positively related to greater performance goal endorsement. In his study, Wolters (1998) used MSR strategies to predict achievement goals. Although there is no empirical study that has examined the specific question of directionality, based on the social cognitive model of self-regulation (Pintrich, 2000a), it is theoretically sound to assume that students’ motivational beliefs activated in the activation phase are likely to serve as the antecedents of students’ choice of MSR strategies in the control phase.

**Chinese Education System and Research Among Chinese Students**

As previously mentioned, prior studies on MSR have only studied Western sample. It is unclear whether extant findings can be generalized to other cultures. The current study seeks to explore these issues among Chinese high school students who are subject to intensive daily study and high academic pressure. Presented in the following sections are the background information of China’s education system and research on achievement goals among Chinese students.

**Background Information of China’s Education System**

As a Confucian-Heritage culture, China is greatly influenced by the Confucius philosophy of education and learning. Confucius attaches great importance to education and believes in the human malleability that everyone is educable. It is the attitude for learning and effort exerted rather than ability inherited that matter the most for success (Lee, 1996).
Such a Confucian tradition permeates in people’s beliefs about learning today. Cross-cultural studies have frequently found that compared to Western learners, Chinese students have higher academic achievement, spend more time and study more diligently, are assigned more homework, attribute their success and failures more readily to effort instead of ability, find the homework more enjoyable and useful, and have parents with higher expectation and standards as well as involvement (e.g., Biggs, 1996; Chen & Stevenson, 1989, 1995; Cheung & McBride-Chang, 2008; Lee, 1996; Salili, 1994, 1995; Stevenson, Hofer & Randel, 2000; Stevenson & Lee, 1990).

China enforces a nine-year compulsory education policy, providing free education to all the students during the elementary and middle school phase. Middle school graduates need to take exams to go to high schools. Compared to only 51.2% of middle school graduates admitted to high school in 2000, this number increased to 87.5% by 2010 (Ministry of Education of the People’s Republic of China, 2010). High school graduates are required to take the National Entrance Examination, which will determine whether the graduates are qualified to go to college. Since 1999, China started expanding college admission rates at an average speed of 30% increase each year, resulting in a tremendous jump in the number of students admitted to college (924,000 in 1999 to six million in 2008). Although there are more spots in college for high school graduates, the competition is still high because students are striving to achieve a good score to go to nationally renowned universities (about 110) among a total of over 2300 schools of higher learning in China (Ministry of Education of the People’s Republic of China, 2010) for better education and a more promising future.

Compared to most of the Western high school education, Chinese high school education is characterized by long school days, high academic standards, a lack of variety in the curriculum,
frequent examination, and high competition (Salili, 1996). Furthermore, the school size and class size in China are much larger compared to that in the Western countries. The regular elementary, middle and high school in China host, on average, 386, 962 and 1727 students in the whole school respectively and 38, 53 and 57 students respectively when it comes to each individual classroom (Ministry of Education of the People’s Republic of China, 2010).

The combination of a large class size and higher academic standards has an important influence on the nature of teaching and learning in high school. Teaching rarely involves interactive activities because of the inconvenience of moving around in a rather packed classroom and the need to follow a tight schedule. Lessons are highly structured and learning follows listening to the lecture, taking notes, independent seatwork and a large amount of homework assignments (Liu, 2003). In addition, the National Entrance Examination is of extremely high stake with only one exam held every year. Students who fail to perform well in the exam have to repeat the whole year to take the exam again the next year or go to a college of much lower quality and reputation and stay there for four years because college transfer later on is virtually impossible. With this unique educational culture, students need to have high motivation to handle such high demands (Salili, 1996) and pressure. Therefore, self-regulation especially MSR is imperative for success.

Achievement Goals Research Among Chinese Population

Achievement motivation research among Chinese students is less compared to the voluminous literature on the same subject in the Western culture. Mastery goals have been related to deep learning approach (the desire for a deeper understanding of the material), deep strategy use, surface learning approach (i.e., getting by with minimum effort expenditure), and higher effort expenditure (Ho & Hau, 2008; Ng, 2000; Shi, Wang, Wang et al., 2001).
Performance goals have been related to both deep and surface approach, achieving approach (the desire for high performance) and higher effort expenditure (Ho & Hau, 2008; Ng, 2000). In addition, mastery goals and performance avoidance goals were positively and negatively related to achievement (Ho & Hau, 2008). However, the relationship between performance approach goals and achievement is not straightforward. Ho and Hau (2008) found performance approach goals to be related to higher math achievement whereas Chan (2008) found that performance approach did not predict achievement in any of the three areas: academic, non-academic or social/leadership areas. In general, the patterns of the relationships between achievement goals and Chinese students’ educational outcomes are not different from those conducted in the Western culture. Mastery goals are adaptive whereas performance avoidance goals are maladaptive. Performance approach goals however, have mixed results and fail to yield a consistent pattern of relations.

This is consistent with cross-culture research findings on achievement goals. Achievement goals indeed manifest differently in individualist and collectivist cultures (Maehr & Nicholls, 1980). Research has found mean level differences of achievement goals endorsed by students from different cultures. For example, it has been found that Asian American college students endorsed higher avoidance goals than non-Asian Americans. Also, college students from South Korea and Russia had higher avoidance goals than those in the United States (Elliot, Chirkov, Kim, & Sheldon, 2001). Similarly, Zusho et al. (2005) also found that Asian-born college students in the US showed higher performance avoidance goal than native-born students in the US.

However, even though there are mean level differences across cultures, the underlying goal structure (e.g., Bong, 2009; Murayama et al., 2009; Sun & Hernandez, 2012) and the
relationships between achievement goals and outcomes are universal (e.g., Wiltkow & Fuligni, 2007; Zusho et al., 2005). For example, Sun and Hernandez (2012) found structural invariance of the achievement goals model (i.e., mastery approach, mastery avoidance, performance approach, performance avoidance goals) across American, Chinese and Dutch college students. Similarly, Murayama et al. (2009) found the same goal structure among Japanese and Canadian college students. Kim, Schallert and Kim (2010) also found theorized three latent factors (mastery goals, performance approach goals and performance avoidance goals) among both 7-9\textsuperscript{th} grade middle school students and among 10-11\textsuperscript{th} grade high school girls in Korea. In addition to the universality of the goal structures, Witkow and Fuligni (2007) found that the relationships between achievement goals with intrinsic value and GPA were similar among high school students with Latino, Asian and European American backgrounds. The only relationship difference was found between performance avoidance goals and outcomes. For example, Elliot et al. (2001) found a null relationship between avoidance goals and psychological wellbeing for South Korea and Russian students but a negative relationship for US students. In another study, performance avoidance goals were found to relate positively to motive to achieve success among Japanese students (Tanaka, Okuno, & Yamauchi, 2002). It is argued that in collective Asian countries where avoiding negative outcomes and fitting in are valued, performance avoidance goals are consistent with the cultural value and thus, may not be maladaptive (Elliot et al., 2001).

Achievement goals studies among Chinese gifted students are scarce. Chan (2008) found that among 1041 Hong Kong gifted students (3\textsuperscript{rd}-12\textsuperscript{th} graders), gifted students tend to endorse learning goals higher than performance approach and avoidance goals. Another study done among 566 high achieving 6\textsuperscript{th} graders in Singapore, found that although students endorsed both high task and ego goals, task goals ($M=3.46$) had higher endorsement than ego goals ($M=2.93$).
(Ee, Moore, & Atputhasamy, 2003). This is a pattern similar to studies among non-gifted Asian students and among students from the West (e.g., Elliot & Church, 1997; Murayama & Elliot, 2009; Kim et al., 2010), indicating that gifted students in a culture in which competition is especially keen are not more likely to endorse performance approach goals. Instead, they are still mainly focused on learning for the sake of learning.
CHAPTER III

METHODOLOGY

Participants and Procedure

This research was conducted in a large high school in an industrial city in the northeast part of China. The school serves 10th through 12th grades and is one of the two high performing schools in the city. Among 12,741 middle school graduates in the city in 2011, the top 16% of the graduates were admitted to these two top high schools in the city. Each school admits 8% of the students (Han, 2011). Contacts were made and a support letter was obtained from the high school principal. The school principal provided me the permission to invite all the 10th graders to participate in the study (N=1182). Ball State University Institutional Review Board approved this project.

The head teacher in each of the classrooms distributed the consent forms and surveys to the students. All the 10th grade students received the consent forms and surveys in an envelope on a Friday and were asked to return the envelope the following Monday to their head teachers if they decided to participate in the study and their parents gave them permission. The survey was completed anonymously. The final number of participants was N=1096 (43% male; mean age=16.8), with a response rate of 93%.

Measures

Students responded to five-point likert-type survey questions asking their general achievement goals, MSR strategies and cognitive and behavioral engagement. Response choices ranged from Not at all true of me (1) to Very true of me (5). All items are shown in Appendix A, Appendix B and Appendix C. The original scales are in English and therefore were translated.
Achievement goals. Students’ general achievement goals were measured using Patterns of Adaptive Learning Survey (PALS; Midgley et al., 2000). Three types of goals were measured. A mastery goal focuses on learning, understanding, and developing competence (5 items; \( \alpha = .81 \); e.g., It’s important to me that I thoroughly understand my class work). A performance approach goal focuses on demonstrating and validating one’s competence (5 items; \( \alpha = .85 \); e.g., One of my goals is to look smart in comparison to the other students in my class). A performance avoidance goal focuses on masking incompetence (4 items; \( \alpha = .77 \); e.g., It’s important to me that I don’t look stupid in class).

Previous studies have found good reliability of achievement goals measures from PALS. For example, Midgley et al. (1998) investigated the reliability of achievement goals among seven samples of elementary and middle school students comprised of primarily European and African American students of lower-to-middle class families. The Cronbach’s \( \alpha \) among all the samples for mastery goals was greater than .70 and were mostly above .80 and showed higher internal consistency among students of higher grades (i.e., 8\(^{th}\) graders). The Cronbach’s \( \alpha \) for performance approach goals was greater than .60 and often higher among older students (e.g., .84 among 8\(^{th}\) graders). Middleton and Midgley (1997) found among 703 6\(^{th}\) graders the Cronbach’s \( \alpha \) was .84 for all of the mastery, performance approach and performance avoidance goals scales.

In their validation study (Midgley et al., 1998), convergent validity was achieved by examining the correlation between two similar scales that should measure similar constructs. They correlated PALS with Nicholls’ task vs. ego goal orientation scale (Maehr & Nicholls,
and found that the correlation between mastery and task goal orientation was .67 and the correlation between performance approach goals and ego goals was .63.

This scale has been widely used in previous research and has shown high reliability among not only European American students but among students with diverse cultural backgrounds around the world. For example, Keys et al. (2012) used mastery goals, performance approach and performance avoidance goals in their study among 2231 urban middle school (7th & 8th grade) students in California. The majority of the students were Hispanic (73%), followed by Vietnamese (20%) and White (6%). The Cronbach’s α in Key’s study ranged from .78-.88 on all three scales over four time points during two academic years. Kim et al. (2010) conducted a study using PALS among Korean middle school and high school students. In their study, the reliability for each of the three scales (mastery goals, performance approach goals, performance avoidance goals) were .80, .84, .80 for Korean middle school students and .83, .88, .81 for Korean high school students. Confirmatory factor analyses revealed adequate fit of the three-factor goal structure in both samples retaining all the items in their study.

**Motivational self-regulation strategies.** Items measuring mastery self-talk, performance/extrinsic self-talk, performance/relative ability self-talk, interest enhancement and relevance enhancement were adopted from the Strategies for the Regulation of Academic Motivation scale (Wolters et al., 2005). Items measuring efficacy enhancement were adapted from the Academic Volitional Strategy Inventory (McCann & Garcia, 1999).

*Mastery self-talk* refers to students’ self-talk that highlights the importance of learning and mastery (6 items; α=.85; e.g., I tell myself that I should keep working just to learn as much as I can). *Performance/extrinsic self-talk* refers to students’ self-talk that highlights the importance of getting good grades (5 items; α=.88; e.g., I remind myself about how important it
is to get good grades). *Performance/relative ability self-talk* refers to students’ self-talk that makes salient the importance of outperforming others (4 items; $\alpha=.83$; e.g., I think about doing better than other students in my class). *Interest enhancement* refers to students deliberately making the task more enjoyable to complete (5 items; $\alpha=.89$; e.g., I make studying more enjoyable by turning it into a game). *Relevance enhancement* refers to students’ efforts in making the task more personally relevant and instrumental (6 items; $\alpha=.87$; e.g., I tell myself that it is important to learn the material because I will need it later in life). *Efficacy enhancement* refers to students’ self-talk that reassures their efficacy (5 items; $\alpha=.82$; e.g., I tell myself “I can do this”) (Wolters et al., 2005).

Although studies using the scale of MSR strategies are limited, this scale has shown good reliability among middle school, high school and college students in both the US and Germany with reliability to be at least .71 (Schwinger, von der Laden, & Spinath, 2007; Schwinger et al., 2009, 2012; Wolters, 1999; Wolters & Rosenthal, 2000; Wolters et al., 2005). In addition, Wolters and Benzon (2013) found through exploratory factor analysis that mastery self-talk, performance/extrinsic self-talk, interest enhancement, self-consequating and environmental structuring represent theoretically consistent factors that explained 69% of the total variance. Schwinger et al. (2007) found among German college students a good structure for these MSR strategies as well.

For the scale of efficacy enhancement, the original scale developed by McCann & Garcia (1999) reported high Cronbach’s $\alpha$ of .82. The original scale had 13 items with factor loadings ranging from .30 to .67. Due to the large number of items on the original scales, only 5 items with high factor loadings (factor loadings range from .55 to .67) with the factor of efficacy enhancement were selected for the current study.
Wolters (1998) developed the MSR scale based on college students’ written responses to researchers’ open-ended questions on what strategies they use to boost their waning motivation. Therefore, the items have high face and content validity (Wolters & Benzon, 2013). The extant research studies have provided construct validity for the MSR strategies. These strategies have predicted cognitive and metacognitive strategies, effort expenditure and performance (Schwinger et al., 2009, 2012; Wolters, 1998, 1999; Wolters et al., 2005).

**Cognitive and behavioral engagement.** Cognitive engagement (i.e., rehearsal and elaboration) was measured using 2 subscales from the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991). Involved engagement items were adapted from Eccles (1983). Withdrawal in the face of difficulties and avoidance of challenges were measured by adapting the items from maladaptive learning strategies (Midgley, Maehr, & Urdan, 1993). Involved Engagement refers to students’ effort in their academic work (7 items; α=.84; e.g., I am engaged when doing homework). Withdrawal in the face of difficulties refers to students’ behavior of quitting when they are doing difficult work (4 items; α=.81; e.g., When I don’t understand my work, I give up and do something else.). Avoidance of Challenge refers to students’ behavior of skipping or avoiding challenging work (4 items; α=.81; e.g., I would avoid difficult class work whenever possible.). Rehearsal refers to the cognitive strategy of repeating information (4 items; α=.79; e.g., When I study, I practice saying the material to myself over and over.). Elaboration refers to the cognitive strategy of organizing information, making connections and applying learned information to facilitate meaningful encoding (6 items; α=.84; e.g., When I study, I pull together information from different sources, such as lectures, readings and discussions.). MSLQ has been used by hundreds of researchers (Artino, 2005). Prior research using MSLQ to measure students’ cognitive strategies have found it to be a reliable
measure with reliabilities higher than .86 in a study conducted among 434 junior high school students (e.g., Wolters et al., 1996). A validation study conducted among 380 college students (Pintrich et al., 1993) found that rehearsal had a Cronbach’s α of .69 and elaboration had a Cronbach’s α of .75. In addition, the cognitive strategies are positively related to each other (r=.36) as expected and are also positively related to motivation (.10 ≤ r ≤ .48) as expected, suggesting construct validity. Higher levels of cognitive strategy usage have also been linked to higher levels of students’ performance (Pintrich & De Groot, 1990), indicating predictive validity. Although the items used for behavioral engagement measures are adapted from other scales, the items have good content and face validity and have shown to be highly reliable in the current study.

**Literature on Translation**

Because the sample in this study is from a culture that is different from the culture in which the original scales were developed, scales used in the current study have to be translated from English to Chinese. To ensure the procedure to be effective, extensive literature was reviewed on translation.

When translating an instrument from a source language (i.e., English) to a target language (i.e., Chinese), it is important to establish equivalence and avoid bias especially when direct cross culture comparison is intended. Several types of equivalence are to be met before direct comparison is warranted. The lowest level of equivalence is construct equivalence. Construct equivalence refers to that the construct being measured is the same across different cultures. Construct equivalence does not require the actual items to be exactly the same as long as the constructs measured have the same meaning, or in other words, equivalent (e.g., Ægisdóttir, Gerstein, & Cinarbas, 2007; van de Vijver, 2001). Construct equivalence is the necessary but not
sufficient condition for direct comparison to be warranted. It is necessary because for any direct comparison to be made, the underlying educational or psychological construct should be the same. It is not sufficient because there is no operational restriction to construct equivalence.

The next level of equivalence is measurement unit equivalence. This type of equivalence refers to that the interval scale is the same but the constant is different (van de Vijver & Tanzer, 2004). In other words, within each cultural group, the scale increment is the same, but the origin of the scale varies by a certain value. Therefore, the comparison of the differences within a group can be made but between group differences are not warranted because of the difference in the origin (e.g., Ægisdóttir et al., 2007; van de Vijver, 2001).

The highest level of equivalence is scalar equivalence. Scalar equivalence means that not only the scale increments but also the origin are the same (Van de Vijver & Tanzer, 2004). Therefore, direct comparison can be made between groups across different cultures (e.g., Ægisdóttir et al., 2007; van de Vijver, 2001).

To establish equivalence, researchers should make effort to minimize bias. There are several types of bias to avoid in cross culture research, namely construct bias, method bias and item bias (e.g., Ægisdóttir et al., 2007; van de Vijver & Tanzer, 2004). Construct bias refers to that the construct being measured is different across cultures (Van de Vijver & Tanzer, 2004). The items associated with the construct in the source culture may be a narrow representation of the same construct in the target culture or too broad that a different construct is reflected in the target culture. In addition, the items appropriate in the source culture may not be applicable in the target culture after translation. All these result in construct bias and pose a threat to construct equivalence (e.g., Ægisdóttir et al., 2007; van de Vijver & Tanzer, 2004).
The second type of bias is method bias. There are many sources of method bias in cross-culture research, such as respondents’ familiarity with the instruments, social desirability involved when answering the instruments, differences in the procedures of administering instruments across cultures, and preexisting individual differences (e.g., education background, motivation) among participants (e.g., Ægisdóttir et al., 2007; van de Vijver, 2001; van de Vijver & Tanzer, 2004). Method bias may pose a threat to measurement-unit equivalence or scalar equivalence.

The third type of bias is item bias. Biased items are perceived differently across cultures (Van de Vijver & Tanzer, 2004). When people across cultures have the same mean score on a certain construct but not on an item within the construct, the item is biased (e.g., Ægisdóttir et al., 2007; van de Vijver, 2001; van de Vijver & Tanzer, 2004). Item bias may be the result of inappropriate translation or inapplicability across cultures and poses a threat to scalar equivalence.

Establishing equivalence and minimizing bias is no trivial task. Translating instruments is an important step for valid cross culture research (Ægisdóttir et al., 2007) and deserves thoughtful consideration. Before considering which approach one ought to go when it comes to translating an instrument developed in another culture, the researchers must first decide whether the construct to be translated is equivalent across cultures (Berry, 1969; Lonner, 1985). If there is a reason to suspect construct nonequivalence, the researchers should consider assembly approach (Ægisdóttir et al., 2007), which refers to creating a new set of items that reflect the construct for the target culture (van de Vijver & Leung, 1997). If there is no concern for construct bias, then the researchers could use two most commonly adopted approaches: applied approach and adapted approach (Ægisdóttir et al., 2007; van de Vijver, 2001). Applied approach refers to the
translation of items of a scale into another language without changing any item. Adapted approach translates some items directly while modifying others to fit in the target culture.

**Translation Procedure**

As indicated in the literature review section, prior research has in general found similar factor structure for achievement goals across different cultures (e.g., Bong, 2009; Chang & Wong, 2008; Ho & Hau, 2008; Murayama et al., 2009). Similarly, cognitive engagement scales have also been implemented in other countries (Wolters et al., 2005). Although the scale for MSR strategies is a relatively new development, the nature of the construct did not invite major concern of construct nonequivalence across cultures. Therefore, the current study opts for application approach, a widely used approach, towards the translation of the scales.

Based on the recommendation of translation method discussed by Brislin and colleagues (Brislin, 1986; Brislin, Lonner, & Thorndike, 1973) and the International Test Commission (ITC) guidelines (e.g., Hambleton, 2001; van de Vijver & Hambleton, 1996), Ægisdóttir et al. (2007) developed a summary of recommended translation practices which were followed in the current study to ensure the quality of translation. Specifically, as recommended, translation, back translation and review of translation were conducted. Such a procedure is widely used and has been considered as rigorous (e.g., Hambleton & Patsula, 1998; Werner and Campbell, 1970; van de Vijver & Tanzer, 2004).

First, I translated the original English version of the scales to Chinese. I am from China and hold a BA in English from a Chinese school and a MA in Educational Psychology from a US school. In addition, I have two years of training in translation and extensive experiences as an interpreter. Therefore, I am proficient in both the source and target language and culture with expertise in the domain of research interest (e.g., Hambleton & Kanjee, 1995). I then invited two
bilingual speakers to review whether the Chinese translation was accurate and appropriate for 10th graders and applicable in Chinese culture. One of the reviewers is Chinese and holds a BA in English from a Chinese school and a MA in English Translation from a Chinese school. The other reviewer is Chinese and holds a BA in Chinese from a Chinese school and a MA in Sociology from a US school. Therefore, these two reviewers are proficient in both English and Chinese to review the translation to ensure construct equivalence. Discrepancies were resolved through discussion. After checking was completed, I invited another three Chinese translators who are proficient in both languages but blind to the research to back translate the translated scales to the source language (English). The first back translator is a doctoral student in a US school who holds a BA in English from a Chinese school. The second back translator holds a BA in English from a Chinese school and a MA in Chinese linguistics from a Chinese school and is currently teaching Chinese in a US university. The third back translator is a Chinese professor who teaches geography in a US university. After back translation was completed, I invited a fluent English speaker (not native) who is a professor in a US university and an expert in the current research topic to compare whether the original and back-translated versions of the scales were compatible. Disagreements, if any, were resolved through discussion. In general, there were not many disagreements and the disagreements were usually about the choice of words. The revised items again went through the back translation and comparison process.

In addition to the above procedure, if the researchers are conducting cross-cultural research and want to make direct comparisons, it is ideal to have statistical evidence (e.g., multi-group confirmatory factor analysis or differential item functioning) for establishing equivalence (Ægisdóttir et al., 2007) through pretesting, for instance. However, the current study only collected data from China and does not intend to compare two cultures directly. In addition, there
are limited resources and time available. Therefore, pretest was not conducted in the current study. Construct equivalence was tested through conducting confirmatory factor analysis but no statistical procedures were conducted to check higher-level equivalence such as scalar equivalence. Since the study did not intend to directly compare the responses between two cultures, scalar equivalence was not stringently required (Van de Vijver & Tanzer, 2004). This is, however, certainly a limitation that should be discussed and future studies are encouraged to collect more statistical evidence for studies that use scales originally developed in another culture.

**Statistical Analyses**

The current study seeks to address three questions: 1) what are the relationships between MSR strategies and students’ cognitive and behavioral engagement among Chinese elite high school students? 2) What are the relationships between achievement goals and MSR strategies among Chinese elite high school students? 3) Do MSR strategies mediate the relationships between achievement goals and students’ cognitive and behavioral engagement among Chinese elite high school students?

A series of confirmatory factor analyses (CFA, Byrne, 2010) were conducted to examine whether the data fits the theoretically proposed factor structures for achievement goals (3 factors), MSR strategies (6 factors) and cognitive and behavioral engagement (5 factors). Structural equation modeling (SEM) was conducted to examine the major research questions. Common fit indices were examined to see the fit of the hypothesized mediation model. Following Hu and Bentler’s (1999) recommendation: Comparative Fit Index (CFI) >.90, Root Mean Square Error of Approximation (RMSEA) <.08, Standardized Root Mean Square Residual (SRMR) <.08, and Tucker Lewis Index (TLI) >.90 are considered to have a good model fit.
Chi-square test statistics and chi-square by degrees of freedom are measures of absolute fit. They are to test whether the predicted model reflects the observed data (Kline, 2011). If the test is statistically significant, that means the differences between predicted and observed models exceed those due to sampling error, indicating a bad model-data correspondence. However, chi-square test statistics are sensitive to sample size. When a sample is large, a slight difference between predicted and observed model can show up as significant (Kline, 2011). Comparative fit index (CFI) and Tucker-Lewis Index (TLI) are measures of incremental fit, which compare the predicted model with a baseline independence (null) model (Kline, 2011). CFI penalizes for sample size and TLI penalizes for model complexity. The range is between 0~1 with higher value considered desirable. Standardized root mean square residual (SRMR) is the average difference between the predicted and observed model covariances with smaller value considered desirable. Root mean square error of approximation (RMSEA) penalizes for the lack of parsimony with smaller values considered desirable (Kline, 2011).

Although Hu and Bentler (1999)’s recommendations were considered, they were not followed as the “golden rules”. Marsh, Hau and Grayson (2005) argued that the “golden rules” are too restrictive because it is almost impossible to reach perfect fit without having to reduce the number of items for each factor or decrease the sample size so that chi-square test will not be significant. In addition, Marsh, Hau and Wen (2004) argued that many of the misspecified models according to Hu and Bentler (1999) should actually be considered acceptable. Kline (2011) argued that model viability is a matter of judgment. Model fit indices are only rules of thumb and should not be used for a definite yes or no answer. Having a meaningful model is better than having a perfect fit model without any scientific value (Kline, 2011). After all, model fit can be improved significantly by simply adding free parameters (Kline, 2011). Therefore, Hu
and Bentler’s (1999) guidelines were considered but they were not followed as the absolute values to determine whether the models are acceptable.
CHAPTER IV

RESULTS

Descriptive Statistics for Achievement Goals and MSR Strategies

Descriptive statistics (means and standard deviations, as well as zero order correlations among variables) were examined and shown in Table 2. Reliability coefficients (i.e., Cronbach’s $\alpha$) of the scales were calculated.

Achievement Goals

As shown in Table 2, students were more likely to endorse mastery goals, followed by performance avoidance goals and performance approach goals. Dependent sample t-test indicated that the mean differences among the three goals were statistically significant, $p<.001$. Correlation statistics indicated positive correlations among achievement goals. In particular, there was a high correlation between performance approach goals and performance avoidance goals. The positive correlations among achievement goals are commonly observed among US samples as well (e.g., Witkow & Fuligni, 2007). However, performance approach goals usually have higher means than performance avoidance goals among US sample (e.g., Lee, Sheldon, & Turban, 2003).

Motivational Self-Regulation Strategies

As shown in Table 2, students were most identified with the MSR strategy of performance/extrinsic self-talk, followed by performance/relative ability self-talk, efficacy enhancement, mastery self-talk, relevance enhancement, and interest enhancement.

Correlation coefficients indicated that there were medium to high relationships (Cohen, 1988) among these six MSR strategies, $.29 \leq r \leq .78, p<.01$. Similarly, Schwinger et al. (2009) also found moderate positive correlations among strategies.
Table 2

Means, Standard Deviations, Correlations and Reliability Among Variables (N=1096)

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mean       | 3.91 | 2.75 | 2.97 | 3.10 | 3.35 | 3.22 | 2.79 | 3.01 | 3.16 | 3.46 | 2.27 | 2.58 | 2.94 | 3.05 |
Standard Deviation | .79  | .98  | .95  | .84  | .90  | .92  | .95  | .89  | .84  | .71  | .83  | .86  | .82  | .77  |
Reliability (Cronbach’s alpha) | .81  | .85  | .77  | .85  | .88  | .83  | .89  | .87  | .82  | .84  | .81  | .81  | .79  | .84  |

Note. *p<.05.  **p<.01.
Confirmatory Factor Analysis for Assessing Measurement Models of Achievement Goals, MSR Strategies and Outcomes

Achievement Goals

Confirmatory factor analysis (CFA) was conducted to examine whether the data fits the theoretically proposed 3-factor model of achievement goals. Based on the fit statistics, the model did not appear to fit the data well, $\chi^2(74) = 1262.16, p<.001, \chi^2/df = 17.06, \text{RMSEA}=0.123; \text{CFI} = 0.84, \text{TLI}=0.80; \text{SRMR}=0.09$. When all three goals were later used in the structural equation modeling with the mediators and outcome variables, the model did not converge. It was suspected that such a problem in the model fit of the three-factor model of achievement goals and model convergence of the structural equation model was due to the high correlation between performance approach goals and performance avoidance goals. Given the less-than-appropriate fit of the data, the original analysis plan to include all of the three achievement goals was aborted.

As reviewed in the literature, past research has generally supported the validity of achievement goal factor structure among different cultures, including Asian countries such as Japan (e.g., Murayama et al., 2009) and Korea (e.g., Bong, 2009; Kim et al., 2010). However, to the author’s best knowledge, studies among Chinese students have rarely tested the factor structure of the well-established measure of achievement goals. One exception is the study conducted by Sun and Hernandez (2012). Their study included another construct of achievement goals, which is a mastery avoidance goal. They found evidence supporting the distinctiveness of each of the achievement goal construct. In other words, their study supported the 2*2 model (i.e., mastery approach goals, mastery avoidance goals, performance approach goals, performance avoidance goals) among Chinese college students. Therefore, it is not clear whether the current
CFA result of an unsatisfactory model fit is common among Chinese students in general or unique to the current sample.

Because of the potential problems associated with the high correlation between performance approach and performance avoidance goals, there are three potential ways to deal with such an issue. One way is to combine performance approach goals and performance avoidance goals into one construct of performance goals (e.g., Dweck & Leggett, 1988)(Figure 4). However, the most contemporary research of achievement goals has primarily utilized the trichotomous framework of achievement goals (e.g., Linnenbrink-Garcia et al., 2008) and thus, it is not possible to integrate the current findings to the contemporary goal research if performance approach and performance avoidance goals are combined. A second way is to exclude performance approach goals and retain only mastery goals and performance avoidance goals (Figure 5). A third way is to exclude performance avoidance goals and retain only mastery goals and performance approach goals (Figure 6). I chose to study the model with mastery goals and performance approach goals even though the model with mastery goals and performance avoidance goals has a smaller AIC and BIC value. Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) are general fit statistics for both nested and non-nested models. They measure unexplained variance between the predicted and observed models. Both of them penalizes for the lack of parsimony. Smaller AIC and BIC are considered to be desirable (Kline, 2011). The decision of choosing mastery goals and performance approach goals was made based on the tradition of most recent research studies on achievement goals. When only one type of performance goals was included, researchers have primarily chosen the inclusion of performance approach goals rather than performance avoidance goals (e.g., Hulleman et al., 2008; King, McInerney, & Watkins, 2011). In their review paper, Senko et al. (2011)
acknowledged the contribution of approach vs. avoidance distinction but they also summarized researchers’ common practices when it comes to the selection of achievement goal constructs to investigate: “most researchers either study all four goals or hone in on performance approach and mastery approach goals in particular.” (p. 28). In addition, as indicated in the literature review section, the research findings on performance avoidance goals have been, in general, consistent whereas much debate is ongoing for performance approach goals (Hulleman & Senko, 2010). Therefore, retaining performance approach goals is likely to make more contribution to the literature. Furthermore, performance approach goals in the current study have higher internal consistency (α=.85) than performance avoidance goals (α=.77). Therefore, the current study chose to retain mastery goals and performance approach goals.

\[ \chi^2(76) = 1276.93, p<.001, \chi^2/df = 16.80, \text{RMSEA} = .12, \text{CFI} = .84, \text{TLI} = .81, \text{SRMR} = .09 \]
\[ \text{AIC} = 39829.57, \text{BIC} = 40034.31 \]

**Figure 4.** Confirmatory factor analysis for mastery goals and combined performance goals.
Figure 5. Confirmatory factor analysis for mastery goals and performance avoidance goals.

Figure 6. Confirmatory factor analysis for mastery goals and performance approach goals.
Motivational Self-Regulation Strategies

Although the six MSR strategies have medium to high correlations among each other, the results from CFA showed that the 6-factor structure of MSR strategies was adequate fit to the data (see Figure 7).

![Diagram of Motivational Self-Regulation Strategies]

$\chi^2(419) = 2662.16$, $\chi^2/df = 6.35$, RMSEA = 0.07, CFI = 0.88, TLI = 0.87, SRMR = 0.05

Figure 7. Confirmatory factor analysis for MSR strategies.

Cognitive and Behavioral Engagement

Model fit statistics from CFA results showed that the 5-factor structure model for cognitive and behavioral engagement was adequate fit to the data (see Figure 8).
Figure 8. Confirmatory factor analysis for cognitive and behavioral engagement.

Structural Equation Modeling Analysis Plans

Although the CFA results for achievement goals (mastery goals vs. performance approach goals) were not the most satisfactory, the fit statistics were not unacceptable. Based on the theoretical value of the achievement goals model and the suggestions that model fit indices are not to be strictly followed as the “golden rules” (Marsh, Hau & Grayson, 2005), the 2-factor model of achievement goals with mastery goals and performance approach goals was retained to proceed with the structural equation modeling analysis (SEM). Specifically, the current study intends to understand the relationships among achievement goals, MSR strategies and cognitive and behavioral engagement, as well as the role of MSR strategies as mediators.
Main Analysis Using Structural Equation Modeling

To test mediation, three different models (a direct path model, a partial mediation model, and a full mediation model) should be conducted and compared with each other to determine whether a partial or full mediation occurs. A direct path model refers to the model with paths only from the predictors to the outcome variables. A partial mediation model refers to the model with both mediation and direct paths from the predictors to the outcome variables. A full mediation model refers to the model with mediation paths but without direct paths from the predictors to the outcome variables. Model fit statistics and model chi-square comparisons should be examined to determine the best fitting model.

Following the steps, a direct path model (Figure 9), a partial mediation model (Figure 10), and a full mediation model (Figure 11) were examined to investigate the relationships among achievement goals, MSR strategies and cognitive and behavioral engagement. Model fit statistics and model chi-square comparisons are summarized in Table 3. As indicated by the fit statistics, all three models were adequate fit to the data. Model chi-square comparisons suggested that the partial mediation model was the best fitting model among all three models. However, the partial mediation model had higher AIC and BIC values than the direct path model. Such a result indicated that although the partial mediation model was significantly better fit to the data than the direct path model, the improvement of model fit was not great enough to offset the penalty for adding more free parameters (Kline, 2011).
Figure 9: Direct path model depicting the relationships between achievement goals and outcomes; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. *p<.05. **p<.01. ***p<.001.
Figure 10. Partial mediation model with both mediation paths and direct paths from achievement goals to outcomes; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. *p<.05. **p<.01. ***p<.001.

χ²(2001) = 6600.96, χ²/df = 3.29, RMSEA = .05; CFI = .88, TLI = .87, SRMR = .05; AIC = 175310.20, BIC = 176690.04
Figure 11. Full mediation model with mediation paths but without direct paths from achievement goals to outcomes; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. *p < .05. **p < .01. ***p < .001.

Table 3

Model Fit Statistics and Model Chi-square Comparisons for the Direct Path Model and the Partial and Full Mediation Models With All MSR Strategies as Mediators Simultaneously

<table>
<thead>
<tr>
<th>Models</th>
<th>χ²</th>
<th>df</th>
<th>χ²/df</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>AIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Path Model (D)</td>
<td>2219.63</td>
<td>539</td>
<td>4.12</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>94991.71</td>
<td>95621.64</td>
</tr>
<tr>
<td>Partial Mediation Model (P)</td>
<td>6600.96</td>
<td>2001</td>
<td>3.29</td>
<td>0.05</td>
<td>0.88</td>
<td>0.87</td>
<td>0.05</td>
<td>175310.20</td>
<td>176690.04</td>
</tr>
<tr>
<td>Full Mediation Model (F)</td>
<td>6679.50</td>
<td>2011</td>
<td>3.32</td>
<td>0.05</td>
<td>0.88</td>
<td>0.87</td>
<td>0.05</td>
<td>175368.75</td>
<td>176698.59</td>
</tr>
</tbody>
</table>

Model Chi-Square Comparison

<table>
<thead>
<tr>
<th></th>
<th>Δχ²</th>
<th>Δdf</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>P vs. D</td>
<td>568.08</td>
<td>212</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>P vs. F</td>
<td>78.54</td>
<td>10</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
A close examination of the paths revealed problems associated with this approach. As shown in Figure 10, some path coefficients have shown attenuated coefficients in that the relationships between MSR strategies and outcomes have shown the opposite directions of the relationships from the respective zero-order correlations. This might be the result of the medium to high correlations among MSR strategies, \( .29 \leq r \leq .78, p<.01 \). Putting the relatively highly correlated MSR strategies simultaneously in the model may not reflect the nature of each strategy accurately due to the shared variance. Therefore, even though the model produced an acceptable model fit, the parameter estimates lack interpretability and such a model should not be adopted. Therefore, to have a better understanding of the nature and effectiveness of each strategy, six mediation models with each strategy as the mediator were conducted.

**Model with Mastery Self-Talk as a Mediator**

A direct path model (Figure 9), a partial mediation model (Figure 12), and a full mediation model (Figure 13) were examined to investigate the relationships among achievement goals, mastery self-talk and outcomes. Model fit statistics and model chi-square comparison are summarized in Table 4. As indicated by the fit statistics, all three models were adequate fit to the data. Model chi-square comparisons suggested that the partial mediation model was the best fitting model among all three models. Due to the number of tests \((n=6)\) conducted, Bonferroni adjustment was implemented to correct family-wise Type I error rate \((\alpha=.05/6=.0083)\). Therefore, for model chi-square comparison tests, a \(p\) value less than .0083 was considered significant. However, the partial mediation model had higher AIC and BIC values than the direct path model. Such a result indicated that although the partial mediation model was significantly better fit to the data than the direct path model, the improvement of model fit was not great enough to compensate for the increased complexity of the model (Kline, 2011).
Figure 12. Partial mediation model 1: Mastery self-talk as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. Paths with two coefficients indicate the presence of mediation. The coefficient before the slash indicates the relationship between the predictor and the outcome without the mediator whereas the coefficient after the slash indicates the relationship between the predictor and the outcome after including the mediator. *p<.05. **p<.01. ***p<.001.
Figure 13. Full mediation model 1: Mastery self-talk as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. ***p<.001.

Table 4

<table>
<thead>
<tr>
<th>Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>AIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Path Model (D)</td>
<td>2219.63</td>
<td>539</td>
<td>4.12</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>94991.71</td>
<td>95621.64</td>
</tr>
<tr>
<td>Partial Mediation Model (P)</td>
<td>2787.71</td>
<td>751</td>
<td>3.71</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>111364.02</td>
<td>112118.94</td>
</tr>
<tr>
<td>Full Mediation Model (F)</td>
<td>2933.63</td>
<td>761</td>
<td>3.85</td>
<td>0.05</td>
<td>0.89</td>
<td>0.88</td>
<td>0.06</td>
<td>111489.94</td>
<td>112194.86</td>
</tr>
</tbody>
</table>

Model Chi-Square Comparison

<table>
<thead>
<tr>
<th></th>
<th>$\Delta \chi^2$</th>
<th>$\Delta$df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>P vs. D</td>
<td>568.08</td>
<td>212</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>P vs. F</td>
<td>145.92</td>
<td>10</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

$\chi^2$(761) = 2933.63, $\chi^2$/df = 3.85, RMSEA = .05; CFI = .89, TLI=.88; SRMR=.06.
To determine mediation, four conditions have to be met. First, there must be relationships between predictors (i.e., achievement goals) and outcomes (i.e., engagement, withdrawal, avoidance of challenges, rehearsal and elaboration) when no mediator is included. Second, there must be relationships between predictors and the mediators (i.e., MSR strategies). Third, there must be relationships between mediators and outcomes. Fourth, after including the mediators, the magnitude of the direct relationships between predictors and outcomes must decrease. The relationships between predictors and outcomes when no mediator is included are called total effects. Total effects can be partitioned into two effects: direct and indirect effects. Direct effects refer to the relationships between predictors and outcomes when mediators are included. Indirect effects refer to the relationship between predictors and outcomes that happen through mediators. The total effect is the sum of the direct effect and the indirect effect. As indicated in Figure 9 and Figure 12, mastery self-talk served as a partial mediator between mastery goals and engagement, rehearsal and elaboration. The total, direct and indirect effects between achievement goals and outcomes with mastery self-talk as a mediator are summarized in Table 5.

Table 5

The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 1: Mastery Self-Talk as a Mediator

<table>
<thead>
<tr>
<th>Paths</th>
<th>Total Effects</th>
<th>Direct Effects</th>
<th>Indirect Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery Goals--&gt;Engagement</td>
<td>.57***</td>
<td>.39***</td>
<td>.19***</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Withdrawal</td>
<td>-.34***</td>
<td>-.28***</td>
<td>ns</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Avoidance of Challenges</td>
<td>-.28***</td>
<td>-.23***</td>
<td>ns</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Rehearsal</td>
<td>.48***</td>
<td>.16***</td>
<td>.32***</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Elaboration</td>
<td>.49***</td>
<td>.24***</td>
<td>.25***</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Engagement</td>
<td>-.12***</td>
<td>-.13***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Withdrawal</td>
<td>.21***</td>
<td>.21***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Avoidance of Challenges</td>
<td>.15***</td>
<td>.15***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Rehearsal</td>
<td>ns</td>
<td>ns</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Elaboration</td>
<td>.08*</td>
<td>.06*</td>
<td>ns</td>
</tr>
</tbody>
</table>

Note. Total effects: the effects between achievement goals and outcomes with no mediators; direct effects: the effects between achievement goals and outcomes with mediators; indirect effects: the effects between achievement goals and outcomes that happen through mediator; ns: not significant. *p<.05. ***p<.001.
Model with Performance/Extrinsic Self-Talk as a Mediator

A direct path model (Figure 9), a partial mediation model (Figure 14), and a full mediation model (Figure 15) were examined to investigate the relationships among achievement goals, performance/extrinsic self-talk and outcomes. Model fit statistics and model chi-square comparison are summarized in Table 6. As indicated by the fit statistics, all three models were adequate fit to the data. Model chi-square comparisons suggested that the partial mediation model was the best fitting model among all three models. However, the partial mediation model had higher AIC and BIC values than the direct path model. Such a result indicated that although the partial mediation model was significantly better fit to the data than the direct path model, the improvement of model fit was not great enough to compensate for the increased complexity of the model (Kline, 2011). As indicated in Figure 9 and Figure 14, performance/extrinsic self-talk served as a partial mediator between mastery goals and engagement, rehearsal and elaboration. In addition, performance/extrinsic self-talk served as a partial mediator between performance approach goals and avoidance of challenges and served as a full mediator between performance approach goals and elaboration. The total, direct and indirect effects between achievement goals and outcomes with performance/extrinsic self-talk as a mediator are summarized in Table 7.
Figure 14. Partial mediation model 2: Performance/extrinsic self-talk as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. Paths with two coefficients indicate the presence of mediation. The coefficient before the slash indicates the relationship between the predictor and the outcome without the mediator whereas the coefficient after the slash indicates the relationship between the predictor and the outcome after including the mediator. *p<.05. **p<.01. ***p<.001.
Figure 15. Full mediation model 2: Performance/extrinsic self-talk as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. *p < .05, **p < .01, ***p < .001.

Table 6

Model Fit Statistics and Model Chi-square Comparisons for the Direct Path Model and the Partial and Full Mediation Model 2: Performance/Extrinsic Self-Talk as a Mediator

<table>
<thead>
<tr>
<th>Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>AIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Path Model (D)</td>
<td>2219.63</td>
<td>539</td>
<td>4.12</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>94991.71</td>
<td>95621.64</td>
</tr>
<tr>
<td>Partial Mediation Model (P)</td>
<td>2565.88</td>
<td>712</td>
<td>3.6</td>
<td>0.05</td>
<td>0.91</td>
<td>0.90</td>
<td>0.05</td>
<td>107745.14</td>
<td>108485.06</td>
</tr>
<tr>
<td>Full Mediation Model (F)</td>
<td>2804.65</td>
<td>722</td>
<td>3.88</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.07</td>
<td>107963.92</td>
<td>108653.84</td>
</tr>
</tbody>
</table>

Model Chi-Square Comparison

<table>
<thead>
<tr>
<th></th>
<th>$\Delta\chi^2$</th>
<th>$\Delta$df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>P vs. D</td>
<td>346.25</td>
<td>173</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>P vs. F</td>
<td>238.77</td>
<td>10</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>

$\chi^2(722) = 2804.65, \chi^2$/df = 3.88, RMSEA = .05; CFI = .90, TLI = .89; SRMR = .07
Table 7

The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 2: Performance/Extrinsic Self-Talk as a Mediator

<table>
<thead>
<tr>
<th>Paths</th>
<th>Total Effects</th>
<th>Direct Effects</th>
<th>Indirect Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery Goals→Engagement</td>
<td>.57***</td>
<td>.50***</td>
<td>.08**</td>
</tr>
<tr>
<td>Mastery Goals→Withdrawal</td>
<td>-.34***</td>
<td>-.38***</td>
<td>ns</td>
</tr>
<tr>
<td>Mastery Goals→Avoidance of Challenges</td>
<td>-.28***</td>
<td>-.34***</td>
<td>.06*</td>
</tr>
<tr>
<td>Mastery Goals→Rehearsal</td>
<td>.48***</td>
<td>.33***</td>
<td>.15***</td>
</tr>
<tr>
<td>Mastery Goals→Elaboration</td>
<td>.49***</td>
<td>.41***</td>
<td>.08**</td>
</tr>
<tr>
<td>Performance Approach Goals→Engagement</td>
<td>-.12***</td>
<td>-.15***</td>
<td>.03**</td>
</tr>
<tr>
<td>Performance Approach Goals→Withdrawal</td>
<td>.21***</td>
<td>.19***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals→Avoidance of Challenges</td>
<td>.15***</td>
<td>.13***</td>
<td>.02*</td>
</tr>
<tr>
<td>Performance Approach Goals→Rehearsal</td>
<td>ns</td>
<td>ns</td>
<td>.06***</td>
</tr>
<tr>
<td>Performance Approach Goals→Elaboration</td>
<td>.08*</td>
<td>ns</td>
<td>.03**</td>
</tr>
</tbody>
</table>

Note. Total effects: the effects between achievement goals and outcomes with no mediators; direct effects: the effects between achievement goals and outcomes with mediators; indirect effects: the effects between achievement goals and outcomes that happen through mediators; ns: not significant. *p<.05. **p<.01. ***p<.001.

Model with Performance/Relative Ability Self-Talk as a Mediator

A direct path model (Figure 9), a partial mediation model (Figure 16), and a full mediation model (Figure 17) were examined to investigate the relationships among achievement goals, performance/relative ability self-talk and outcomes. Model fit statistics and model chi-square comparison are summarized in Table 8. As indicated by the fit statistics, all three models were adequate fit to the data. Model chi-square comparisons suggested that the partial mediation model was the best fitting model among all three models. However, the partial mediation model had higher AIC and BIC values than the direct path model. Such a result indicated that although the partial mediation model was significantly better fit to the data than the direct path model, the improvement of model fit was not great enough to compensate for the increased complexity of the model (Kline, 2011). As indicated in Figure 9 and Figure 16, performance/relative ability self-talk served as a partial mediator between mastery goals and engagement, rehearsal and elaboration. In addition, performance/relative ability self-talk served as a full mediator between performance approach goals and elaboration. The total, direct and indirect effects between
achievement goals and outcomes with performance/relative ability self-talk as a mediator are summarized in Table 9.

![Diagram](image)

Figure 16. Partial mediation model 3: Performance/relative ability self-talk; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. Paths with two coefficients indicate the presence of mediation. The coefficient before the slash indicates the relationship between the predictor and the outcome without the mediator whereas the coefficient after the slash indicates the relationship between the predictor and the outcome after including the mediator. \*p<.05. \**p<.001.

\[ \chi^2(674) = 2528.08, \chi^2/df = 3.75, \text{RMSEA} = .05; \text{CFI} = .90, \text{TLI} = .89; \text{SRMR} = .05 \]
**Figure 17.** Full mediation model 3: Performance/relative ability self-talk; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. ***p < .001.

**Table 8**

*Model Fit Statistics and Model Chi-square Comparisons for the Direct Path Model and the Partial and Full Mediation Model 3: Performance/Relative Ability Self-Talk as a Mediator*

<table>
<thead>
<tr>
<th>Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>AIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Path Model (D)</td>
<td>2219.63</td>
<td>539</td>
<td>4.12</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>94991.71</td>
<td>95621.64</td>
</tr>
<tr>
<td>Partial Mediation Model (P)</td>
<td>2528.08</td>
<td>674</td>
<td>3.75</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>105743.89</td>
<td>106468.81</td>
</tr>
<tr>
<td>Full Mediation Model (F)</td>
<td>2758.25</td>
<td>684</td>
<td>4.03</td>
<td>0.05</td>
<td>0.89</td>
<td>0.88</td>
<td>0.07</td>
<td>105954.07</td>
<td>106628.99</td>
</tr>
</tbody>
</table>

*Model Chi-Square Comparison*

<table>
<thead>
<tr>
<th></th>
<th>$\Delta \chi^2$</th>
<th>$\Delta df$</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>P vs. D</td>
<td>308.45</td>
<td>135</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>P vs. F</td>
<td>230.17</td>
<td>10</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Table 9

The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 3: Performance/Relative Ability Self-Talk as a Mediator

<table>
<thead>
<tr>
<th>Paths</th>
<th>Total Effects</th>
<th>Direct Effects</th>
<th>Indirect Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery Goals→Engagement</td>
<td>.57***</td>
<td>.47***</td>
<td>.10***</td>
</tr>
<tr>
<td>Mastery Goals→Withdrawal</td>
<td>-.34***</td>
<td>-.30***</td>
<td>ns</td>
</tr>
<tr>
<td>Mastery Goals→Avoidance of Challenges</td>
<td>-.28***</td>
<td>-.26***</td>
<td>ns</td>
</tr>
<tr>
<td>Mastery Goals→Rehearsal</td>
<td>.48***</td>
<td>.30***</td>
<td>.17***</td>
</tr>
<tr>
<td>Mastery Goals→Elaboration</td>
<td>.49***</td>
<td>.35***</td>
<td>.14***</td>
</tr>
<tr>
<td>Performance Approach Goals→Engagement</td>
<td>-.12***</td>
<td>-.18***</td>
<td>.06***</td>
</tr>
<tr>
<td>Performance Approach Goals→Withdrawal</td>
<td>.21***</td>
<td>.23***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals→Avoidance of Challenges</td>
<td>.15***</td>
<td>.16***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals→Rehearsal</td>
<td>ns</td>
<td>ns</td>
<td>.10***</td>
</tr>
<tr>
<td>Performance Approach Goals→Elaboration</td>
<td>.08*</td>
<td>ns</td>
<td>.08***</td>
</tr>
</tbody>
</table>

Note. Total effects: the effects between achievement goals and outcomes with no mediators; direct effects: the effects between achievement goals and outcomes with mediators; indirect effects: the effects between achievement goals and outcomes that happen through mediators; ns: not significant. * p<.05. ** p<.01. *** p<.001.

Model with Interest Enhancement as a Mediator

A direct path model (Figure 9), a partial mediation model (Figure 18), and a full mediation model (Figure 19) were examined to investigate the relationships among achievement goals, interest enhancement and outcomes. Model fit statistics and model chi-square comparison are summarized in Table 10. As indicated by the fit statistics, all three models were adequate fit to the data. Model chi-square comparisons suggested that the partial mediation model was the best fitting model among all three models. However, the partial mediation model had higher AIC and BIC values than the direct path model. Such a result indicated that although the partial mediation model was significantly better fit to the data than the direct path model, the improvement of model fit was not great enough to compensate for the increased complexity of the model (Kline, 2011). As indicated in Figure 9 and Figure 18, interest enhancement served as a partial mediator between mastery goals and engagement, avoidance of challenge, rehearsal and elaboration. In addition, interest enhancement served as a full mediator between performance
approach goals and elaboration. The total, direct and indirect effects between achievement goals and outcomes with interest enhancement as a mediator are summarized in Table 11.

\[ \chi^2(712) = 2646.39, \chi^2/df = 3.72, \text{RMSEA} = .05; \text{CFI} = .90, \text{TLI} = .89; \text{SRMR} = .05 \]

**Figure 18.** Partial mediation model 4: Interest enhancement as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. Paths with two coefficients indicate the presence of mediation. The coefficient before the slash indicates the relationship between the predictor and the outcome without the mediator whereas the coefficient after the slash indicates the relationship between the predictor and the outcome after including the mediator. *p < .05. **p < .01. ***p < .001.
Figure 19. Full mediation model 4: Interest enhancement as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. **p<.01. ***p<.001.

Table 10

Model Fit Statistics and Model Chi-square Comparisons for the Direct Path Model and the Partial and Full Mediation Model 4: Interest Enhancement as a Mediator

<table>
<thead>
<tr>
<th>Models</th>
<th>χ²</th>
<th>df</th>
<th>χ²/df</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>AIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Path Model (D)</td>
<td>2219.63</td>
<td>539</td>
<td>4.12</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>94991.71</td>
<td>95621.64</td>
</tr>
<tr>
<td>Partial Mediation Model (P)</td>
<td>2646.39</td>
<td>712</td>
<td>3.72</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>108110.48</td>
<td>108850.40</td>
</tr>
<tr>
<td>Full Mediation Model (F)</td>
<td>2954.30</td>
<td>722</td>
<td>4.09</td>
<td>0.05</td>
<td>0.89</td>
<td>0.88</td>
<td>0.08</td>
<td>108398.39</td>
<td>109088.31</td>
</tr>
</tbody>
</table>

Model Chi-Square Comparison

<table>
<thead>
<tr>
<th></th>
<th>Δχ²</th>
<th>Δdf</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>P vs. D</td>
<td>426.76</td>
<td>173</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>P vs. F</td>
<td>307.91</td>
<td>10</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Table 11

The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 4: Interest Enhancement as a Mediator

<table>
<thead>
<tr>
<th>Paths</th>
<th>Total Effects</th>
<th>Direct Effects</th>
<th>Indirect Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery Goals--&gt;Engagement</td>
<td>.57***</td>
<td>.51***</td>
<td>.06***</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Withdrawal</td>
<td>-.34***</td>
<td>-.33***</td>
<td>ns</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Avoidance of Challenges</td>
<td>-.28***</td>
<td>-.26***</td>
<td>-.03*</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Rehearsal</td>
<td>.48***</td>
<td>.37***</td>
<td>.11***</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Elaboration</td>
<td>.49***</td>
<td>.39***</td>
<td>.09***</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Engagement</td>
<td>-.12***</td>
<td>-.14***</td>
<td>.02**</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Withdrawal</td>
<td>.21***</td>
<td>.21***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Avoidance of Challenges</td>
<td>.15***</td>
<td>.16***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Rehearsal</td>
<td>ns</td>
<td>ns</td>
<td>.04**</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Elaboration</td>
<td>.08*</td>
<td>ns</td>
<td>.03**</td>
</tr>
</tbody>
</table>

Note. Total effects: the effects between achievement goals and outcomes with no mediators; direct effects: the effects between achievement goals and outcomes with mediators; indirect effects: the effects between achievement goals and outcomes that happen through mediators; ns: not significant. *p<.05. **p<.01. ***p<.001.

Model with Relevance Enhancement as a Mediator

A direct path model (Figure 9), a partial mediation model (Figure 20), and a full mediation model (Figure 21) were examined to investigate the relationships among achievement goals, relevance enhancement and outcomes. Model fit statistics and model chi-square comparison are summarized in Table 12. As indicated by the fit statistics, all three models were adequate fit to the data. Model chi-square comparisons suggested that the partial mediation model was the best fitting model among all three models. However, the partial mediation model had higher AIC and BIC values than the direct path model. Such a result indicated that although the partial mediation model was significantly better fit to the data than the direct path model, the improvement of model fit was not great enough to compensate for the increased complexity of the model (Kline, 2011). As indicated in Figure 9 and Figure 20, relevance enhancement served as a partial mediator between mastery goals and engagement, rehearsal and elaboration. In addition, relevance enhancement served as a full mediator between performance approach goals...
and elaboration. The total, direct and indirect effects between achievement goals and outcomes with relevance enhancement as a mediator are summarized in Table 13.

Figure 20. Partial mediation model 5: Relevance enhancement as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. Paths with two coefficients indicate the presence of mediation. The coefficient before the slash indicates the relationship between the predictor and the outcome without the mediator whereas the coefficient after the slash indicates the relationship between the predictor and the outcome after including the mediator. *p<.05. **p<.01. ***p<.001.

χ²(751) = 2717.08, χ²/df = 3.72, RMSEA = .05; CFI = .90, TLI=.99; SRMR=.05
Figure 21. Full mediation model 5: Relevance enhancement as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. ***p<.001.

Table 12

Model Fit Statistics and Model Chi-square Comparisons for the Direct Path Model and the Partial and Full Mediation Model 5: Relevance Enhancement as a Mediator

<table>
<thead>
<tr>
<th>Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>AIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Path Model (D)</td>
<td>2219.63</td>
<td>539</td>
<td>4.12</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>94991.71</td>
<td>95621.64</td>
</tr>
<tr>
<td>Partial Mediation Model (P)</td>
<td>2717.08</td>
<td>751</td>
<td>3.72</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>111376.02</td>
<td>112130.93</td>
</tr>
<tr>
<td>Full Mediation Model (F)</td>
<td>2953.71</td>
<td>761</td>
<td>3.88</td>
<td>0.05</td>
<td>0.89</td>
<td>0.88</td>
<td>0.07</td>
<td>111592.65</td>
<td>111849.72</td>
</tr>
</tbody>
</table>

Model Chi-Square Comparison

<table>
<thead>
<tr>
<th></th>
<th>$\Delta \chi^2$</th>
<th>$\Delta$df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>P vs. D</td>
<td>497.45</td>
<td>212</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>P vs. F</td>
<td>236.63</td>
<td>10</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
Table 13

The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 5: Relevance Enhancement as a Mediator

<table>
<thead>
<tr>
<th>Paths</th>
<th>Total Effects</th>
<th>Direct Effects</th>
<th>Indirect Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery Goals--&gt;Engagement</td>
<td>.57***</td>
<td>.48***</td>
<td>.09***</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Withdrawal</td>
<td>-.34***</td>
<td>-.33***</td>
<td>ns</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Avoidance of Challenges</td>
<td>-.28***</td>
<td>-.26***</td>
<td>ns</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Rehearsal</td>
<td>.48***</td>
<td>.29***</td>
<td>.19***</td>
</tr>
<tr>
<td>Mastery Goals--&gt;Elaboration</td>
<td>.49***</td>
<td>.30***</td>
<td>.19***</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Engagement</td>
<td>-.12***</td>
<td>-.15***</td>
<td>.02**</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Withdrawal</td>
<td>.21***</td>
<td>.21***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Avoidance of Challenges</td>
<td>.15***</td>
<td>.16***</td>
<td>ns</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Rehearsal</td>
<td>ns</td>
<td>ns</td>
<td>.05**</td>
</tr>
<tr>
<td>Performance Approach Goals--&gt;Elaboration</td>
<td>.08*</td>
<td>ns</td>
<td>.05**</td>
</tr>
</tbody>
</table>

Note. Total effects: the effects between achievement goals and outcomes with no mediators; direct effects: the effects between achievement goals and outcomes with mediators; indirect effects: the effects between achievement goals and outcomes that happen through mediators; ns: not significant. *p < .05. **p < .01. ***p < .001.

Model with Efficacy Enhancement as a Mediator

A direct path model (Figure 9), a partial mediation model (Figure 22), and a full mediation model (Figure 23) were examined to investigate the relationships among achievement goals, efficacy enhancement and outcomes. Model fit statistics and model chi-square comparison are summarized in Table 14. As indicated by the fit statistics, all three models were adequate fit to the data. Model chi-square comparisons suggested that the partial mediation model was the best fitting model among all three models. However, the partial mediation model had higher AIC and BIC values than the direct path model. Such a result indicated that although the partial mediation models was significantly better fit to the data than the direct path model, the improvement of model fit was not great enough to compensate for the increased complexity of the model (Kline, 2011). As indicated in Figure 9 and Figure 22, efficacy enhancement served as a partial mediator between mastery goals and engagement, withdrawal, avoidance of challenges, rehearsal and elaboration. In addition, efficacy enhancement served as a full mediator between performance approach goals and elaboration. The total, direct and indirect effects between
achievement goals and outcomes with efficacy enhancement as a mediator are summarized in Table 15.

\[ \chi^2(712) = 2585.37, \chi^2/df = 3.63, \text{RMSEA} = .05; \text{CFI} = .90, \text{TLI} = .89; \text{SRMR} = .05 \]

**Figure 22.** Partial mediation model 6: Efficacy enhancement as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. Paths with two coefficients indicate the presence of mediation. The coefficient before the slash indicates the relationship between the predictor and the outcome without the mediator whereas the coefficient after the slash indicates the relationship between the predictor and the outcome after including the mediator. *p* < .05. **p** < .01. ***p* < .001.
Figure 23. Full mediation model 6: Efficacy enhancement as a mediator; solid lines indicate positive relationships whereas dashed lines indicate negative relationships. All path coefficients are standardized. For simplicity, paths that are not significant are not shown. *p<.05. **p<.01. ***p<.001.

Table 14

Model Fit Statistics and Model Chi-square Comparisons for the Direct Path Model and the Partial and Full Mediation Model 6: Efficacy Enhancement as a Mediator

<table>
<thead>
<tr>
<th>Models</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$\chi^2$/df</th>
<th>RMSEA</th>
<th>CFI</th>
<th>TLI</th>
<th>SRMR</th>
<th>AIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct Path Model (D)</td>
<td>2219.63</td>
<td>539</td>
<td>4.12</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>94991.71</td>
<td>95621.64</td>
</tr>
<tr>
<td>Partial Mediation Model (P)</td>
<td>2585.37</td>
<td>712</td>
<td>3.63</td>
<td>0.05</td>
<td>0.90</td>
<td>0.89</td>
<td>0.05</td>
<td>108668.95</td>
<td>109408.87</td>
</tr>
<tr>
<td>Full Mediation Model (F)</td>
<td>2763.01</td>
<td>722</td>
<td>3.88</td>
<td>0.05</td>
<td>0.89</td>
<td>0.88</td>
<td>0.06</td>
<td>108826.59</td>
<td>109516.51</td>
</tr>
</tbody>
</table>

Model Chi-Square Comparison

<table>
<thead>
<tr>
<th></th>
<th>$\Delta\chi^2$</th>
<th>$\Delta$df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>P vs. D</td>
<td>365.74</td>
<td>173</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>P vs. F</td>
<td>177.64</td>
<td>10</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
### Table 15

**The Total, Direct and Indirect Effects Between Achievement Goals and Outcomes for Model 6: Efficacy Enhancement as a Mediator**

<table>
<thead>
<tr>
<th>Path</th>
<th>Total Effects</th>
<th>Direct Effects</th>
<th>Indirect Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery Goals→Engagement</td>
<td>.57***</td>
<td>.42***</td>
<td>.15***</td>
</tr>
<tr>
<td>Mastery Goals→Withdrawal</td>
<td>-.34***</td>
<td>-.27***</td>
<td>-.07*</td>
</tr>
<tr>
<td>Mastery Goals→Avoidance of Challenges</td>
<td>-.28***</td>
<td>-.20***</td>
<td>-.08**</td>
</tr>
<tr>
<td>Mastery Goals→Rehearsal</td>
<td>.48***</td>
<td>.22***</td>
<td>.25***</td>
</tr>
<tr>
<td>Mastery Goals→Elaboration</td>
<td>.49***</td>
<td>.25***</td>
<td>.24***</td>
</tr>
<tr>
<td>Performance Approach Goals→Engagement</td>
<td>-.12***</td>
<td>-.17***</td>
<td>.05***</td>
</tr>
<tr>
<td>Performance Approach Goals→Withdrawal</td>
<td>.21***</td>
<td>.23***</td>
<td>-.02*</td>
</tr>
<tr>
<td>Performance Approach Goals→Avoidance of Challenges</td>
<td>.15***</td>
<td>.17***</td>
<td>-.03*</td>
</tr>
<tr>
<td>Performance Approach Goals→Rehearsal</td>
<td>ns</td>
<td>ns</td>
<td>.08***</td>
</tr>
<tr>
<td>Performance Approach Goals→Elaboration</td>
<td>.08*</td>
<td>ns</td>
<td>.07***</td>
</tr>
</tbody>
</table>

*Note.* Total effects: the effects between achievement goals and outcomes with no mediators; direct effects: the effects between achievement goals and outcomes with mediators; indirect effects: the effects between achievement goals and outcomes that happen through mediators; ns: not significant. *p<.05. **p<.01. ***p<.001.

### The Effects of MSR Strategies on Outcomes

Detailed results among predictors, mediators and outcomes are summarized in Table 16 and Table 17. As shown in Table 16, all six MSR strategies showed positive relationships with engagement, rehearsal and elaboration, indicating that students who used any of the six MSR strategies tended to be more engaged and to utilize both rehearsal and elaboration strategies for retaining information.

In addition, three of the MSR strategies showed interesting additional relationships with outcomes. Performance/extrinsic self-talk, and interest enhancement were positively and negatively related to avoidance of challenges, respectively. Efficacy enhancement was negatively related to both withdrawal in the face of difficulties and avoidance of challenges.

### The Effects of Achievement Goals on MSR Strategies

As shown in Table 17, the results indicated that mastery goals were related to all six MSR strategies. The strongest relationship was between mastery goals and mastery self-talk,
followed by efficacy enhancement, performance/extrinsic self-talk, performance/relative ability self-talk, relevance enhancement and interest enhancement. Performance approach goals were related to all the MSR strategies except for mastery self-talk. The strongest relationship was between performance approach goals and performance/relative ability self-talk, followed by performance/extrinsic self-talk, efficacy enhancement, relevance enhancement and interest enhancement. In addition, the magnitude of path coefficients from mastery goals to MSR strategies was larger than those from performance approach goals.

**Total Effects of Achievement Goals on Outcomes**

As shown in Table 16, mastery goals were linked to a positive profile of students’ cognitive and behavioral engagement. Specifically, mastery goals were positively related to engagement, rehearsal and elaboration whereas negatively related to withdrawal in the face of difficulties and avoidance of challenges. Performance approach goals, however, were in general linked to a negative profile of students’ cognitive and behavioral engagement. Specifically, performance approach goals were negatively related to engagement and positively related to withdrawal in the face of difficulties and avoidance of challenges. There was one exception: performance approach goals were positively related to one of the cognitive strategies—elaboration. In addition, mastery goals had stronger relationships with outcome variables than performance approach goals did among this sample.
**Table 16**

**The Total Effects of Achievement Goals on Outcomes and the Effects of MSR Strategies on Outcomes**

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Involved Engagement</th>
<th>Withdrawal</th>
<th>Avoidance of Challenges</th>
<th>Rehearsal</th>
<th>Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predictors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Achievement Goals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastery goals</td>
<td>.57***</td>
<td>- .34***</td>
<td>- .28***</td>
<td>.48***</td>
<td>.49***</td>
</tr>
<tr>
<td>Performance approach goals</td>
<td>- .12***</td>
<td>.21***</td>
<td>.15***</td>
<td>- .03</td>
<td>.08*</td>
</tr>
<tr>
<td><strong>MSR Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastery self-talk</td>
<td>.30***</td>
<td>- .09</td>
<td>- .09</td>
<td>.52***</td>
<td>.40***</td>
</tr>
<tr>
<td>Performance/Extrinsic Self-talk</td>
<td>.14***</td>
<td>.08</td>
<td>.10*</td>
<td>.27***</td>
<td>.14&quot;</td>
</tr>
<tr>
<td>Performance/Relative Ability Self-talk</td>
<td>.20***</td>
<td>- .07</td>
<td>- .04</td>
<td>.34***</td>
<td>.27***</td>
</tr>
<tr>
<td>Interest Enhancement</td>
<td>.21***</td>
<td>- .04</td>
<td>- .09*</td>
<td>.37***</td>
<td>.30***</td>
</tr>
<tr>
<td>Relevance Enhancement</td>
<td>.20***</td>
<td>- .02</td>
<td>- .06</td>
<td>.43***</td>
<td>.43***</td>
</tr>
<tr>
<td>Efficacy Enhancement</td>
<td>.26***</td>
<td>- .13*</td>
<td>- .15**</td>
<td>.45***</td>
<td>.42***</td>
</tr>
</tbody>
</table>

*Note. All path coefficients are standardized. *p<.05. **p<.01. ***p<.001

**Table 17**

**The Effects of Achievement Goals on MSR Strategies**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predictors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastery goals</td>
<td>.62***</td>
<td>.55***</td>
<td>.52***</td>
<td>.30***</td>
<td>.44***</td>
<td>.56***</td>
</tr>
<tr>
<td>Performance approach goals</td>
<td>.03</td>
<td>.22***</td>
<td>.31***</td>
<td>.10**</td>
<td>.12**</td>
<td>.17***</td>
</tr>
</tbody>
</table>

*Note. All path coefficients are standardized. *p<.05. **p<.01. ***p<.001

**The Role of MSR Strategies as Mediators**

Although the improvement in model fit as a result of adding in MSR strategies was not great enough to compensate for the increased model complexity, the partial mediation model did fit the data significantly better than the direct path model (p<.001). In general, the effects of mastery goals on outcomes were partially mediated by MSR strategies in all six models.
Specifically, the effects of mastery goals on engagement, rehearsal and elaboration were partially mediated by all six MSR strategies. In addition, the effects of mastery goals on avoidance of challenges were partially mediated by interest enhancement and efficacy enhancement; the effects of mastery goals on withdrawal in the face of difficulties were partially mediated by efficacy enhancement.

In contrast, the effects of performance approach goals on only two outcomes were mediated by MSR strategies. Specifically, the effects of performance approach goals on elaboration were fully mediated by all MSR strategies except for mastery self-talk. In addition, the effects of performance approach goals on avoidance of challenges were partially mediated by performance/extrinsic self-talk.
CHAPTER V

DISCUSSION

Students inevitably will encounter learning situations that challenge their motivation. What should they do to maintain their level of motivation for continual task engagement and eventual goal attainment? For example, during a very academically challenging period of time, a student said she would persist and not give up and keep telling herself to deemphasize the outcome and focus on digging the fun and enjoyment during the process. This is an example of using mastery self-talk to actively regulate one’s motivation, which has important implications for students’ learning (e.g., Pintrich, 2000a). The current study contributes to the literature by examining the nature and effectiveness of a series of MSR strategies on a broad range of outcomes.

The six MSR strategies examined in the current study showed different patterns of relationships with engagement, withdrawal in the face of difficulties, avoidance of challenges, rehearsal and elaboration. In addition, mastery goal oriented students differed from performance approach goal oriented students in their navigation of amotivating situations, as indicated by different patterns and strengths of the relationships between achievement goals and MSR strategies. Furthermore, this study is the first to examine the mediating role of MSR strategies in the effects of achievement goals on students’ cognitive and behavioral engagement.

To summarize the findings to the three research questions, results showed that a) the six MSR strategies had both similar and unique relationships with cognitive and behavioral engagement, b) mastery goals were related to all strategies with medium to strong effects whereas performance approach goals were related to five out of six strategies (except for mastery self-talk) with small to medium effects, and c) mediation hypothesis was partially confirmed.
That is, while the partial mediation model provided a better fit to the data than the direct model, AIC and BIC revealed the slight improvement was not sufficient to offset the increased level of complexity in the mediated model design.

The Relationships Between MSR Strategies and Outcomes

The current results indicated that students’ endorsement of mastery self-talk, performance/extrinsic self-talk, performance/relative ability self-talk, interest enhancement, relevance enhancement and efficacy enhancement were likely to boost their motivation to stay engaged and more involved cognitively by using strategies such as rehearsal and elaboration.

In particular, mastery self-talk, interest enhancement, efficacy enhancement, relevance enhancement had larger path coefficient values with involved engagement, rehearsal and elaboration. These four types of MSR strategies reflect students’ effort to regulate intrinsic motivation that is inherently related to the task completion (Wolters, 1998). Among them, mastery self-talk had the largest path coefficient value with involved engagement, rehearsal and elaboration. This suggests that using intrinsic forms of MSR strategies, especially when students reminded themselves of the importance of learning for the sake of learning, was much more related to students’ heightened engagement and cognitive strategy usage.

In contrast, performance/extrinsic self-talk, performance/relative ability self-talk had much smaller path coefficient values with engagement, rehearsal and elaboration. These two types of MSR strategies reflect students’ regulation of extrinsic motivation that is outside of the task (Wolters, 1998). Among them, performance/extrinsic self-talk had the smallest value. This indicates that using extrinsic forms of MSR strategies, especially when students reminded themselves of the importance of obtaining good grades and doing better than others, was not very effective in making themselves more engaged in learning and using cognitive strategies. This
finding partially confirmed the results from a prior study, by Wolters (1998), which found intrinsic regulation strategies to be related to deeper cognitive strategy usage (i.e., elaboration, critical thinking, metacognitive strategies) whereas extrinsic regulation strategies were not.

However, although performance/extrinsic self-talk and performance/relative ability self-talk had comparatively smaller path coefficient values with involved engagement, rehearsal and elaboration, they were the most identified strategies to boost waning motivation among students in the current study. It is likely that because of the highly competitive and evaluative environment in the school and the culture, students may routinely remind themselves of the importance of getting good grades and outperforming other people, as a means to enhance motivation. Such a high endorsement of performance self-talk, however, is not unique to Chinese students; previous studies have found similar results. For example, Wolters and Benzon (2013) found that among 215 American university students, performance/extrinsic self-talk was the most often used strategy. Similarly, Schwinger et al. (2012) also found performance/extrinsic self-talk to be the most highly used strategy among both 11th and 12th grade German students and college German students. However, the results of the current study raised some concern over the high endorsement of performance self-talk to enhance dwindling motivation. In addition to the relatively weaker relationships with involved engagement, rehearsal and elaboration, performance/extrinsic self-talk had a weak but positive relationship with avoidance of challenge. This finding indicated that when students reminded themselves of the importance of getting good grades, they were also likely to avoid doing challenging tasks. Future studies should replicate the current findings and investigate the role of performance self-talk on more outcomes to inform educational practices.
Although performance/extrinsic self-talk was positively related to avoidance of challenges, performance/relative ability self-talk was not. This is interesting but consistent with research on achievement goals. Grant and Dweck (2003) found that outcome goals (focusing on doing well on a task such as getting a good grade) were significantly correlated with decreases in intrinsic motivation whereas normative goals were not. It is possible that students who reminded themselves of the importance of getting good grades tended to avoid challenges to make sure that they can get good grades. However, students who reminded themselves of the importance of outperforming others may not avoid challenges because challenges make them better students so that they can achieve their goals.

With regard to interest enhancement, the current study found that, in addition to the positive relationships with involved engagement, rehearsal and elaboration, it also had a weak but negative relationship with avoidance of challenges. Although previous research found potential costs (i.e., low cognitive strategy usage and low performance)(Schwinger et al., 2012; Wolters, 1999) associated with using the inherently effortful strategy of interest enhancement, the current study revealed a positive nature of interest enhancement strategy and supported Sansone et al. (1999)’s research that students who used interest enhancement were more likely to have enhanced situational interest in tackling challenging tasks with more persistence. However, the descriptive analysis provided additional interesting details about interest enhancement. Although interest enhancement has been proven effective and adaptive in the current study, it was the least identified strategy among students. The same results were found in previous studies among Western students as well (Schwinger et al., 2012; Wolters, 1999; Wolters & Benzon, 2013).
It is interesting that students were least likely to engage in interest enhancement strategy, albeit its adaptive role on students’ cognitive and behavioral engagement. There are several potential reasons. First, it was argued that students have conditional knowledge regarding whether it is a good idea to implement certain strategies in certain situations (Wolters & Benzon, 2013). It is possible that although students may have the declarative and procedural knowledge about interest enhancement, their conditional knowledge regarding interest enhancement indicate to them that it is not the most practical strategy to use in school. This is because interest enhancement strategies are inherently effortful and can be time consuming (Sansone & Thoman, 2006). However, these high school students are usually buried in a large amount of schoolwork (Liu, 2003), which makes finishing school work in a timely fashion essential. Therefore, although making the tasks more interesting is attractive, students may not be willing to exert extra time because the effort required to enact interest enhancement strategies may outweigh their benefits. Secondly, it is possible that because these students are high-achieving students and are primarily mastery oriented (Chan, 2008), they tend to view learning tasks as interesting and engaging without having to purposefully make it so. In contrast, it can also be the case that students may believe schoolwork “cannot” be interesting. In other words, because they do not expect schoolwork to be interesting, they do not have to justify their engagement in doing schoolwork based on the “interesting” aspect of the schoolwork. Therefore, they may not even try to make schoolwork more interesting. However, it is unclear exactly what are the reasons for the observed low endorsement of interest enhancement strategies; future research should examine the potential factors associated with this observed pattern.

With regard to efficacy enhancement, although its importance has been mentioned (Wolters & Benzon, 2013), the current study is the first empirical study that examined the effects
of efficacy enhancement on students’ learning outcomes. As shown in the results, in addition to the positive relationships with engagement, rehearsal and elaboration, efficacy enhancement was also negatively related to withdrawal in the face of difficulties and avoidance of challenges. Students who sought to boost their self-efficacy not only showed more behavioral and cognitive engagement but also heightened persistence in the face of difficulties and lower avoidance behavior of challenging tasks. This reflects the saying, “You can because you think you can.”

In sum, all six MSR strategies were useful in enhancing students’ engagement and their usage of rehearsal and elaboration, with some more effective than the others. In addition, interest enhancement and efficacy enhancement had broader relationships with outcomes, with efficacy enhancement being the most versatile MSR strategy.

Achievement Goals and MSR Strategies

As hypothesized, the results indicated that students’ achievement goals did serve as predictors of their endorsement of MSR strategies. This means students tended to use strategies that align with their motivational beliefs. Specifically, mastery goals were strongly related to all six MSR strategies and performance approach goals were related to five of six strategies (except for mastery self-talk) but to a much lesser extent.

As expected, mastery goal oriented students tended to remind themselves of the importance of learning as much as possible, to make the tasks more enjoyable, to find out how the tasks are relevant to their life and to reassure their ability to learn when things are getting tough. Similarly, as expected, students with performance approach goals tended to remind themselves of the importance of obtaining good grades and doing better than others, which is in line with their motivational beliefs.
While all of the obtained links are theoretically predicted, one interesting anomaly was found: mastery oriented students also utilized performance self-talk to motivate themselves. The existing two studies among American college students that investigated the relationships between achievement goals and MSR strategies have not reached consensus. Mastery goals were found to positively relate to performance/extrinsic self-talk in one study (Wolters & Rosenthal, 2000) but not in the other (Wolters & Benzon, 2013). No empirical study, however, has investigated performance/relative ability self-talk. The descriptive analysis adds another interesting detail about the sample. The high means of mastery goals and performance/extrinsic self-talk (highest among all six strategies) indicated that the students in this study were highly mastery goal oriented but often used performance/extrinsic self-talk (r=.48). It may be the case that the students have the declarative and procedural knowledge for certain strategies (Wolters & Benzon, 2013) but do not utilize all of them and favor some of them depending on the salient messages they receive from their environment. Their parents and teachers may have emphasized the importance of doing better than others and getting good grades, especially for those high-achieving students who are expected to go to good universities. Even though students were focused on mastery goals, they also often utilized performance self-talk for immediate effort toward boosting their motivation.

It is also interesting that performance approach oriented students also utilized efficacy, relevance and interest enhancement strategies that are usually viewed as intrinsic regulation strategies, although to a much lesser degree. Perhaps, using these strategies can serve their purpose of achieving their goal of demonstrating competence. However, performance approach goals were not related to mastery self-talk, which is consistent with previous findings among American college students (i.e., Wolters & Benzon, 2013; Wolters & Rosenthal, 2000). This
indicates that when students are focused on demonstrating competence, reminding themselves of the importance of learning for the sake of learning is not a salient strategy to boost motivation. This can be concerning because in the current study, mastery self-talk was a strategy that had the largest path coefficient values with engagement, rehearsal and elaboration.

A closer examination of the strength of the path coefficients revealed that mastery goals had stronger relationships with MSR strategies whereas performance approach goals were weakly related to them. Based on the research studies of Pekrun et al. (2006), mastery goals have been related to activity-related emotions (e.g., enjoyment, boredom) whereas performance approach goals were linked to outcome-related emotions (e.g., pride). Thus, it is likely that students with mastery goals are process oriented. Such a focus on the process may lead mastery-oriented students to frequently attend to their experiences during the learning process. When motivation is dwindling, they seek to utilize a variety of strategies to enhance their motivation for continued cognitive and behavioral engagement. However, it is likely that performance approach goal oriented students are outcome oriented. Wolters et al. (1996) argued that performance approach goal oriented students were more likely to focus on the learning materials that can lead them to success without attending to how interesting the materials were. Therefore, students with this type of goals may not attend to their subjective experiences during the learning process. Therefore, some of them may use MSR strategies whereas others may not, resulting in a weak relationship between performance approach goals and MSR strategies.

In sum, mastery oriented students were more likely to take actions using a variety of MSR strategies, including performance self-talk, to maintain an optimal level of motivation in amotivating learning situations. Performance approach oriented students were less likely to
engage in effortful regulation of their motivation compared to mastery goals. Note that performance approach goals were not related to mastery self-talk.

**Achievement Goals and Cognitive and Behavioral Engagement**

The results have clearly shown the positive role of mastery goals. Students who focused on learning, improving and developing competence were more likely to be engaged, to use cognitive strategies and were less likely to withdraw in the face of difficulties or avoid challenges. Except for the weak positive relationships with elaboration strategy ($\beta=.08$, $p<.05$), the current study has consistently shown the maladaptive nature of performance approach goals. Students who focused on demonstrating competence were less likely to be engaged in class and were more likely to withdraw in the face of difficulties and avoid challenges.

In the achievement goal literature, there is a debate between two groups of researchers over whether performance approach goals should also be promoted among students (e.g., Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Midgley, Kaplan, & Middleton, 2001). Results regarding the relationships between performance approach goals and outcomes have been in general inconsistent. Some have shown performance approach goals to be related to adaptive outcomes whereas others found performance approach goals to be related to maladaptive outcomes (e.g., Meece et al., 1988; Midgley & Urdan, 2001). However, the positive relationships between performance approach goals and adaptive outcomes are limited in the scope of adaptive outcomes (i.e., effort, achievement) and the beneficiary groups (i.e., college students) and also have disturbing costs attached (Linnenbrink, 2005; Shim & Ryan, 2005).

The current study confirmed the limitation in the adaptive outcomes associated with performance approach goals. Although performance approach goals have often been related to effort and achievement (e.g., Harackiewicz et al., 2002), they had maladaptive effects on
students’ engagement, persistence and choice of tasks in the current study among Chinese elite high school students. Promoting competition and performance approach goals seem to be the norm of many cultures and have come to be accepted by parents and educators. However, the results of many studies including the current one indicate that such competition-focused goals, ironically, may not be effective in enhancing engagement or promoting various motivational strategies. Furthermore, the current findings have also indicated some costs and negative consequences of performance-approach goals. Thus, goal researchers should be cautious in generalizing implications and informing educational policies related to promoting performance approach goals.

**MSR Strategies as Mediators**

Although the correlations among MSR strategies indicated medium to high correlations, factor analysis showed that similar to the results found among Western samples, MSR strategies were distinct and shown to support the proposed factor structure among Chinese high school students as well.

The current study is the first to study the role of MSR strategies as mediators. The results suggested that partial mediation models were the best fitting models, indicating that part of the effects of achievement goals on the outcomes were mediated by students’ engagement in strategies to regulate their motivation. Although students’ achievement goals can directly impact students’ cognitive and behavioral engagement, when people’s motivation is challenged, they deliberately and actively operationalize their overarching motivational beliefs into tangible strategies for motivation enhancement, which in turn, influence their cognitive and behavioral engagement.
However, all six partial mediation models had higher AIC and BIC than the direct path model, indicating that although adding in the mediators improved the model fit, such an improvement was not great enough to offset the penalty for the increased model complexity (Kline, 2011). This is likely because although MSR strategies contributed to the explanation of the variance among outcome variables; achievement goals were much more important predictors. This can be seen by comparing the R square values of outcome variables in the partial mediation and full mediation models. When only mediation paths from the predictors to the outcomes (i.e., full mediation model) were modeled, the R square values of outcome variables were smaller than those of partial mediation models in which both direct paths and mediation paths from predictors to outcome variables were modeled. It can also be because the mediation existed mostly between mastery goals and outcomes, but not as much between performance approach goals and outcomes. Therefore, MSR strategies mediated a limited number of the relationships between predictors and outcomes, resulting in a small model fit improvement that is not enough to compensate for the increased model complexity.

In sum, model fit indices did not provide a definitive conclusion regarding model comparisons. Model chi-square comparisons indicated that having MSR strategies as partial mediators between achievement goals and outcomes did significantly improve the model fit. Therefore, the role of MSR strategies as mediators supported the theoretical proposition. However, it should be with caution to suggest the importance of the mediating role of MSR strategies because of the associated increase in model complexity. Considering this is the first study that investigated such a mechanism, future studies should replicate the current study to test the mediating role of MSR strategies between motivational beliefs and students’ outcomes and compare the results of different model fit indices before any definitive conclusion can be drawn.
Additional Findings About the Relationships Among Achievement Goals

In addition to the major findings, the current study also showed additional interesting findings regarding achievement goals. The correlation statistics indicated that performance approach goals and performance avoidance goals were highly positively correlated \((r=.83)\) among this sample. Such a high correlation suggested that as the desire to outperform other students increases, the fear of showing incompetence also increases.

This finding of a high correlation between performance approach goals and performance avoidance goals has been supported by prior research as well. Zusho et al. (2005) found that among Asian American (58% of Chinese origin) college students in the US, performance approach and performance avoidance goals were highly correlated \((r=.71)\). Similarly, Murayama et al. (2009) found higher correlation between performance approach and performance avoidance goals among Japanese than Canadian college students. Murayama (2003) found higher correlation between performance approach and performance avoidance goals among Japanese than American samples. Tao and Hong (2000) found a correlation of .59 among Hong Kong Chinese college students. Murayama and Elliot (2009) found among Japanese junior high and senior high school students that performance approach and performance avoidance were highly correlated \((r=.61)\). In sum, it is rather common to find higher correlations between these two types of performance goals among Asian samples. It is currently being debated whether these two constructs are indeed separable (Murayama et al., 2011).

The relatively high correlation between performance approach and performance avoidance goals is not surprising. A significant feature of Chinese culture is collectivism, which emphasizes the importance of obedience, respect for parents and other authority figures and more importantly filial piety more than their European counterparts (Fuligni, 2001; Fuligni & Zhang,
Therefore, educational achievement is not just an individual endeavor that only brings honor to the individual achiever; but also carries social meanings and brings honor to socially significant others such as parents and their family at large (Chao & Tseng, 2002). Chinese families value educational achievement; thus, academic success is an important avenue for one to “fulfill their filial obligation” (Fuligni, 2001; Tao & Hong, 2000). High filial obligation that orients Asian students or students with Asian background to bring honor to the family can also trigger a fear of failure to lose face for the families which can lead to the adoption of performance avoidance goals (Chen & Stevenson, 1995; Keys et al., 2012; Witkow & Fuligni, 2007). In addition, the high competition and highly evaluative environments in China may make scoring high and not looking bad equally important, especially when students are linking their success to the success of their social groups (i.e., family) (Sun & Hernandez, 2012).

There were also positive yet small correlations between mastery goals and performance approach goals ($r=.15$) and between mastery goals and performance avoidance goals($r=.21$), indicating that as students’ desire to learn for the sake of learning increases, their desire to outperform other students and their fear of showing incompetence also increases. Such a finding may suggest that the Chinese students in the current study endorsed more than one achievement goal (Pintrich, 2000b). Students may simultaneously endorse multiple goals although a particular goal can be dominant (Pintrich, Conley, & Kempler, 2003). For example, students who espouse mainly mastery goals can also endorse performance approach goals and performance avoidance goals.

China attaches tremendous importance to education and has high expectations of effort and achievement from students (Tao & Hong, 2000). However, the highly competitive nature of
Chinese education system (Salili, 1996) and the high filial obligation (Fuligni, 2001; Tao & Hong, 2000) in China’s society attach other meanings to learning and achieving (Tao & Hong, 2000). Students with the desire to learn and master materials are likely to strive to achieve mastery as well as demonstrate their competences, outperform others (Ho & Hau, 2008) and avoid demonstrating incompetence so that they can bring honor to their family. Therefore, it is likely that students who endorse mastery goals also endorse performance approach and performance avoidance goals, resulting in the positive correlations among them.

This observed multiple goal endorsement, however, is not unique to the current sample or to Asian culture. Although prior research has found negative or non-significant correlations among achievement goals (e.g., Bong, 2009; Elliot et al., 1999), these studies are rare. Instead, research has often found positive correlations among achievement goals. For example, positive correlations have been found among 7th and 8th grade White, Hispanic, and Vietnamese students in the US (r=.17)(Keys et al., 2012), among 10th grade students with Latino, Asian and European American background in the US (r=.32)(Witkow & Fuligni, 2007), among 7th grade Hong Kong Chinese students (r=.12 for math and r=.15 for English)(Ho & Hau, 2008), among Korean female high school students (Kim et al., 2010), and among Japanese junior and senior high school students (r=.21)(Murayama & Elliot, 2009),

An interesting pattern of the means of achievement goals (i.e., the mean of performance avoidance goals was higher than that of the performance approach goals) was found in the current sample. Although previous studies have not specifically tested the significance in the mean differences among goals, such a pattern of the ranking of the means is often observed within Asian sample but rare among US sample. For example, research among Asian students usually found higher means of performance avoidance goals than performance approach goals
(e.g., Kim et al., 2010; Murayama & Elliot, 2009) whereas performance approach goals often had higher means than performance avoidance goals among US students (e.g., Lee et al., 2003; McGregor & Elliot, 2002; Study 2: Pekrun et al., 2006). High-ability students are not an exception to the trend. A prior study reported that the fear of failure among Asian American students was the highest for the most achieving students (Steinberg, Dornbusch, & Brown, 192). This is consistent with the collective culture that values avoiding negative outcomes and fitting in (Elliot et al., 2001). In Asian countries that greatly value education and have fierce competition among students, avoiding showing incompetence can be a salient goal because it may have both personal and familial value. However, to be confident in its cultural implications, cross-cultural comparison studies should be conducted on this matter and the mean differences among achievement goals should be statistically tested.

**Limitations and Future Directions**

Several limitations have to be addressed in the current study. First, the current study is a correlational study. Therefore, no causal inferences are warranted. Social cognitive self-regulated learning theory posits that students’ motivational beliefs affect students’ choice of motivational strategies in the control phase. However, it is possible that the declarative and procedure knowledge that students received from the socialization process regarding motivational strategies direct them to adopt certain achievement goals. Ning and Downing (2010) conducted a two-wave longitudinal study among 581 first year business undergraduates at a Hong Kong university and they found the reciprocal relationships between students’ motivation and self-regulatory strategies. In particular, students’ self-regulatory strategies also influenced students’ motivation later on. Future studies can consider longitudinal studies to examine the issue of directionality and potential reciprocal relationship between achievement goals and MSR strategies.
Second, the current study used survey research method. Due to its convenience, surveys have been most frequently utilized in research studies. However, survey research has its limitations. For example, it is assumed that the participants will view items or experimental conditions the same as how the researchers define them (Kaplan & Maehr, 2007; Urdan & Mestas, 2006). However, this may not always be true. In addition, surveys may limit students’ response choice or feed information into students’ mind. For instance, the current study limited students’ choice to six strategies that are focused on the regulation of important motivational beliefs. However, it is possible that students endorse other strategies (Wolters & Benzon, 2013). For example, it is possible that students try to enhance their motivation by reminding themselves of the importance of character building (i.e., “the very fact that I don’t want to do it is the very reason I should keep doing it and do it well. If I cannot even overcome these trivial problems, I will not be able to achieve my ultimate goals.”). Similarly, it is also possible that students do not usually utilize these strategies under normal situations but were triggered by the survey items. Future studies can incorporate research methods such as interviews and direct observations to have a more comprehensive and accurate understanding of students’ MSR strategy usage (Wolters et al., 2011).

Third, as the social cognitive self-regulated learning model suggests, students who are actively engaged in self-regulation (control phase) must possess metacognitive awareness about themselves and the tasks (monitor phase) (Pintrich, 2000a). Therefore, students’ engagement of MSR strategies might be moderated by their metacognitive knowledge about their motivation (Wolters & Benzon, 2013). Future research can examine the potential role of metacognition as a moderator of the relationships between achievement goals and MSR strategies.

Fourth, the current study was conducted among elite high school students. These students
are characterized with high achievement and high motivation. Future studies can validate whether the patterns from the current study can be generalized to other samples with students of varied achievement and motivation level. It is also suggested that future studies examine whether the relationships between achievement goals and MSR studies are moderated by students’ level of achievement and motivation. It is possible that students who are not achieving and have low motivation will not care enough to even try to regulate their motivation (Wolters, 2003).

Fifth, future studies could further expand our understanding of MSR strategies by including more outcome variables. Emotions, for example, would be interesting for future research to examine. Strategies aimed to enhance students’ motivation may change their subjective experiences during task completion. In addition, the nature and effectiveness of different MSR strategies may have different implications for students’ achievement emotions.

Conclusion

All students are likely to encounter learning situations that challenge their motivation. This study contributes to the literature that students can actively utilize MSR strategies to enhance situational motivation and different MSR strategies have different implications. The findings of the current study are particularly informative for adolescence, during which students’ achievement motivation tends to decline (e.g., Shim, Ryan, & Anderson, 2008).

There are two take-home messages from the current study. First, MSR strategies served as the tangible behaviors that operationalize students’ overall achievement goals and mediate the influence of achievement goals on students’ cognitive and behavioral engagement. Teachers and parents should provide students with the declarative, procedural and conditional knowledge related to a variety of MSR strategies and encourage students to frequently reflect upon their level of motivation and engage in MSR strategies when they are needed. Teachers and parents
should also model MSR strategies themselves, especially intrinsic MSR strategies such as mastery self-talk, interest enhancement, relevance enhancement and efficacy enhancement.

Second, the current study clearly showed that the benefits of performance approach goals in promoting MSR strategies were offset by the maladaptive effects on engagement. Under the current Chinese education system with such a salient emphasis on performance approach goals (Tao & Hong, 2000), it would be practically challenging to dissuade teachers and parents from emphasizing performance approach goals. However, it is important to inform them the potential cost associated with promoting performance approach goals. Maybe instead of trying to eliminate performance approach goals, teachers and parents can focus on promoting and modeling mastery goals. It is ironic that teachers and parents can help students get good grades by shifting students’ focus from getting good grades. Research on parental achievement goals (e.g., Friedel et al., 2007) and parenting styles (e.g., Gonzalez, Holbein, & Quilter, 2002) provides practical tips for promoting desirable forms of achievement goals among students.
REFERENCES


Contextual Influences (pp. 45-67). Melbourne and Hong Kong: Australian Council for Educational Research and the Comparative Education Research Centre, University of Hong Kong.


students in Singapore: Structure and relationships with achievement motives, goals and

Chao, R., & Tseng, V. (2002). Parenting of Asians. In M. H. Bornstein (Ed.), *Handbook of
Mahwah, NJ: Erlbaum.

Development, 60*, 551-561.

Comparative Study of Asian-American, Caucasian-American, and East Asian High

practices, and learning motivation to academic competence in Chinese children. *Merrill-
Palmer Quarterly, 54*, 1-22.

Academic Press.


Washington, DC: AERA.


Kong: Australian Council for Educational Research and the Comparative Education Research Centre, University of Hong Kong.


### APPENDIX A

**Achievement Goals**

Please indicate whether the following statements are true of you. If they are Not at all true of you, please choose 1; if they are Slightly true of you, please choose 2; if they are Somewhat true of you, please choose 3; if they are True of you, please choose 4; if they are Very true of you, please choose 5. Please fill the circle of the number you choose. ◯ → ●

<table>
<thead>
<tr>
<th></th>
<th>Not at all True</th>
<th>Slightly True</th>
<th>Some–what True</th>
<th>True</th>
<th>Very True</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Mastery Goals:** Items 1, 4, 7, 10, 13

**Performance Approach Goals:** Items 2, 5, 8, 11, 14

**Performance Avoidance Goals:** Items 3, 6, 9, 12
APPENDIX B

Motivational Self-Regulation Strategies

Please indicate whether the following statements are true of you. If they are Not at all true of you, please choose 1; if they are Slightly true of you, please choose 2; if they are Somewhat true of you, please choose 3; if they are True of you, please choose 4; if they are Very true of you, please choose 5. Please fill the circle of the number you choose. ● ➔ ●

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Not at all True</th>
<th>Slightly True</th>
<th>Somewhat True</th>
<th>True</th>
<th>Very True</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I tell myself that I should keep working just to learn as much as I can</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>I remind myself about how important it is to get good grades.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>I think about doing better than other students in my class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>I persuade myself to keep at it just to see how much I can learn.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>I tell myself that I need to keep studying to do well in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>I tell myself that I should work at least as hard as other students.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>I challenge myself to complete the work and learn as much as possible.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>I convince myself to keep working by thinking about getting good grades.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>9</td>
<td>I keep telling myself that I want to do better than others in my class.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>I convince myself to work hard just for the sake of learning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>I think about how my grade will be affected if I don't do my reading or studying.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>12</td>
<td>I make myself work harder by comparing what I'm doing to what other students are doing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>13</td>
<td>I tell myself that I should study just to learn as much as I can.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>14</td>
<td>I remind myself how important it is to do well on the tests and assignments in this course.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>15</td>
<td>I think about trying to become good at what we are learning or doing.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>16</td>
<td>I make studying more enjoyable by turning it into a game.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>17</td>
<td>I tell myself that it is important to learn the</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
material because I will need it later in life.

18 I tell myself that I will be able to understand and remember this course material.

19 I try to make a game out of learning the material or completing the assignment.

20 I try to connect the material with something I like doing or find interesting.

21 I tell myself, "I can do this!"

22 I try to get myself to see how doing the work can be fun.

23 I think up situations where it would be helpful for me to know the material or skills.

24 I remind myself that I usually do fine on exams and/or other course assignments when I stay on track with my studying.

25 I make doing the work enjoyable by focusing on something about it that is fun.

26 I try to make the material seem more useful by relating it to what I want to do in my life.

27 I think about my strengths and the resources that I can draw upon to help me with difficult course material.

28 I think of a way to make the work seem enjoyable to complete.

29 I try to make myself see how knowing the material is personally relevant.

30 I tell myself I am a competent person.

31 I make an effort to relate what we’re learning to my personal interests.

Mastery self-talk: Items 1, 4, 7, 10, 13, 15

Performance/Extrinsic self-talk: Items 2, 5, 8, 11, 14

Performance/Relative ability self-talk: Items 3, 6, 9, 12

Interest Enhancement: 16, 19, 22, 25, 28

Relevance Enhancement: 17, 20, 23, 26, 29, 31

Efficacy Enhancement: 18, 21, 24, 27, 30
APPENDIX C

Cognitive and Behavioral Engagement

Please indicate whether the following statements are true of you. If they are Not at all true of you, please choose 1; if they are Slightly true of you, please choose 2; if they are Somewhat true of you, please choose 3; if they are True of you, please choose 4; if they are Very true of you, please choose 5. Please fill the circle of the number you choose.

1. I listen carefully in class.
2. I try very hard in school.
3. The first time my teachers talk about a new topic I listen very carefully.
4. I pay attention in my classes.
5. I pay close attention when reading.
6. I am engaged when doing homework.
7. I discuss ideas from my readings or classes with others outside of class.
8. I figure out why I got something wrong only when the teacher makes me do it.
9. When the work is difficult, I just do what is easy.
10. When I don’t understand my work, I give up and do something else.
11. When I study, I sometimes skip the hard parts.
12. When I don't understand my work, I just give up trying to reach my goal.
13. When I study, I prefer to do work that is easy.
14. When I don't understand my work, I admit to myself that I can’t deal with it, and quit trying.
15. I would avoid difficult class work whenever possible.
16. When I study, I practice saying the material to myself over and over.
17. When I study, I pull together information from different sources, such as lectures, readings and discussions.
18. When studying, I review my class notes and the
I try to relate ideas in one subject to those in other courses whenever possible.

I memorize key words to remind me of important concepts in class.

When reading for classes, I try to relate the material to what I already know.

When I study, I memorize the important terms.

When I study for classes, I write brief summaries of the main ideas from the readings and the concepts from the lectures.

I try to understand the class material by making connections between the readings and the concepts from the lectures.

I try to apply ideas from course readings in other class activities such as lecture and discussion.

**Involved engagement:** Items 1, 2, 3, 4, 5, 6, 7

**Withdrawal in the face of difficulties:** Items 8, 10, 12, 14

**Avoidance of challenges:** Items 9, 11, 13, 15

**Rehearsal:** Items 16, 18, 20, 22

**Elaboration:** Items 17, 19, 21, 23, 24, 25