Teacher Goal Endorsement, Student Achievement Goals, and Student Achievement in Mathematics; a Longitudinal Study

Matthew D. Deevers
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TEACHER GOAL ENDORSEMENT, STUDENT ACHIEVEMENT GOALS
AND STUDENT ACHIEVEMENT IN MATHEMATICS: A LONGITUDINAL STUDY

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DOCTOR OF PHILOSOPHY IN URBAN EDUCATION
at the
CLEVELAND STATE UNIVERSITY
May, 2010
DEDICATION

This work is dedicated to my wife, Shannon, and to my three children: Marin, Bailey and Riley. Without their unending support, patience and sacrifice, I would never have attained such an ambitious goal.

I would also like to dedicate this work in memory of my father, Chris Paul Deevers. He instilled in me an uncompromising commitment to pursuing mastery. My achievement is his legacy.
ACKNOWLEDGMENTS

I would like to thank the members of my committee for their feedback, suggestions and support during this process. My co-chairs, Dr. Joshua Bagaka’s and Dr. Rosemary Sutton, have provided invaluable guidance through several drafts, iterations and revisions of this work. These two professors are the embodiment of mastery goal endorsement, maintaining high standards and even higher levels of support for every student lucky enough to learn from them. The remaining members of the committee include Dr. Jeremy Genovese, Dr. E. Michael Loovis, and Dr. Michael Horvath. It has been a great privilege to learn from and work with each of these individuals throughout my studies and my research. I hope that, in this work, all of my committee members can see the contributions they have made to my growth.

As my advisor, Dr. Joshua Bagaka’s has been a mentor, a coach and a friend for over a decade. I am indebted to him for all he has done.

Ms. Wanda Pruett-Butler handles the questions, crises, e-mails, setbacks and other needs of students in this program with patience and style. I hope she knows how important she is to the success of this program and its students.

Personally, I have had the advantage of a supportive family and a network of friends and colleagues while working through this project. My wife, Shannon, and my children have made this work possible through the sacrifices they have made in time and
attention. Shannon has, in essence, completed this entire program with me, sharing ideas, challenges and triumphs every step of the way. She has been a great partner to me.

Mr. Sean Folk has also endured more hours of conversation related to Achievement Goal Theory than should be expected of any one person. His friendship, support and insight have been a constant throughout my work.

There is no doubt that I have been able to reach this high by standing on the shoulders of giants. I would like to acknowledge the pioneering work of Carol S. Dweck, and to thank Dr. Rosemary Sutton once again for navigating me through my initial understanding of that work. Additionally, the work of Rick Stiggins gave me a framework for understanding some of the critical dynamics at play in a classroom when teachers ask students to achieve any goal. Without scholars such as these, my thoughts would have never taken shape.
TEACHER GOAL ENDORSEMENT, STUDENT ACHIEVEMENT GOALS
AND STUDENT ACHIEVEMENT IN MATHEMATICS: A LONGITUDINAL STUDY

MATTHEW D. DEEVERS

ABSTRACT

This study investigated relationships among teacher practices, student motivation and student achievement on standardized mathematics assessments using an Achievement Goal Theory framework. From 2006 through 2009, 800 public school students participated in mathematics assessments and completed surveys measuring perceptions of teacher practices and student achievement goal orientations. Hierarchical linear modeling (HLM) was used to assess relationships among teacher goal endorsement practices, student goal orientations, and student mathematics achievement. Findings indicated teacher mastery goal endorsement was positively related to student mastery and performance-approach orientations, and negatively related to student performance-avoidance orientation. Performance goal endorsement was positively related to student performance-approach and performance-avoidance orientations. Student mastery goal orientation was positively related to initial mathematics achievement and to rates of improvement over time. Performance-approach and performance-avoidance goal orientations were negatively related to initial mathematics achievement. The study recommends teachers endorse mastery goals to promote student mastery goal orientation and increased mathematics achievement.
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CHAPTER ONE

INTRODUCTION

Understanding the ways teachers influence student motivation, behavior or achievement is the core purpose of most educational research. The purpose of this study was to investigate the relationships among teachers’ practices, students’ motivation and students’ academic achievement in one public school district. Achievement can be viewed as the product of ability and motivation within a given context. While ability can explain the capacity to achieve, an understanding of motivation is needed to explain the behaviors and dispositions that lead to specific achievement outcomes. This study used the social psychology construct of revised Achievement Goal Theory (Barron & Harackiewicz, 2003) to understand the contributions of teacher practices (achievement goal endorsement) to student motivation (achievement goal orientation) and student achievement in mathematics. The following paragraphs will define the ways in which achievement goal endorsement, student achievement goal orientation and student achievement were defined within this study.
School Achievement Goal Endorsement

Students tend to perceive two general patterns of teacher practice or goal endorsement within the achievement goal framework. These practices represent the motivational context in which students are situated. The practices reflect teachers’ tendency to endorse the pursuit of goals related to either learning and improvement or performance and competition. The endorsement of learning and improvement means that “emphasis is given to the understanding of school work, to skill acquisition, to effort, and to personal improvement,” which can be contrasted with a school’s tendency to emphasize “the importance of high grades and external rewards, social comparison and competition among the students” (Gonida, Voulala, & Kiosseoglou, 2009, p. 54). Within the achievement goal theory framework, the former set of practices is referred to as mastery goal endorsement, and the latter is referred to as performance goal endorsement.

It is reasonable to assume that schools use “a mixture of messages and cues that can influence the endorsement of both mastery and performance goals” (Pintrich, Conley, & Kempler, 2003, p. 327). Since mastery goal endorsement and performance goal endorsement may be salient to varying degrees within a school, the measurement of both endorsement practices presents a more comprehensive view of a school’s instructional climate.

Student Achievement Goal Orientation

Just as schools may tend to endorse the pursuit of multiple goals within an achievement setting, students tend to be oriented toward the adoption of multiple achievement goals to varying degrees. Students’ achievement goals within this
framework are referred to as mastery orientation, performance-approach orientation and performance-avoidance orientation (Grant & Dweck, 2003). Similar to the notion of mastery goal endorsement, mastery oriented individuals seek to develop competence and focus on self-improvement. When students hold performance-oriented goals, they tend to either approach or avoid performance. Performance-approach oriented individuals seek to demonstrate competence relative to peers or publicly recognized standards; performance-avoidance oriented individuals seek to avoid demonstrating a lack of skills or competence within achievement settings (Barron, 2000). These individual achievement goal orientations can be viewed as situated within a hierarchy of goals and individual identity constructs (DeShon & Gillespie, 2005). Achievement goals tend to be a popular focus of study because they are more directly related to observable academic behaviors than global needs (e.g. esteem) or principle aspirations (e.g. social value) (DeShon & Gillespie, 2005). Some observable academic behaviors related to achievement goal orientations include variations in help-seeking (Butler, 1998; Butler & Neuman, 1995; Butler & Shibaz, 2008; Newman, 1998; Nielsen, 2008; Ryan & Gheen, 1998; Ryan & Pintrich, 1997; Ryan, Pintrich, & Midgley, 2001; Smiley & Dweck, 1994), task completion (Ng, 2006), and intrinsic motivation and persistence (Agbuga & Xiang, 2008; Guan, Xiang, McBride, & Bruene, 2006; T. Urdan, Pajares, & Lapin, 1997).

Findings from previous research suggest students’ achievement goal orientations are related, at least to some extent, to individual differences (Dweck & Leggett, 1988; E. S. Elliott & Dweck, 1988; Grant & Dweck, 2003; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000) as well as contextual factors (Lynley Hicks Anderman & Anderman, 1999; Fryer & Elliot, 2007; Midgley, Anderman, & Hicks, 1995). This type of research –
where the purpose is to understand the sources of students’ achievement goals – is referred to as *goals as outcomes* research. The first aim of this study was to determine the extent to which perceptions of school achievement goal endorsement practices predict students’ achievement goal orientations in one public school district over four academic years.

Student Achievement

Because individual achievement goal orientations are associated with variations in academic behaviors, one question addressed in this study was the extent to which goal orientations predict variations in academic achievement itself. Research conducted for this purpose is referred to as *achievement as outcomes* research. Most studies within achievement goal research investigate relationships between achievement goals and other psychological factors defined as achievement outcomes (e.g. interest, self-reports of cognitive strategy use). Other studies define achievement in terms of student work completion, course grades or student grade point average. Few studies, however, have investigated the relationships between students’ achievement goal orientations and achievement on standardized assessments. Student achievement within this study is defined through student scores on standardized mathematics assessments. In light of federal and state educational accountability polices, the results of this study can help inform educators about the ways in which policies and practices may influence valued educational outcomes. This was the second aim of the current study: to determine the extent to which student achievement goal orientations predict academic achievement outcomes on one standardized mathematics test over time.
Figure 1 presents a theoretical framework for the current research. The figure also indicates consensus from previous research regarding the relationships among teachers’ goal endorsement practices, students’ achievement goal orientations, and students’ academic achievement.

**Figure 1: Theoretical framework for current research.**

Note: solid lines represent consensus regarding relationships between variables; dotted lines indicate inconsistent findings.

Inconsistencies emerge within the field depending on study participants (e.g. school age children, university students, adults), settings (e.g. clinical studies, field research) and the definition of outcomes (e.g. psychological measures, grades/GPA, tests).

Motivation research in an era of accountability

For over 25 years, from the publication of *A Nation At Risk* (1983) to the authorization of the *No Child Left Behind Act* ("No Child Left Behind Act of 2001", 2001), legislative and political energies have focused intently on student learning outcomes such as test scores and collective rates of proficiency among groups of students. As a result, student motivation can become a secondary consideration within
policy and pedagogical debates. The motivation to achieve precedes achievement itself, however. Therefore, determining the effects of student motivation on academic achievement is a valuable pursuit. Likewise, understanding the extent to which school context (e.g., goal endorsement) may influence student motivation (achievement goals), and thereby achievement, can provide teachers, educational leaders and policy makers with a means for establishing positive climates which promote growth for all students.

While research into motivation in social and achievement settings has been conducted for decades (Church, Elliot, & Gable, 2001; Nicholls & Burton, 1984; White, 1959), there has certainly been a greater interest in measuring achievement without considering factors associated with motivation. For instance, the word “motivation” appears only seven times in the 670-page No Child Left Behind Act (2001), the largest and most influential federal legislation regarding America’s public schools since the 1960s. For comparison, the words “test” and “achievement” appear 123 and 538 times, respectively, within the same document. With policy makers so focused on outcomes in education, it is understandable that less attention is paid to the precursors to those outcomes, such as motivation.

Achievement Goal Theory has been inconsistently defined from both personality and social psychology perspectives (for a review, see Deshon & Gillespie, 2005). Additionally, many motivation studies use self-reported behaviors (e.g., self-regulation, self-handicapping), or other psychological factors (e.g., task interest) as their outcomes. When achievement itself is measured as an outcome within the literature, it is typically defined in terms of course grades or scores on locally developed assessments. Course grades and achievement on locally developed assessments can also be significantly
predicted by personality traits (Heaven, Ciarrochi, & Vialle, 2007; Zweig & Webster, 2004) and intelligence (Laidra, Pullman, & Allik, 2007), factors found to be relatively stable over the lifespan. For motivation to be considered a central contributor within the achievement debate, research must be able to demonstrate the ways in which motivational factors significantly contribute to academic achievement on multiple measures, particularly with regard to achievement on standardized tests. If individual student motivational factors can be reliably measured and linked with variations in growth or achievement on valued, standardized outcomes, motivation may become more central to the debates regarding school reform and improvement. This study sought to determine if such relationships exist in a particular school district, and attempted to explain the extent to which teachers’ goal endorsements within school settings influence students’ achievement goal orientations.

**Statement of the Problem**

This study investigated relationships among teacher goal endorsement in school settings, student achievement goal orientations, and student academic achievement on a standardized mathematics test. Student motivation measures are based on constructs from contemporary Achievement Goal Theory (Barron, 2000; Elliot, 1999; Grant & Dweck, 2003; Pintrich, 2000b). Achievement Goal Theory suggests that within an achievement context, students tend to hold one or several goals for their own achievement. Individuals can be oriented to either approach mastery, or to approach or avoid performance. Mastery oriented individuals seek to develop increasing levels of competence in achievement settings. Performance oriented individuals seek either to
demonstrate current levels of competence (approach), or to avoid demonstrating incompetence (avoidance). Because both performance-approach and performance-avoidance orientations are concerned with the demonstration of competence, some studies have found them to be distinct, but highly correlated, constructs (Grant & Dweck, 2003). Achievement goal orientations have been associated with individual differences (e.g. age, gender). This is reasonable, given the fact that individuals may feel as though they are in competition for valuable resources (e.g. esteem) as they age. Investigating the ways in which goal endorsement predicts achievement goal outcomes beyond the person-level variable of age was a central issue within this research.

This study analyzed results from survey data collected from students within a medium-sized public school district in northeast Ohio from 2006 through 2009. This longitudinal investigation into the influences of context and goal orientations on standardized measures can help to clarify the value of achievement goal research in an era of accountability. Motivational data represent student responses from the school district’s annual student survey. Academic achievement data represent student scores on standardized mathematics assessments administered semi-annually to students across the school district.

Assumptions

Several assumptions underlie this study. First, the researcher assumes that students within this sample are representative of students within the school district population as a whole. A second assumption is that the assessments used to measure student achievement within the study, namely test scores, are both valid and reliable.
Lastly, it is assumed that the motivation measures used within the study represent actual, measurable psychological constructs. Many of the items in the student surveys were adapted from established measures, adding to the validity of the constructs.

**General Research Questions**

1. Do perceptions of school-wide teacher achievement goal endorsements predict variations in students’ achievement goal orientations beyond the effects of student age?

2. Do students’ achievement goal orientations predict achievement outcomes on standardized mathematics assessments?

**Definitions and Operational Terms**

As previously stated, student motivational constructs are based on contemporary achievement goal theory (Pintrich, 2000a, 2003; Pintrich et al., 2003). Individuals’ achievement behaviors within a given context (e.g. school) can be understood through the achievement goal orientations they hold.

Mastery Orientation: mastery goals are also referred to as learning goals and task goals in goal literature; individuals holding mastery goals are oriented toward developing or cultivating increasing levels of academic competence with a focus on growth or improvement over status.

Performance-Approach Orientation: performance-approach goals have also been defined as ego goals, in which the individual is oriented toward demonstrating academic competence, relative to peers or recognized standards.
Performance Avoidance Orientation: performance-avoidance goals emerged as a distinct construct within the revised achievement goal framework, and represent goals directed at avoiding the demonstration of a lack of competence.

Mastery Goal Endorsement: general perceptions of teacher practices in which the pursuit of mastery goals is implicitly or explicitly supported (e.g. teachers emphasizing the importance of students understanding their work, recognizing students for improvement and providing constructive feedback).

Performance Goal Endorsement: general perceptions of teacher practices in which the pursuit of performance approach goals are implicitly or explicitly supported (e.g. recognizing students who earn the highest grades; placing a heavy emphasis on getting the right answer).

Mathematics Achievement: Measured through student scores on the Measures of Academic Progress (MAP), a norm-referenced, standardized test developed by the Northwest Evaluation Association. This adaptive, computerized assessment provides a continuous, scaled score for mathematics achievement measured from second through tenth grade.

Age: student age will be measured through student grade level

Significance of the Study
Motivation within achievement contexts has been researched for decades. However, several unanswered questions remain which were addressed through this study.

Studies have, in the past, used self-report variables (e.g., intentions, task value) or local measures of achievement (e.g. grades, GPA) as typical outcomes (DeShon & Gillespie,
2005). The scope of most studies also tends to be confined to one academic year, at most. For example, Turner, Meyer et al. (2002) studied students’ perceptions of classroom environment on students’ reports of avoidance strategies. The study’s outcomes were confined to self-report measures and classroom grades. Similarly, Greene et al. (2004) conducted a longitudinal investigation into the ways in which classroom perceptions and motivation predicted high school students’ cognitive engagement and achievement. In that study as well, classroom grades and student self-reports of engagement served as the outcomes, which spanned only several months during a spring semester. Studies in which classroom grades, grade point average and self-reports of behavior are the measured outcomes can be limited in that they fail to establish links between motivational constructs and standardized measures. Those studies also overlook social factors that may be related to the assigning of course grades. Wolters (2004) studied the relationships between classroom context, achievement goal orientations and student achievement using both class grades and performance on curriculum-based tests. That study, however, was confined to one year and assessed students’ achievement goal orientations at one point in time.

This study contributes to a greater understanding of the nature of motivation within a school context by studying general perceptions of teacher practices and students’ achievement goal orientations over time, and by identifying relationships among achievement goal orientations and achievement on standardized mathematics assessments.

The question of whether achievement goal orientation is predictive of achievement on standardized assessments remains largely unanswered. Such measures
are currently at the center of attention among school leaders and policy makers. The data available for this study span multiple years and grade levels, reflecting students’ individual achievement goal orientations and perceptions of school contexts. Studying student achievement patterns in mathematics from standardized assessments establishes the predictive validity of achievement goal orientation to academic achievement, and also the ways in which school achievement goal endorsement influence achievement goals, and therefore academic achievement.

**Delimitations and Limitations of the Study**

Students in the study participated in the district’s student survey process each year. Sampling issues within the study were limited only to those students who were absent during the survey process and to survey inconsistencies within school buildings. Items from the annual student survey used for this study included those that were germane to the research, namely factors related to student goal orientations and teacher goal endorsing practices. All data used in the study came from archived data.

Due to the longitudinal nature of the study, individuals who were not enrolled in the district for multiple years were not included in all analyses. Although the sample size for this study is large relative to other studies of this nature, it is confined to one suburban public school district. Issues related to generalizability are addressed in the discussion and recommendations. Because the study will not include randomization or manipulation of variables, it is difficult to make inferences of causation. This limitation will also be addressed in the discussion and recommendations.
CHAPTER TWO
LITERATURE REVIEW

This review will define contemporary achievement goal theory and trace its historical development in educational research. The chapter will be divided into four parts. The review will first highlight the establishment and evolution of achievement goal theory as a theory of motivation in educational psychology. An examination of the influences of teacher goal endorsement on student achievement goal orientation (goals as outcomes) will follow. Sections on academic behaviors and academic achievement as outcomes related to achievement goal orientations will demonstrate the contributions achievement goal theory can make to student achievement in an era of high standards and accountability.

The establishment and evolution of achievement goals in motivation research

This section will trace the evolution of achievement goal theory from early articulations of competence motivation (White, 1959) through the contemporary, revised multiple goals perspective (Harackiewicz & Linnenbrink, 2005; Pintrich, 2000b; Pintrich et al., 2003).
White (1959) defined competence as “an organism’s capacity to interact effectively with its environment” (p. 297), and understood “an independent exploratory motive” (p. 298) as an innate, adaptive behavior. This motive identification was an early articulation of what could later be viewed as a mastery or task-centered orientation. White suggested children are innately mastery oriented and driven to engage in activities in order to achieve increasing levels of competence, especially in novel situations. This competence motivation was theorized as separate from other innate drives (e.g. hunger), in that “interest is pursued precisely at those times when major needs are in abeyance” (p. 315). White viewed mastery orientation to be at its peak when needs for survival were met. This was not to say, however, that competence motivation was a secondary drive, since “an autonomous capacity to be interested in the environment has great value for the survival of a species” (p. 315). While competence motivation is highest when basic needs for survival are met, the innate exploratory drive of organisms makes the meeting of those survival needs more likely. White also acknowledged “narrower but efficient learnings that go with the reduction of strong drives…are certainly an important element in capacity to deal with the environment, but a much greater effectiveness results from having this capacity fed also from learnings that take place in quieter times” (p. 327).

White’s (1959) foundational theories would eventually support the work of revised Achievement Goal Theory, in which it is believed that maximum achievement may be attained through the adoption of multiple goals within a learning environment (Harackiewicz & Linnenbrink, 2005; Pintrich, 2000b, 2003; Pintrich et al., 2003). Some of those goals are related to exploration and growth (e.g. mastery) and others are related
to expediency (e.g. performance). White’s work was among the earliest to view competence motivation as innate, rather than a response to external stimuli.

Another early articulation of motivation as an internal drive rather than a reaction to external stimuli was the establishment of the Need for Achievement (McClelland, Clark, Roby, & Atkinson, 1949). While this need was established as a global facet of motivation triggered by experiences with success and failure, the early research recognized that “success and failure must be in relation to some achievement goal which the [students] have for themselves” (p. 251). This was contrasted with physiological needs, such as hunger, which could be induced through the denial of food. This early research highlighted the importance of goals and their ability to direct behavior and perceptions, but did not hypothesize as to the nature of those goals (e.g. goals directed at developing or demonstrating competence). Later research measuring the need for achievement found it to be significantly correlated with mastery, performance-approach and performance-avoidance goals, having the strongest relationship with mastery goals (Zusho, Pintrich, & Cortina, 2005).

Research that led to the articulation of achievement goal theory was based in observations of individuals’ cognitive, affective and behavioral responses to failure (e.g., Deiner & Dweck, 1978, 1980; E. S. Elliott & Dweck, 1988). In response to failure, individuals were observed to respond in either helpless or mastery-oriented ways. Helpless individuals in clinical situations tended to attribute failure to external factors, whereas individuals who exhibited mastery-oriented responses to failure were “directed towards the attainment of a solution… less concerned with explaining past failures and more concerned with producing future successes” (Deiner & Dweck, 1978). Further
investigations into patterns of learned helplessness behavior revealed helpless individuals engaged in ineffective strategies for solving problems, viewed failures as more predictive of future outcomes than successes, and attributed success to luck rather than to strategy, effort or ability (Deiner & Dweck, 1980).

Elliott and Dweck (1988) proposed that variations in patterns of responses to success and failure (i.e. helpless versus mastery) could be attributed to the specific goals individuals were pursuing within achievement settings. The first articulation of those goals were “(a) performance goals, in which individuals seek to maintain positive judgments of their ability and avoid negative judgments by seeking to prove, validate or document their ability and not discredit it; and (b) learning goals, in which individuals seek to increase their ability or master new tasks” (p. 5). A study conducted with fifth-grade students created conditions in which perceived levels of current ability were manipulated to be either high or low on a pattern recognition task, and where instructions highlighted the value of either performing well (performance goal) or improving (learning goal) within that task. Results of the study indicated an interaction between perceived ability and performance goal orientation, such that individuals with low perceived ability in a performance goal condition were significantly more likely to attribute mistakes to a lack of ability, respond with negative affect and fail to find effective problem solving strategies. Individuals with high perceived ability in a performance condition, however, “persisted in attempts to find solutions and did not make attributions for failure or express negative affect” (p. 10) in the face of failure; they exhibited a mastery-oriented response to failure. High ability performance-oriented participants did not, however, choose to take advantage of additional opportunities to
increase their skills on tasks that would involve public mistakes. In a learning (mastery) goal condition, participants sought to increase their levels of competence and to pursue challenging tasks regardless of perceived levels of ability, and their problem-solving skills became more sophisticated. This study established the early articulation of achievement goals, and created the dichotomous learning (mastery) goal and performance goal framework.

In a review motivation literature, Dweck and Leggett (1988) articulated the ways in which goals predicted patterns of cognition, affect and behavior. Within achievement settings, performance-oriented individuals attributed feedback and achievement results to ability, whereas mastery-oriented individuals attributed feedback and achievement to strategy choice and effort. For performance-oriented individuals, a need to increase effort indicated a low level of ability, which would produce negative affect. That negative affect could lead to the withdrawal of effort in order to protect perceived ability (Tesser & Campbell, 1983). In contrast, the adoption of a learning goal “creates a focus on increasing ability and sets in motion cognitive and affective processes that promote adaptive challenge seeking, persistence, and sustained performance in the face of difficulty” (Dweck & Leggett, 1988, p. 262).

While this early articulation of achievement goal theory depicted mastery goals as more adaptive than performance goals, there were inconsistent findings about the deleterious effects of performance goals. In a similar review of literature, Nicholls (1984) found “good evidence of the predicted effects of ego versus task involvement when difficulty is perceived as moderate, problems are clearly defined, and time periods are relatively short. Compared to task involvement, ego involvement produces lower
performance in low-perceived-ability individuals and equal or higher performance in high-perceived-ability individuals” (p. 341). There appeared to be general acceptance of the adaptive nature of mastery-oriented goals, and an unstable effect of performance-oriented goals.

Harackiewicz, Barron et al (1998) proposed an expanded and refined achievement goal framework that included independent approach and avoidance performance orientations. In a pair of clinical studies, university undergraduate students were assigned to four conditions (performance-approach, performance-avoidance, performance-neutral and mastery) and given a series of puzzles to solve. Dependent variables within the study included participants’ intrinsic motivation to solve puzzles, and process and performance self-report measures. With performance-avoidance as a distinct goal orientation, results revealed varying patterns of task involvement between performance-avoidance oriented participants and participants within the performance-approach and mastery oriented conditions. Task involvement mediated the effects of goal orientation on time spent solving puzzles and enjoyment of the task, such that performance-avoidance oriented individuals invested less time and reported lower levels of enjoyment. Performance-approach goals within the study were as adaptive as mastery-oriented goals, and were related to increased task involvement, increased time dedicated to puzzle solving and increased enjoyment. This was the earliest research connecting performance-approach goals with adaptive academic behaviors in ways similar to mastery goals, which led to the establishment of the three-goals basis of revised achievement goal theory. The Patterns of Adaptive Learning Scales (Midgley et al., 1998), an instrument consistently
used to assess achievement goals in educational research, measures these three goal orientations as distinct constructs.

It is worth noting that some (e.g. A. J. Elliott & McGregor, 2001) have proposed a 2 X 2 framework for assessing and understanding achievement goals. This included a mastery-avoidance orientation where “competence is defined in terms of the absolute requirements of the task or one’s pattern of attainment, and incompetence is the focal point of regulatory attention” (p. 502). Elliott and McGregor (2001) investigated the antecedents and consequences of each goal orientation. Consequences included cognitive processing (deep and shallow), subsequent goal orientations, health center visits (i.e. illness), exam performance and emotionality. Within the study, performance-approach goals were predictive of valued outcomes such as test scores, but were also correlated significantly with performance-avoidance goals. This balance between positive and potentially maladaptive outcomes highlights the fact that “performance-approach goals are difficult to investigate empirically, because they often become entangled with diverse motivational concerns beyond competence” (Elliot & Reis, 2003, p. 327). Mastery-approach goals in the study were predictive of deep processing, decreases in subsequent performance-avoidance orientation and student wellness, but were not predictive of subsequent academic achievement. Both avoidance orientations were predictive of detrimental outcomes, such as disorganization, low achievement, increased health center visits (i.e. decreased wellness), anxiety and emotionality. The presence of mastery-approach goals suppressed the relationship between performance-avoidance goals and health center visits, indicating that a mastery-approach orientation may mediate the effects of performance-avoidance goals. The antecedents to avoidant orientations
included fear of failure, parental focus on negative feedback and parental worry, and low self-determination (i.e. individual differences and goal endorsement of others). Neither mastery-approach nor performance-approach goals within the study were predictive of significant, negative outcomes. These findings have also been replicated in physical education settings (Chen, Wu, Kee, Lin, & Shui, 2009). However, mastery-avoidance goals are still a relatively underexplored and variably defined aspect of goal theory. This study used the triarchic model of achievement goal theory as the basis of investigation (Harackiewicz & Linnenbrink, 2005; Pintrich et al., 2003).

Early achievement goal research was limited in that it was rooted in a false dualism of personality and social psychology. Goals were viewed as either related to personality and individual differences or to the influences of social/contextual factors (for a discussion, see DeShon & Gillespie, 2005). Thorkildsen and Nicholls (1998) tested both perspectives by examining whether classroom teachers’ practices and individual student perceptions would follow similar patterns over time. Overall, differences in achievement goal orientations and related outcomes (e.g. satisfaction with schoolwork, interest, ability beliefs) were related to both psychological and sociological factors. Findings indicated “fifth graders’ motivational orientations are distinct from their perceptions of teachers’ expectations. Nevertheless, their beliefs about the causes of success have some relationship to both their personal identities and to their interpretations of the social world” (p. 195). The results of the study highlighted the importance of understanding goals from both personality and social psychology perspectives. Achievement goals appear to be products of both individual differences and contextual factors. The relationships between social (e.g. classroom) context and student
achievement goal orientations will be further explored in the next section of this chapter. One limitation of the study was that it surveyed students only at one point in time, so inferences could not be made about the extent to which goal endorsement causes variations in goal orientations longitudinally.

A similar study investigated the continuity of academic intrinsic motivation among students from middle elementary grades through the high school years to address whether changes in academic achievement motivation could be explained as a product of age (Gottfried, Fleming, & Gottfried, 2001). Over 100 students participated in this study at ages 9, 10, 13, 16 and 17, which measured the intrinsic motivation of students in general-verbal, mathematics, social studies, science and school in general. Intrinsic motivation within the study was operationally defined as “an orientation toward mastery; curiosity; persistence, task endogeny; and the learning of challenging, difficult, and novel tasks” (p. 5). This definition is most closely related to a mastery-goal orientation. Results from a path analysis indicated that “academic intrinsic motivation is a stable construct from childhood through late adolescence that becomes increasingly stable for both general-verbal and math areas” (p. 9). This seemed to support the individual differences perspective of motivation. That is, since individual students’ motivational profiles at each time were highly predictive of their profiles later in life, and those profiles became increasingly stable over time, they were more similar to personality traits. Although a similar decline was seen in science, there was not a significant decline in intrinsic motivation in social studies, leading the researchers to conclude “the decline in academic intrinsic motivation is not a general development or ontogenetic one, nor is it inevitable” (p. 10). This second finding from the study supported the social psychology
perspective of motivation, and pointed to the role that curricula and school practices play in the promotion of intrinsic motivation among individual students. The researchers concluded “children who begin this sequence with lower motivation during childhood are likely to be at a greater disadvantage over the age span” (p.10). Students low in mastery-oriented motivation are more vulnerable to the typical detrimental effects that age has on intrinsic motivation in school.

Several studies have highlighted similar trends in achievement goal orientation from both the individual differences and social psychology perspectives. Female students tend to be more mastery oriented than males (Meece, Glienke, & Burg, 2006; D. J. Stipek & Gralinski, 1991), and younger students tend to be more mastery oriented than older students (Lynley Hicks Anderman & Anderman, 1999; Middleton, Kaplan, & Midgley, 2004). This decline in mastery orientation coincides with the onset of adolescence and the transition to middle school. Some have found that variations in teacher beliefs and practices contribute to differences in achievement goal orientations (Midgley et al., 1995; Roeser, Midgley, & Urdan, 1996; Ryan et al., 2001; Turner et al., 2002; T. Urdan & Midgley, 2003). This research study sought to understand the extent to which school practices predict student motivation beyond the effects of age (i.e. the influence of context beyond individual differences). The specific influence of context on achievement goal orientation will be discussed in the next section.

School Context, Teacher Practices and Student Achievement Goal Orientation

This section will identify some of the factors that contribute to differences in teacher practices related to the endorsement of achievement goal pursuits, and the
influence teacher practices have on students’ achievement goal orientations.

Achievement goal theory provides a framework for understanding teacher practices and classrooms structures, which tend to endorse the pursuit of particular achievement goals (Ames, 1992; Ames & Ames, 1984).

An increased emphasis on test results has shifted the focus of public education to a set of discrete skills that can be easily measured through standardized tests (Goertz & Duffy, 2003; Gulek, 2003; Jones, 2001). This strong focus on achievement outcomes may lead to the de facto endorsement of performance goals within educational settings and a narrowing of the curriculum (Gunzenhauser, 2003). Such a narrowing may also result in changes in teacher practices. One study of four Midwestern high schools investigated the relationships between school-wide contextual factors and teachers’ instructional practices (Ciani, Summers, & Easter, 2008). Results indicated that “when schools overly stress the importance of high test scores, academic competition, and use the highest achieving students as models for all students, teachers may tend to feel less community, perceive less self-efficacy for using a variety of instructional strategies, and may be more likely to use performance-oriented instructional practices in the classroom” (p.551).

School-wide focus on performance outcomes is not the only variable predictive of teacher practices. Teachers’ beliefs about intelligence also predict their behaviors. A study of teachers’ beliefs about the nature of intelligence and their practices (Lee, 1996) found “entity teachers, who believe that intelligence is fixed, were revealed to treat students in a more biased and unfair way; on the other hand, incremental teachers, who believe that intelligence is malleable, were more likely to treat students in a fair and
appropriate way” (p. 8). The findings also describe the ways in which these beliefs predict variations in practices and the endorsement of particular achievement goals:

entity teachers are more likely to evaluate, grade, or give feedback based on their perceived ability of students; when they hold low expectations for target students, teachers tended to downgrade scores, underestimate and criticize ability, pay less attention to students, try to make them feel good with easy assignments, and prefer to track according to scores. Thus they implicitly establish a performance-oriented goal of teaching…incremental teachers are less likely to treat students on the basis of their perception and to judge or evaluate students’ potential with limited information. They diagnose what students need for better learning and set the goals of learning, that is, ‘any student can learn anything with enough effort’ (p. 8).

The above patterns of beliefs and practices have been consistently found in mathematics classes specifically. A similar study investigated the relationships between teachers’ beliefs about the nature of mathematics ability and mathematics instruction to their classroom practices and goal endorsements (D. Stipek, Givvin, Salmon, & MacGyvers, 2001). Beliefs within the study were categorized as traditional (e.g. emphasis on rules and procedures, focus on correctness) or inquiry-oriented (e.g. emphasis on problem solving and communication, focus on growth over status). Results indicated “the higher teachers scored on the traditional beliefs, the more they emphasized performance (e.g., getting correct answers, getting good grades) and speed in their classrooms, rather than learning and understanding. Teachers who held the more traditional beliefs also gave students relatively less autonomy and maintained a social context in which mistakes were something to be avoided” (p. 223). Along with the significant relationships the study established between teacher beliefs and practices, the findings suggest the endorsement of performance-approach goals may also lead to the intentional or unintentional endorsement of performance-avoidance goals within
classrooms. The impacts of such practices on student achievement goals were documented in similar study, which found students “using avoidance strategies significantly less in classrooms perceived as emphasizing learning, understanding, effort, and enjoyment…students reported higher incidences of avoidance strategies in classrooms in which teachers devoted little attention to helping build understanding and in which motivational support was low” (Turner et al., 2002, p. 102).

There is some evidence to suggest that teachers’ initial perceptions of students’ motivation may have an influence on teachers’ practices (Skinner & Belmont, 1993). “If left to run their typical course, teachers tend to magnify students’ initial levels of engagement. This is fine for students who enter the classroom motivationally rich…however, for students whose initial motivation is low, their typical classroom experiences may result in the future deterioration of their motivation” (p. 580).

As students age, they become more attuned to the goals endorsed within classrooms, and the relationship between goal endorsement and goal orientations becomes stronger (Middleton et al., 2004; Midgley et al., 1995). The transition from elementary school to middle school appears to be the time at which students are most attuned to teachers’ goal endorsement, especially the endorsement of performance goals. It is also a time when individual goal orientations are most predictive of variations in behaviors and achievement (Lynley H. Anderman, 2003; Lynley Hicks Anderman & Anderman, 1999; Bong, 2001; Hicks & et al., 1995; Middleton et al., 2004; Midgley et al., 1995; Pajares, Britner, & Valiante, 2000; Powell, 1997; Ryan & Shim, 2008; T. Urdan & Midgley, 2003; Zan, Lee, Solmon, & Tao, 2009). That is, research suggests that as students progress into middle school, the goals endorsed within classrooms become
increasingly predictive of students’ achievement goal orientations within those classrooms.

Elementary and middle school students’ achievement goal orientations are significantly related to the classroom goal endorsement of teachers (Lynley H. Anderman, 2003; Lynley Hicks Anderman & Anderman, 1999; Hicks & et al., 1995; Middleton et al., 2004; Midgley et al., 1995; Powell, 1997; D. Stipek & Feiler, 1995; T. Urdan & Midgley, 2003; T. Urdan et al., 1997). For elementary students, school goal endorsement predicts corresponding student goal orientations (e.g. performance endorsement only predicts performance orientation) (Midgley et al., 1995). Among middle school students, the relationships between goal endorsement and goal orientations become more nuanced. Mastery goal endorsement has been positively correlated with both mastery and performance-approach orientations; performance goal endorsement is positively related to performance-approach orientation and performance-avoidance orientation and negatively related to mastery goal orientation. This suggests that, although there may be a developmental tendency among adolescents or older learners to pursue performance goals regardless of school goal endorsement, the endorsement of performance goals may decrease the likelihood that students will adopt mastery goals for learning. In other words, the endorsement of mastery goals may not preclude students from being oriented toward performance, but the endorsement of performance goals may indeed discourage the adoption of mastery goals (Midgley et al., 1995). Of perhaps even greater interest may be the extent to which performance endorsements predict the adoption of a performance-avoidance orientation (Bong, 2000; Gonida et al., 2009; Leondari & Gonida, 2007; Middleton & Midgley, 1997). This is a reasonable outcome in
light of findings that the endorsement of performance goals leads to decreases in efficacy beliefs among students (Midgley et al., 1995).

Within a university setting, students were just as likely to adopt performance-avoidance goals as they were to adopt performance-approach goals when the focus of instruction was on evaluation over engagement (Church et al., 2001). Middle school students high in performance-approach orientation were more likely to report increases in avoidance orientations in a subsequent school year as the school goal endorsements shifted more toward a performance orientation (Middleton et al., 2004). There is some evidence to suggest that the endorsement of performance goals in classrooms is perceived to be unfair and leads to decreases in the motivation to learn (Thorkildsen & Nolen, 1994).

Student achievement goal orientations are not always direct products of school goal endorsement. There may be a natural tendency for students to become increasingly performance-oriented even when teachers and schools endorse mastery goals (Midgley et al., 1995). There is still adequate evidence to suggest, however, that changes in classroom and school goal endorsement predict corresponding changes in students’ goal orientations (James & Yates, 2007; Roeser et al., 1996; T. Urdan, 2004; T. Urdan & Midgley, 2003).

In summary, the goals endorsed in a learning environment may indeed predict variations in students’ goal orientations, but it may be that only the negative effects of goal endorsement are significant over time. While teachers may tend to endorse performance goals as a means to encourage higher achievement, research tends to suggest there may be more unintended consequences that occur. School mastery goal
endorsement is predictive of students’ mastery goal orientation, but school performance goal endorsement may lead to increases in performance-avoidance orientation as well as performance-approach orientation (Gonida et al., 2009) and also to increases in self-consciousness (Roeser et al., 1996). In an academic setting that focuses on the development of competence, directing one’s energy toward personal growth seems a very reasonable response. There is minimal risk of failure in such a setting. Students are also free to pursue performance goals if they are so inclined, since there is neither a positive nor a negative consequence for doing so. This explains why students may tend to report increases in performance-approach orientations even in a mastery-endorsement context.

When what is endorsed is the demonstration of ability or competence, however, the adoption of a performance-avoidance goal orientation is just as reasonable as the adoption of a performance-approach goal orientation, particularly if students are also concerned with protecting a sense of self (Jagacinski & Nicholls, 1990; Thompson, Davidson, & Barber, 1995).

Urdan and Maehr (1995) highlighted the ways in which social goals may interact with achievement goals as adolescent students transition to middle school. Tracking students based upon ability and achievement becomes a prominent practice in middle school. Students placed in higher tracks may view the demonstration of competence as a more valued outcome than students in a lower track, since it was that very demonstration of competence that earned them their place in the social setting. On the other hand this may also create a tendency for students to adopt performance-avoidance goals. They may seek to avoid demonstrating a lack of competence in order to protect their social status as a high-achiever. These patterns of responses to goal endorsement and goal
contexts become critical to an understanding of student behavior and achievement in a learning environment. The next sections of this chapter address the behavioral and academic outcomes typically associated with student achievement goals.

Achievement Goals and Behavioral Outcomes

Within the contemporary achievement goal framework, there is consensus that students with high mastery goal orientations consistently select adaptive learning strategies, persist in the face of challenges, and engage in more self-regulated behaviors (Dupeyrat & Mariné, 2005; Grant & Dweck, 2003; Greene & Miller, 1996; Pintrich, 2000b; T. Urdan & Midgley, 2001). Some research also suggests that mastery orientation is more predictive of the development of human capital skills among university students than intelligence. When students entered a university, having an achievement goal orientation directed at developing increasing levels of competence was more predictive of valued interpersonal skills and problem-solving abilities than a student’s intelligence quotient (Cote & Levine, 2000).

Performance-approach oriented students may tend to engage in shallow learning strategies (e.g., focusing on getting the right answer over understanding), demonstrate less cognitive engagement and show less intrinsic motivation and satisfaction after tasks. Other studies, however, have demonstrated that performance-approach oriented individuals may report increases in satisfaction in performance contexts (Senko & Harackiewicz, 2002). Especially among university students, holding a performance-approach orientation has also been predictive of higher course grades and overall grade point average (Barron & Harackiewicz, 2003; Harackiewicz, Barron, Carter, Lehto, &
Elliot, 1997; Harackiewicz et al., 1998; Harackiewicz et al., 2000; Harackiewicz, Barron, Tauer, & Elliot, 2002). This may be due to the fact that older students’ achievement orientations are more stable (Muis & Edwards, 2009). Older students may also be more resilient and less influenced by context in achievement settings.

Since performance-avoidance goals have been established as a separate construct within the field, there is little question within the literature regarding the maladaptive nature of these goals. Students holding a performance-avoidance orientation tend to avoid challenging situations or tasks in order to avoid demonstrating a lack of competence (Bong, 2000; Butler & Shibaz, 2008; Elliot & Covington, 2001; Elliot, Cury, Fryer, & Huguet, 2006; Middleton & Midgley, 1997; Ryan & Gheen, 1998; Sideridis, 2005; T. Urdan, 2004).

Within a learning context, seeking help can be an especially adaptive behavior. Not all individuals acquire the ability to conduct abstract reasoning or to solve complex problems independently. Help seeking provides individual students with resources for success they do not otherwise possess by accessing a teachers’ knowledge or the knowledge of a more skilled peer. Variations in patterns of behavior related to help seeking have been associated with variations in achievement goal orientations among students (Butler, 1998; Butler & Shibaz, 2008; Karabenick, 2003; Newman, 1998; Ryan & Pintrich, 1997).

In a study of middle school students, “students who were concerned with demonstrating their ability relative to others (performance-approach oriented) were more likely to report feeling threatened by their peers regarding help seeking” (Ryan & Pintrich, 1997, p. 334). Additionally, “students who were focused on goals external to
the task itself, either relative to ability or extrinsic motivation, were more likely to feel threatened by asking their teachers for help. In contrast, students who were focused on task mastery were less likely to report feeling dumb or threatened by asking teachers for help” (p. 335). Other studies (e.g. Middleton & Midgley, 1997) yielded similar results, revealing a consistent link between performance-approach oriented students and the avoidance of help-seeking. Pintrich (2000b), however, found that holding a high-performance orientation in combination with a high-mastery orientation predicted increased levels of perceived task value, positive affect and risk taking, along with decreased levels of self-handicapping. These findings supported the need for considering a multiple-goals perspective in achievement goal research (Pintrich, 2000a).

Goal orientation has also been predictive of variations in academic behaviors at the college level. For instance, one study found that “mastery approach goal orientation was directly related to instrumental help seeking and the preference for formal sources of assistance (teachers). Students who were concerned about their ability relative to their peers … were threatened by and avoided seeking help and did so to minimize effort” (Karabenick, 2003, p. 50).

There is also evidence to suggest performance-oriented students experience higher levels of anxiety within a testing environment (Elliot & McGregor, 1999), which can inhibit the demonstration of competence. Early research from a multiple goals perspective found students holding a multiple goals orientation (mastery plus performance) reported similar patterns of adaptive behaviors to those holding a predominance of just mastery goals (Valle et al., 2003).
In a performance setting, mastery-oriented students have been more likely to disengage from unsolvable tasks and to pursue more solvable tasks sooner than their peers (Aspinwall & Richter, 1997). This is considered an adaptive behavior in an achievement setting. In contrast, more contemporary research suggests that highly mastery-oriented students may pursue their own interests in a course at the expense of their grades and course-specific achievement (Senko & Miles, 2008).

In summary, past research has highlighted the fact that behavioral and emotional outcomes related to students’ mastery goal orientations are generally positive, and that behavioral and emotional outcomes related to performance-avoidance orientations are generally negative. The long-term relationships between performance-approach orientations and behavioral and emotional outcomes are still unclear, and remain a valuable topic of study in achievement goal research.

Achievement Goals and Academic Achievement Outcomes

One purpose of this study was to identify the ways in which teachers’ achievement goal endorsement and student achievement goal orientations contribute to academic achievement. This section will discuss those studies which have used academic achievement as outcomes in motivational research, with the greatest attention being paid to those studies employing the achievement goal framework. A limitation of achievement goal research is that studies seldom use measures of standardized achievement as outcome variables. A distinction is made here between local and standardized measures of achievement. Local measures shall be defined as class grades, grade point average and teacher-generated test scores. Standardized measures are norm-
referenced measures over which teachers or schools do not have control over the
development or scoring of the measures. The former is the most common measure in the
research literature; the latter is the most common measure of public accountability.

Grades and Local Measures as Outcomes

There is evidence to suggest that the effects of achievement goals are mediated
through perceived competence (Leondari & Gialamas, 2002). Students in junior high
school responded to survey items that measured implicit beliefs about intelligence,
achievement goals and perceived competence. The outcome variable in the study was
students’ average English and mathematics course grades taken from school records.
Within the study, the only direct paths found to achievement were between perceived
competence, gender and school level, such that younger students, females and students
with higher levels of perceived competence demonstrated higher achievement. Older
students in the study demonstrated lower levels of achievement. Perceived competence
mediated the effects of achievement goals on academic achievement. Mastery and
performance-approach orientations were positively related with perceived competence in
nearly identical way, and a performance-avoidance orientation was negatively related to
perceived competence. There was not a direct path between incremental beliefs about
ability, perceived competence and academic achievement. Rather, incremental beliefs
had the strongest relationship with mastery goals, and a slightly weaker relationship with
performance approach goals. This suggests “incremental beliefs influence academic
achievement indirectly through the adoption of a specific goal orientation” (p. 287). A
limitation of this study was that data were collected at one point in time, so it is impossible to infer any causality from the findings.

Little research has been conducted to determine the extent to which student motivation in general, or achievement goals in specific, predict academic achievement beyond the effects of student intelligence. One such study (Gagne & St Pere, 2001), investigated whether student motivation predicted academic achievement after controlling for IQ. This study was not conducted using an achievement goal framework. Rather, motivational variables included measures of student intrinsic and extrinsic motivation (Deci & Ryan, 2000) and persistence (Edwards, 1959). Participants included female students (n = 208) in eighth grade who completed two intelligence tests and self-assessments of motivational factors. Parents and teachers also provided assessments of motivational characteristics of the students. The outcome within the study was the pooled average course grades across four courses. Results indicated that aptitude (IQ) predicted academic achievement over student motivation at more than a 5:1 ratio. The results showed “no significant contribution of intrinsic or extrinsic motives, whether assessed by students themselves or rated by their parents, to the prediction of academic achievement” (p. 91). Aside from the obvious explanation that academic aptitude should clearly be predictive of academic achievement outcomes, another explanation for the findings may be attributable to the motivation variables used within the study. The intrinsic/extrinsic motivation paradigm, absent an achievement goal perspective, ignores the directionality or purpose of that motivation (e.g. to demonstrate or to cultivate competence, or to avoid demonstrating a lack of competence). Although students who are highly intrinsically motivated may tend to be more mastery oriented, that correlation
does not imply causation. Goals are more specific and more closely related to behaviors than general intrinsic/extrinsic motivation (DeShon & Gillespie, 2005). It is possible that a student could be extrinsically motivated to pursue mastery goals, just as a student could be intrinsically motivated to pursue performance-approach goals.

Among college students in an educational psychology class, meaningful cognitive engagement and shallow processing strategies mediated the effects of perceived ability and achievement goals on scores on a midterm exam (Greene & Miller, 1996). Path analysis indicated that a performance goal orientation predicted increases in shallow processing, which led to decreases in midterm scores. Mastery goal orientation and perceived ability were both highly correlated with meaningful cognitive engagement, which was predictive of higher midterm scores. A similar study conducted with university statistics students revealed positive relationships between mastery goal orientation, deep processing strategies and self-efficacy; performance goals were positively related to disorganization and test anxiety (Bandalos, Geske, & Finney, 2003). A limitation of both studies was that measures were gathered at one point in time. Additionally, a distinction was not made between the approach and avoidance dimensions of performance goals.

Phan (2009) conducted a study with third-year university educational psychology students (n = 275) that included both the approach and avoidance aspects of performance goals. Structural equation modeling was used to test the relationships between future time perspective (FTP), epistemological beliefs, achievement goals and the outcomes of effort, deep processing, surface processing and academic achievement. Achievement within the study was defined through the equal weighting of classroom grades and final
exam scores. Significant, positive paths were found between epistemological beliefs, FTP and all three achievement goal orientations (β range: 0.12-0.32). Mastery, performance-approach and performance-avoidance goals were all also predictive of student effort (avoidance orientation negatively predicted effort). In the study, performance-approach goals were positively related to student effort (β = 0.28). Mastery goals were positively related to deep processing (β = 0.35), as was FTP (β = 0.32). No variables significantly predicted surface processing strategies. The only significant paths to academic achievement in the study came from deep processing strategies (β = 0.21) and surface processing strategies (β = -0.15). These findings supported results from previous studies where students with varying achievement goal orientations may all exert effort in academic settings, but where the most adaptive patterns of behavior tend to be predicted through a mastery goal orientation (Karabenick, 2003).

Church, Elliot et al (2001) studied the roles that both classroom environment and achievement goals play in predicting graded performance among university students (n = 208). Students completed self-reports of achievement goal orientations (mastery, performance-approach, performance-avoidance), along with assessments measuring student perceptions of teacher practices. The practices were defined as lecture engagement (e.g. *The way the professor helps us learn holds my interest*), evaluation focus (e.g. *The professor is more concerned with our grades than what we learn*), and harsh evaluation practices (e.g. *The grading structures make it almost impossible to get an A in this course*). While this early research used the three-goals perspective at the student level, the researchers’ definitions of classroom environment did not align with contemporary achievement goal theory for teacher goal endorsement. Teachers’
evaluation focus was operationalized in terms nearly identical to performance-endorsing practices, but lecture engagement was more a measure of student interest or connection with the instructor than it was a reflection of the instructor’s explicit endorsement of mastery goals. Results indicated significant, positive relationships between student mastery goals and graded performance ($\beta = .20$, $p < .001$), and between performance-approach goals and graded performance ($\beta = .14$, $p < .001$). An interesting result of the study was that the teacher practice of evaluation focus was as closely related to the adoption of performance-approach goals as it was to the adoption of performance-avoidance goals. Performance-avoidance goals were significant, negative predictors of graded performance ($\beta = -.28$, $p < .001$). These results suggested that, while student adoptions of both mastery and performance-approach goals may be adaptive, the endorsement of performance goals by instructors may be just as likely to produce maladaptive outcomes (e.g. performance-avoidance) as adaptive outcomes.

Greene, Miller et al (2004) conducted an investigation with high school students ($n = 220$) in English classes, testing the predictive validity of a model that related classroom goal structures to student motivational outcomes and course grades at the end of a semester. Over a three-month period, participants completed a series of surveys measuring perceptions of teacher practices (providing motivating tasks, autonomy support and mastery evaluation), student achievement goal orientation (mastery and performance-approach only), and other measures of motivation and engagement (e.g. self-efficacy, cognitive engagement). Results from the study indicated that academic achievement was predicted by self-efficacy ($\beta = .38$, $t = 5.29$) and meaningful strategy use ($\beta = .15$, $t = 2.08$). Mastery goals were predicted by teachers’ motivating tasks ($\beta =
.34, \( t = 4.00 \), self-efficacy (\( \beta = .24, t = 4.08 \)) and perceived instrumentality of the class work for future goals (\( \beta = .44, t = 7.49 \)). The effects of mastery goals on academic achievement were mediated through the relationship between mastery goals and meaningful strategy use (\( \beta = .40, t = 5.62 \)). Within the model, performance-approach goals were predicted by self-efficacy (\( \beta = .22, t = 2.68 \)), but not by any perceptions of teachers’ instructional practices or by perceived instrumentality of class work. No direct paths were found between performance-approach goals and strategy use or academic achievement. The study highlights the complex relationships between teacher practices, motivational factors and achievement within the learning environment. One significant finding from the study included the lack of direct influence of teacher practices on students’ performance-approach goals, suggesting that a performance-approach orientation may be more attributable to individual differences than a mastery orientation. A limitation of the study included the inference that some variables influenced others when the work was entirely correlational. The authors noted “a stronger design would involve re-administering all of the instruments over time to more accurately get at causation” (p. 476).

Pintrich (2000) was among the first researchers to test a multiple goals perspective, in a longitudinal study with middle school students. Using semester grades in mathematics classes as an outcome variable, four types of students were identified using a multiple goals perspective: high mastery/low performance; high mastery/high performance; low mastery/high performance; and low mastery/low performance. Between the beginning of eighth grade and the end of ninth grade, students high in both mastery and performance goal orientations exhibited the highest levels of self-efficacy,
perceived task value and risk-taking, and the lowest levels of self-handicapping. Low-mastery/high performance oriented students appeared to the most vulnerable, reporting the lowest final levels of self-efficacy, task value, positive affect and risk-taking, along with the highest levels of self-handicapping strategies, by the end of ninth grade. These findings suggested the benefits of performance goals may only be realized in the presence of mastery goals. For students low in mastery but high in performance “it seems clear that their pathway through math classrooms was not a particularly easy or positive one. They were less confident, less interested, experienced less positive affect, and were more likely to report withdrawing their effort and engagement in difficult tasks over time” (p. 552). Interestingly, relationships between goal orientation and class grades did not reach a level of statistical significance within the study. The fact that performance goals were not parsed out into approach and avoidance orientations may explain this, and may also explain why students in the low-mastery/high performance group appeared so vulnerable over time. Another limitation in the study was that performance and mastery goals were dichotomized using mediate splits in order to accommodate the use of repeated measures analysis of variance (ANOVAs). This categorization technique sacrificed person-level variance at the expense of methodology, and also grouped students according to initial achievement goal orientation for the duration of the 3-wave study. While the study claimed to adopt a multiple goals perspective, the failure to consider student-level achievement goals as scaled predictor variables in fact ignored the individual and joint contributions of those goals to class grade outcomes. As Pintrich acknowledged, “hierarchical linear modeling analysis would allow for the use of continuous predictors
and the multiplicative interaction terms, thereby providing a much more accurate estimation of the effects of different goals than the median split analysis” (p. 553).

Particularly among college-aged students, several studies suggest that holding performance-approach goals may be just as adaptive as holding mastery goals, and that performance-approach goals may be more predictive of academic achievement (Harackiewicz et al., 1997; Harackiewicz et al., 1998; Harackiewicz et al., 2000; Harackiewicz et al., 2002; Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008). The following paragraphs will highlight this body of research.

Harackiewicz, Barron et al (1997) gathered survey data from university students in an introductory psychology course (n = 311) in several waves across one semester. The study examined the predictors of personality factors (gathered in wave 1) on achievement goal orientations (wave 2), and the consequences of achievement goal orientations for interest in coursework near the end of the semester (wave 3) and final course grades. The study also adopted a multiple goals perspective by considering the interaction effects between achievement goals on the outcomes. Although the study employed a three-goals perspective, the performance-avoidance goal construct was replaced with a work-avoidance orientation. Results suggested that the adoption of mastery goals was positively predicted by the person-level characteristics of workmastery (e.g. If I am not good at something, I would rather keep struggling to master it than move on to something I’m already good at). Performance-approach goals and work avoidance goals were both positively predicted by the personality factor of competitiveness (β = .42 and β = .20, respectively). Mastery goals were the only significant predictors of student interest (β = .19). Performance goals positively predicted students’ final grades (β = .21);
work avoidance goals negatively predicted final grades ($\beta = -.15$). No significant interaction effects were found in the study to support the multiple goals perspective. Rather, the findings suggested “successful negotiation of academic life at the college level may require a performance orientation in some contexts, but a mastery orientation in others, and the wisdom to know which one to adopt when” (p. 1293).

Building on their previous work, Harackiewicz, Barron et al (2000) studied the short- and long-term consequences of achievement goals on academic interest and achievement. Again, university students in introductory psychology courses ($n = 648$) participated in the study, which employed the technique of gathering survey data in repeated waves. The first wave of the study assessed students’ achievement goals (mastery, performance-approach and work avoidance) early in the semester. Successive assessments measured students’ study strategies (wave 2) and interests in coursework (wave 3). Outcomes included psychology course grades and student GPAs in the same semester, along with the total of psychology courses taken and student GPAs three semesters later. Short-term consequences of goal orientations revealed a pattern consistent with previous studies (Harackiewicz et al., 1997), with mastery goals being the single, positive predictor of course interest and performance-approach goals being the single, positive predictor of final grade in the course semester and semester GPA. However, when student interest was entered into the path model, the positive effects of mastery goal orientation on course grade were mediated through the effects of course interest. The only long-term effects of achievement goals on student GPA were those associated with performance-approach goals; the only long-term effects of achievement goals on interest were those associated with mastery goals. These findings led the
researchers to conclude “mastery and performance goals have independent, positive effects on different measures of success in college” (p. 327). The findings also suggested neither mastery nor performance-approach goals would be optimal independent of the other. That is, performance goals may predict grades, but not an interest in coursework; mastery goals may predict interest, but not success in coursework.

The reciprocal effects of interest and achievement goal orientation have been examined in more recent studies spanning longer periods of time (Harackiewicz et al., 2008). Employing the multiple-wave design again with university psychology students (n = 858), researchers gathered measures of students’ initial interest in psychology (wave 1), achievement goal orientations, including the performance-avoidance orientation (wave 2), and also interest in psychology near the end of the semester (wave 3). Outcomes included end of course grades, semester GPA, enrollment in subsequent psychology courses and overall psychology GPA for all psychology courses taken in subsequent semesters. Within the study, initial student characteristics of interest and achievement motivation predicted both mastery and performance-approach goal orientations, but the proportion of variance explained in students’ mastery goal orientation was more than twice that of students’ performance-approach and performance-avoidance orientations. Direct, positive relationships were found between students’ performance-approach orientations and final grades in the course; these relationships were approximately twice as strong as the direct, negative relationship found between performance-avoidance goals and final grades. The effects of mastery goals on final grades were mediated through student’s situational interest in the course midway through the semester. These findings were similar to earlier studies that pointed
to a reciprocal relationship between interest and mastery orientation, suggesting “mastery goals can be viewed as both a product and a predictor of interest, or as a mediating mechanism for the continued development of interest in a topic” (p. 117). Long-term consequences of goal orientations followed a similar pattern, where mastery goals were significantly related with increased situational interest, increased enrollment in subsequent psychology course and majoring in psychology; performance-approach goals were significantly related to a higher GPA in college psychology courses, mediated through the effects final grades in the introductory course. The work of Harackiewicz and her colleagues (Harackiewicz et al., 1997; Harackiewicz et al., 2000; Harackiewicz et al., 2002; Harackiewicz et al., 2008) has one notable limitation. Although their studies are longitudinal in nature, the studies gather reports of students’ achievement goal orientations at only one point in time, ignoring the possibility that achievement goals may be more state-like (for a discussion, see DeShon & Gillespie, 2005) and contextually influenced. For example, it is entirely plausible that first-year psychology students are more performance-oriented because of their recent competitive experiences with the college admissions process, scholarship applications and worries over maintaining their status as highly competent individuals. It is also possible that the achievement goal orientations of individuals change with time. Students could become more or less performance- or mastery-oriented as a result of their experiences, but the current body of research fails to address these questions.

The predominant approach to assessing and investigating multiple goals in classrooms has been the separate measuring of each achievement goal orientation among participants, and the examination of relationships between those separate orientations and
outcomes such as interest, strategy use or academic achievement. Daniels, Haynes et al. (2008) approached the multiple-goals concept using cluster analysis from initial student survey results. This approach created categories of students who held varying combinations of goals. K-means clustering allows for the grouping of students who are highly similar within groups and highly disparate between groups, an approach to categorization that is more valid than median splits (e.g. Pintrich, 2000b). Participants in the study included undergraduate students (n = 1002) who were clustered into four groups according to their mastery and performance-approach goal orientations (high-mastery/high-performance; mastery-dominant; performance-dominant; low-mastery/low-performance). Outcomes for the study included cognitive appraisals (expected achievement, perceived success), achievement emotions (enjoyment, boredom, anxiety) and academic achievement (psychology course grade, semester GPA). To control for individual differences, high school GPA, gender and age were entered as covariates in the study. From an achievement perspective, there were not significant differences between students in the performance, mastery or multiple-goals cluster. Only students in the cluster that represented low mastery and performance-approach orientation underperformed others.

From an emotional perspective, however, “students who espoused performance goals, even in combination with mastery goals, were more susceptible to anxiety than those who focused more exclusively on mastery goals or were low on both goals” (Daniels et al., 2008, p. 599). Findings from the study were significant in several respects. First, the use of cluster analysis allowed for the grouping of students while also considering a multiple goals perspective. Second, the potentially negative effects of
performance-approach goals were illuminated once initial achievement was considered. While there were academic benefits to holding a performance-approach orientation, they were no greater than those found among students who were high in mastery and low in performance orientation. This result led the researchers to conclude “programs and initiatives that encourage teachers to promote mastery goals and students to adopt mastery goals are important” (p. 605). There were two significant limitations to this study. The first limitation of the study was that student achievement goals were assessed at only one point in time. While the data were collected across a full academic year, the research design did not allow for the examination of the stability of achievement goal clusters within individuals. It is possible that students identified in a particular cluster might have belonged to a different cluster later in the year. A second limitation of the study was the failure to assess and consider students’ performance-avoidance goal orientations within the cluster analysis. The addition of the performance-avoidance orientation within the cluster analysis might have yielded a separate cluster that could explain the perceived vulnerability of performance-approach orientation within the study.

Much of the work suggesting the adaptive nature of a performance-approach goal orientation regarding graded achievement has been conducted with university students. Three recent studies (Shim, Ryan, & Anderson, 2008; Shu-Shen, 2005; Wolters, 2004) expanded this research into adolescent achievement.

Wolters (2004) investigated the influences of students’ perceptions of their mathematics classrooms on achievement goal orientations and subsequent academic achievement with middle school students (n = 525). Assessed perceptions of the classroom goal structures included teachers’ mastery and performance-approach goal
endorsement practices. Student motivational measures included mastery, performance-approach and performance-avoidance orientations, along with self-efficacy. Students also completed items related to choice (decisions to take other math courses), effort, persistence and procrastination. Outcomes for the study included students’ strategy use and their mathematics class grades at the end of the year. Standardized test scores from the previous school year were used as a control for initial ability. Findings from hierarchical regression analyses indicated students’ performance-approach goal orientation and self-efficacy were the only significant predictors of course grades beyond the effects of prior standardized achievement, and that mastery goal orientation and mastery goal structure within classrooms were the only significant predictors of students’ cognitive and metacognitive strategies. Performance-avoidance orientation predicted increased levels of procrastination, and decreases in persistence and the desire to take additional mathematics coursework voluntarily. These findings were similar to studies conducted that the university level, where a well-rounded student (i.e. one with stronger cognitive strategies and higher achievement) appears to be the product of both performance-approach and mastery goal orientations (Harackiewicz et al., 1997; Harackiewicz et al., 2000; Harackiewicz et al., 2002). While performance-approach orientation predicted course grades, “adolescents who expressed a stronger focus on learning and improving were more likely to report that they procrastinated less frequently within the context of their current mathematics class and would voluntarily take additional mathematics classes in the future” (Wolters, 2004, p. 247).

Correlations between variables in the Wolters (2004) study help to reveal the complexities associated with goal endorsement, goal orientation and achievement.
Teachers’ endorsement of mastery goals (mastery goal structure) was significantly correlated with students’ mastery goal orientation ($r = .48, p < .05$) and performance-avoidance orientation ($r = -.14, p < .05$), but not with performance-approach orientation. Teachers’ endorsement of performance-approach goals (performance-approach structure) was significantly correlated with students’ performance-approach and performance-avoidance orientations ($r = .35$ and $r = .28$, respectively, $p < .05$). The dilemma for teachers, it seems, is in recognizing the benefits of multiple goals (mastery + performance-approach), but also having the knowledge that promoting performance-approach goals may just as likely lead students to adopt a performance-avoidance orientation as a performance-approach orientation. This study expands on Wolters’ (2004) work in its investigation into whether variations in goal orientations can be predicted through changes in goal endorsement contexts over several years.

Shu-Shen (2005), employed median-split methods similar to Pintrich (2000b) to investigate the relationships between gender, achievement goal orientations, intrinsic motivation, self-handicapping, cognitive and metacognitive strategy use and course grades among Taiwanese students in sixth grade ($n = 242$). This study included the dimension of student performance-avoidance goal orientation, creating eight groups of students. Students who were high in mastery orientation, regardless of their levels of performance-approach orientation, earned higher grades and reported increased levels of cognitive strategy use. Students high in performance-approach orientation also earned grades comparable to their high-mastery peers. This suggested there were both additive (mastery + performance) and interactive (mastery x performance) effects found in the multiple goals perspective for Taiwanese adolescent mathematics students.
Although many studies within achievement goal research claim to be longitudinal, most measure students’ goal orientations at one point in time in order to predict future outcomes (e.g. Harackiewicz et al., 1997; Harackiewicz et al., 2000; Harackiewicz et al., 2002; Wolters, 2004). Studies measuring goal orientations at two points in time have been conducted under the goals as outcomes framework (e.g. Middleton et al., 2004), and have not considered the relationships between changing goal orientations and variations in academic achievement. Shim, Ryan et al (2008) investigated the relationships between middle school students’ goal orientations and students’ academic grades across four semesters (two years). The study treated achievement goals as time-varying predictors of achievement using growth-curve analysis in Hierarchical Linear Modeling (Bryk & Raudenbush, 2002) after controlling for prior student achievement. Findings indicated consistent, negative effects of performance-avoidance goals on students’ GPA over time, and positive effects of mastery goals on students’ GPA as they transitioned to middle school. The positive effects of performance-approach goals on student GPA dissipated over time, becoming unrelated to achievement during the second year of the study. This study was the first of its kind to consider the relationships between developmental changes in students from an achievement goal perspective and students’ academic achievement. One limitation addressed in the study was the need to replicate the investigation using students’ standardized test scores, since “standardized test scores provide different information about students’ learning and achievement than do grades, and future work that examines the link between achievement goals and standardized tests across time could broaden our understanding of the implications of goals for achievement” (Shim et al., 2008, p. 668). This current study expands the work of Shim,
Ryan et al. (2008) through the use of standardized test scores as measures of achievement outcomes.

Tests of Achievement as Outcomes

A study with adolescent students in Singapore (n = 1,475) investigated the relationships between higher-level student beliefs (task value, self-efficacy), achievement goals, cognitive, behavioral and social outcomes and scores on a test of English (second language) skills (Liem, Lau, & Nie, 2008). After controlling for students’ prior achievement, significant positive paths were found between task value and students’ mastery goal orientations, and between self-efficacy and mastery and performance-approach goals. There was also a negative relationship between students’ self-efficacy and performance-avoidance goals. The effects of mastery goals on English test scores were mediated through students’ deep learning strategies, surface learning strategies, peer relationships and decreases in task disengagement. Performance-approach goals were related to test scores, as mediated through students’ deep learning and peer relationships. A performance-avoidance orientation was related only with surface learning, decreases in peer relationships and increases in task disengagement. These findings supported the hierarchical view of goals within an overall framework of motivated action (DeShon & Gillespie, 2005), such that “achievement goals held by students largely mediate the relations between self-efficacy and task value, on one hand, and cognitive, behavioral, and social engagement, on the other” (Liem et al., 2008, p. 508).

In a similar study (Zusho et al., 2005), path analysis was used to test whether this hierarchical goal theory explained variations in emotional outcomes and math
achievement. The study also attempted to address cross-cultural differences in achievement motivation by studying Asian American (n = 105) and Anglo American (n = 98) college students. Mathematics achievement in the study was measured using a 30-item test constructed from items on the Graduate Records Exam (GRE), a standardized entrance exam for many graduate school programs. Within the study, positive relationships were found between performance-approach goals and math achievement; performance-avoidance goals were negatively related to math achievement. There was not a significant relationship between mastery goals and math achievement. Data for the study were gathered at one point in time, implying that achievement goals are more trait-like and less influenced by context.

Linnenbrink (2005) attempted to address the unsolved debate over the benefits of varying classroom goal endorsement practices. Three classroom goal structures (mastery, performance, mastery + performance) were created through teacher training and monitored through observations in heterogeneously grouped 5th and 6th grade mathematics classrooms (n = 237 students in 10 classrooms). Student goal orientations and attitudes were assessed at the beginning of the school year. Additionally, a pre-test math exam and group-training sessions occurred. Post-test data was collected at the end of a 5-week unit, and again 5 weeks later to determine how much of the material had been retained. MANCOVA was primarily used to determine main and interactive effects of variables in the study. Findings within the study generally supported a multiple-goals perspective. Students in the mastery and multiple-goals conditions (mastery + performance) reported more adaptive behaviors that those in the performance condition. From an achievement perspective, “students in the combined and performance-approach
conditions showed greater gains in achievement during the unit and, although they did forget some of what was learned, still scored higher than those in the mastery condition at the follow-up measure” (p. 205). Within this study, “only the combined mastery/performance-approach condition was beneficial for both help seeking and achievement” (p. 207). These findings for personal goals, however, “suggest that mastery goals are beneficial and performance-approach goals are detrimental” (p. 208). That is, while the endorsement of mastery and performance goals by teachers may be related to achievement, the effects of such endorsements are mediated through individual goal orientations. The overall findings within this study reinforce the complex nature of goal endorsement and goal orientations within classrooms. Limitations within the study were that goal orientations were measured at only one point in time, and that students were grouped according to achievement goals using median splits (e.g. Pintrich, 2000b), thereby forcing goal orientation into a trait-like variable.

Bridging the gap between adolescent educational research and university student research, Berger (2009) explored the relationships between achievement goals in mathematics, task-specific metacognitive experiences and math achievement among post-secondary vocational students (n = 253; mean age = 18.6 years) from a variety of vocational training programs. The research tested whether task-specific feelings (e.g. feeling of difficulty, feeling of liking) mediated the influence of achievement goals on metacognitive strategies and achievement. The study included the administration of surveys and the completion of a mathematics aptitude test. Motivation measures included mastery, performance-approach and performance-avoidance goals, along with challenge-mastery goals (e.g. I like tasks that are rather difficult for me) and work
avoidance goals (e.g. *My goal is to work no more than needed to obtain the minimal mark*). Perceived mathematics ability and anxiety for learning mathematics were also assessed prior to the administration of the mathematics test. Just before the problem solving task was completed, participants were asked to rate their intention to work at the task, their feeling of liking the task, and their feelings regarding the difficulty of the task. During and after the problem solving task, participants also estimated the amount of effort they were exerting to complete the task, their metacognitive control, and their feelings of confidence regarding the task. Significant paths were found between students’ mastery goals and their intention to work ($\beta = .47$) and their estimates of effort expenditure ($\beta = -.22$). Intention to work significantly predicted students’ estimates of effort expenditure ($\beta = .80$), which in turn predicted performance on the math test ($\beta = .30$).

The benefits of mastery goals in the Berger (2009) study were mediated by students’ intention to work and the effort they expended to complete the task. An unexpected result of the study included the negative relationship between mastery goals and students’ estimates of effort expenditure, suggesting that mastery-oriented students may underestimate the amount of effort they are expending in an achievement context. Another significant finding in the study was in the positive relationship between performance-avoidance goals and the feeling of liking a task ($\beta = .23$) and estimate of effort expenditure ($\beta = .15$). This suggested that “even if students want to avoid being inferior to their classmates, they still experience a strong feeling of liking and report to have exerted effort to solve the problem” (p. 177). All student reports of goals, feelings, intentions and efforts in the study were gathered through surveys and not assessed
through overt behaviors. This may help to explain how a performance-avoidance orientation was related to adaptive behaviors. The negative associations between avoidance goals and behaviors typically involve public behaviors, such as help-seeking (Butler & Neuman, 1995; Karabenick, 2003; Ryan & Gheen, 1998; Ryan & Pintrich, 1997; Ryan et al., 2001). Avoidant students might enjoy their work and be willing to exert effort at a task provided that enjoyment and effort are private affairs unrelated to the public demonstration of competence. Neither performance-approach nor work avoidance goals were significant predictors of metacognitive experiences in the model.

Dupeyrat and Marine (2005) tested the roles that achievement goals and implicit beliefs about intelligence play in predicting behaviors and achievement among adults who returned to school. This uncommon group of participants represents individuals who, for one reason or another, did not successfully complete their educational programs earlier in life. While participants were older students (mean age = 31 years), they were not university students, and they had, by definition, experienced some form of academic failure (failure to complete high school) prior to the study. Observed academic outcomes included the number of voluntary homework assignments completed throughout the semester, along with students’ scores on qualifying exams at the end of the semester. The benefits of mastery goals were mediated through increased effort expenditure, indicating that “students placing a strong emphasis on developing their competence report using more active strategies and put more effort in learning activities” in order to attain higher levels of achievement (p. 54). In this study, performance goals were only predictive of shallow learning strategies, which were not associated with academic achievement. Although the study included a work avoidance measure, the researchers
did not deliberately separate the approach and avoidance dimensions of performance goals, which could explain the limited relationships between performance goals and other outcomes.

Limitations of Previous Achievement Goal Research

One limitation of previous studies has been that independent variables such as context or achievement goals have been measured at only one point in time, even in longitudinal studies (e.g. Harackiewicz et al., 1997; Harackiewicz et al., 1998; Harackiewicz et al., 2000; Harackiewicz et al., 2002; Pintrich, 2000b; Wolters, 2004). With the exception of Shim, Ryan et al (2008), these studies overlook the fact that independent variables may vary over the time of the study. Within achievement goal research, this is a particularly limiting approach, since the failure to represent change also assumes goals to be traits rather than states (for a discussion, see DeShon & Gillespie, 2005). When studies have considered changing independent variables in achievement goal research, they have typically created change scores (goal scores at Time 2 minus goal scores at Time 1), which ignores the initial status of independent variables (T. Urdan & Midgley, 2003). That is, these approaches examine the direction of change but do not incorporate the general level of independent variables measured at the beginning of the study (Shim et al., 2008).

A possible explanation for this limitation is that independent variables in a variety of statistical models represent a unitary measure. These measures can be either categorical (e.g. gender, ethnicity) or scaled (e.g. prior achievement scores, hours of tutoring), but they do not typically reflect a variable that changes throughout a
longitudinal study. This is true especially among growth models where the study of change is focused on the outcome variable. Since measures of independent variables were taken at multiple points in time within the current study, a methodological challenge was to account for both initial levels and variations in independent variables over time. This issue is addressed in Chapter 3.

Summary

While it has traditionally been assumed that a mastery goal orientation predicts more adaptive behaviors and outcomes, the distinction can no longer be easily made. Contemporary studies and theorists have suggested that performance-approach or multiple goal orientations (e.g., mastery + performance-approach) might also be beneficial within achievement settings (Linnenbrink, 2005; Pintrich, 2000b; Sideridis, 2005). Most empirical research positions mastery and performance goals in opposition to each other, rather than examining their additive effects, which is limiting. As Pintrich (2000) explained, the notion that “students should be encouraged to adopt a mastery goal orientation and that classrooms should be structured to facilitate and foster a general mastery orientation is still a valid conclusion. However…if mastery goal students also adopt an approach performance orientation, there seems to be little cost in terms of motivation, affect, cognition, or achievement” (p. 553). A more refined approach to this field of study would consider the simultaneous contributions of mastery, performance-approach and performance-avoidance goal orientations to student achievement. As Barron and Harackiewicz (2001) warn, “failure to consider or test for evidence
supporting each of these multiple goal hypotheses may mask hidden benefits of multiple goal pursuit” (p. 720).

In keeping with the most contemporary findings of achievement goal theory, this study sought to identify the contributions of mastery, performance-approach and performance-avoidance goals to student academic achievement on standardized mathematics assessments. Findings will contribute to the current body of research, since so few studies have focused on standardized assessments as outcomes, and none have done so through a multiple-goals perspective.

This research also sought to determine whether variations in teachers’ goal endorsements are predictive of variations in individual students’ achievement goal orientations. Understanding this relationship between perceptions of teachers’ goal endorsements and individual students’ goal orientations can point to the need for increased attention to learning context and teaching practices when promoting adaptive student behaviors and achievement.

Research into the relationships between classroom goal structures and student goal orientations (Ames, 1992; E. M. Anderman, Anderman, & Griesinger, 1999; Church et al., 2001) indicates that achievement goals should be viewed as states rather than traits (Elliot, Shell, Henry, & Maier, 2005), and that they may be as related to the context in which they are situated as they are to the individual who adopts them. That is, “it could be that given the ways in which classroom variables differ (teacher beliefs and competitive versus cooperative classrooms, for example), it is conceivable that a student who is very unsure of her ability in mathematics could be very optimistic in science, given, for example, a classroom setting that minimizes social comparison” (Gisell,
Janine, Norma, & Beth, 2002, p. 97). Findings from this study identify relationships between teacher practices and student achievement goal orientations beyond the effects of student age and initial goal orientation.

Taken together, contemporary Achievement Goal Theory findings and limitations suggest that research within this field should:

(1) Determine whether goal context is predictive of goal orientation beyond the effects of initial goal orientation and student age;
(2) consider the contributions of multiple goal orientations to academic outcomes; and
(3) define academic outcomes in terms of student achievement on standardized tests.

This study addresses limitations in the current field of achievement goal research. Measures of teachers’ goal endorsements and students’ achievement goal orientations are measured at multiple points in time. This helps to determine whether student goal orientations are reflective of individual differences (traits) or the result of interactions between individuals and the environment (states). Additionally, this study applies the trichotomous Achievement Goal Theory framework of mastery, performance-approach and performance-avoidance goals in determining the relationships among goals and outcomes. Including all three orientations in simultaneous analyses allows for a discussion of the separate and joint contributions these goal orientations make to student achievement. Lastly, modeling the change of independent variables over time as deviations from initial levels provides a model for conducting longitudinal achievement goal research.
CHAPTER III

METHODS

Research Design

This study employed an ex post facto research design through the analysis of archival data. Students within the study were already situated within schools, and there is no manipulation of independent variables. It is difficult to infer causality from studies with this design. A large sample size and the longitudinal nature of the data will increase the study’s external validity.

Participants

Participants in the study included students in grades four through ten in one public school district in northeast Ohio who participated in the district’s survey and assessment processes. Issues of sampling are related to attendance issues for particular students and inconsistencies in building survey practices. It is assumed that the demographic characteristics of the sample reflect the district characteristics as a whole.

The school district’s overall enrollment is approximately 7,300 students in kindergarten through twelfth grade, with approximately 3,400 students in grades 4-10. The school district serves three municipalities. Residents within the district have a
median household income of $32,936 (63rd percentile among public school districts in Ohio; state average median income = $31,316); 21.3% of the district’s population holds a college degree or higher. Racial demographics from district reports indicate 85.5% of the student population is white; 4.3% is African American; 2.4% is Asian/Pacific Islander; and 5.1% is multiracial. Due to the relatively homogenous nature of the student population, race was not considered as a factor within the study. Students considered to be economically disadvantaged represent 27.6% of the population of the district. During the years which the data represent, the school district served students in 7 elementary schools, 2 middle schools and 2 high schools.

Data Sources

A student survey is administered to all students in the district in participating grades annually. This survey gathers feedback on a range of school climate and academic motivation variables, among which are measures of student achievement goal orientation and perceptions of teachers’ achievement goal endorsement practices. The survey was administered four times between the spring of 2006 and the spring of 2009.

In the first year of the survey process, the district administered its survey to all students in select grades, adding grades in subsequent years to follow cohorts. Table 1 indicates the grades surveyed and the number of participating students in each grade level each year, from 2006 through 2009. It is important to note, however, that fewer participants are included in longitudinal analyses within this study. That is, analyses were conducted with students who participated in both the survey and assessment systems from 2006 through 2009 (n = 841).
Table 1. Participants in the district survey process from 2006 through 2009 by grade level.

<table>
<thead>
<tr>
<th>Grade</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>476</td>
<td>480</td>
<td>440</td>
<td>519</td>
<td>514</td>
<td></td>
<td></td>
<td>2429</td>
</tr>
<tr>
<td>2007</td>
<td>463</td>
<td>457</td>
<td>453</td>
<td>458</td>
<td>540</td>
<td>535</td>
<td>420</td>
<td>3326</td>
</tr>
<tr>
<td>2008</td>
<td>510</td>
<td>375</td>
<td>372</td>
<td>494</td>
<td>277</td>
<td>457</td>
<td>475</td>
<td>2960</td>
</tr>
<tr>
<td>2009</td>
<td>492</td>
<td>496</td>
<td>398</td>
<td>485</td>
<td>387</td>
<td>247</td>
<td>334</td>
<td>2839</td>
</tr>
</tbody>
</table>

**Note:** Figures above indicate total participants in the district student survey process across years of the study. This total sample was used to establish reliability of constructs and to create school context variables. Actual participants in the study were students who participated in both district survey and assessment processes (n = 841 students).

Measures of mathematics achievement came from the Measures of Academic Progress test administered to all students within the district semi-annually in reading and math (only math scores were used in the current study). The district began administering MAP tests in the fall of 2006. This adaptive, responsive test provides a continuous scaled score of student achievement, known as a RIT score, in both reading and math ranging from approximately 150 to 270. Internal audits from the Northwest Evaluation Association indicate high test-retest reliability from Fall to Spring MAP administrations (range: .73 – .91) and a strong correlation between MAP results and state-wide standardized tests (Cronin, 2005). One distinguishing characteristic of adaptive computerized tests is that each test is individualized to the student completing the assessment. Initial items are randomly generated from a bank of possible items. The difficulty level of subsequent items depends on whether the student answers an item correctly (i.e. items become more difficult following correct answers, and less difficult following incorrect answers). Neither students nor teachers can explicitly prepare for success on these assessments, as they might with curriculum-based measures or accountability measures that follow specific formats. Assessments of this nature can also be referred to as benchmark tests, since they are not tied directly to a curriculum, but
rather they represent a student’s general level of achievement in a particular subject area at a particular point in time. In the case of this study, that subject area is mathematics.

**Data Collection**

Permission for this research project was granted through the district’s superintendent in accordance with local school district policies (see appendix A), and also through the Cleveland State University office of Institutional Research.

All data collection procedures were electronic. To administer the student surveys, teachers took students to a computer lab. Each student logged in to the survey using his or her unique user name, which was linked to his or her student ID. Students completed one survey each spring. Because students completed the annual student survey through a web based application, responses were extracted and reported digitally at the end of each survey window (typically during the last nine weeks of a given school year). This eliminates errors that can result from data entry.

Achievement measures represent scores from the semi-annual results of the MAP assessment administered between fall 2006 and spring 2009. At the end of each testing window (fall and spring), results are reported to the district digitally. Students who were enrolled in the district between 2006 and 2009, therefore, have up to 6 achievement data points distributed across the years of the study.
Instruments

Student Survey

The annual student survey was administered to students through an internet-based survey application. Students responded to all items on a 6-point Likert-type scale (1 = not at all true; 6 = very true). Items measuring student achievement goal orientation were adapted from the Patterns of Adaptive Learning Survey (PALS), an instrument that has been validated in similar educational settings in previous research (Midgley et al., 1998).

Measures of teachers’ goal endorsement practices were created using items from the PALS, along with locally created items intended to measure perceptions specifically related to teachers’ assessment practices. Overall, the survey intended to measure three separate constructs: mastery goal endorsement, performance goal endorsement and best practices in classroom assessment. Because some teacher practice items in the study were created locally, confirmatory factor analysis was conducted in the first year of the survey administration to establish validity of the teacher practice constructs. Results from the analysis revealed only a two-factor solution which explained 57.3% of the variance in responses. Table 2 indicates the loadings of specific items on the two-factor solution.
Table 2: factor analysis results for teacher practices items from 2006 survey administration (for clarity, values less than .40 are suppressed)

<table>
<thead>
<tr>
<th>Item</th>
<th>Mastery Endorsement</th>
<th>Performance Endorsement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teachers in this school let me know how I can improve my skills</td>
<td>0.805</td>
<td></td>
</tr>
<tr>
<td>Teachers in this school really want us to learn new things and to enjoy school</td>
<td>0.802</td>
<td></td>
</tr>
<tr>
<td>My teachers let me know what I do well in school and how I can improve</td>
<td>0.787</td>
<td></td>
</tr>
<tr>
<td>Teachers in this school really try to understand students when they need help with work</td>
<td>0.773</td>
<td></td>
</tr>
<tr>
<td>Teachers in this school make time to help students with their work</td>
<td>0.770</td>
<td></td>
</tr>
<tr>
<td>In this school, teachers say it’s okay to make mistakes as long as we are learning</td>
<td>0.755</td>
<td></td>
</tr>
<tr>
<td>Teachers in this school want us to understand our work, not just memorize it</td>
<td>0.752</td>
<td></td>
</tr>
<tr>
<td>Teachers in this school want us to work through hard problems until we understand them</td>
<td>0.699</td>
<td></td>
</tr>
<tr>
<td>Teachers in this school look at homework/tests to understand how students are thinking</td>
<td>0.687</td>
<td></td>
</tr>
<tr>
<td>Teachers in this school ask us to explain how we get our answers</td>
<td>0.672</td>
<td></td>
</tr>
<tr>
<td>In this school, students are recognized for how much they improve their skills</td>
<td>0.628</td>
<td></td>
</tr>
<tr>
<td>In this school, getting the right answers is more important than understanding the work</td>
<td>0.773</td>
<td></td>
</tr>
<tr>
<td>In this school, getting good grades is more important that learning new things</td>
<td>0.772</td>
<td></td>
</tr>
<tr>
<td>Teachers in this school focus on grades more than on learning</td>
<td>0.747</td>
<td></td>
</tr>
<tr>
<td>In this school, teachers point out the students who have the highest grades</td>
<td>0.743</td>
<td></td>
</tr>
<tr>
<td>Students who get the highest grades get special privileges</td>
<td>0.698</td>
<td></td>
</tr>
</tbody>
</table>

Motivation Variables

The following list represents the coding of variables within the study.

MG  student mastery goal orientation (e.g. One of my goals is to learn as much as I can in school)

PAP  student performance-approach orientation (e.g. It is important to me that I get better grades than other students in my school)

PAV  student performance-avoidance orientation (e.g. If I don’t know something in class, I try to hide it)

MEND  school mastery goal endorsement (e.g. In this school, teachers say it’s okay to make mistakes as long as we are learning; Teachers in this school want us to understand and enjoy our work, not just memorize it)

PEND  school performance goal endorsement (e.g. Teachers in this school point out the students who get the best grades; In this school, getting the right answers is more important than understanding the work)
Table 3 shows descriptive statistics and measures of internal reliability for all measured constructs in the study from 2006 through 2009. Results indicate constructs are acceptably reliable (Alpha range: .74 - .98). Specific items from the survey for each construct in the study can be found in Appendix B.

Table 3: Descriptive statistics and Chronbach’s Alpha reliability values for survey variables, 2006-2009

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MG (5 items)</td>
<td>4.74</td>
<td>.94</td>
<td>.86</td>
<td>4.76</td>
<td>.95</td>
<td>.85</td>
<td>4.71</td>
<td>1.0</td>
<td>.87</td>
<td>4.69</td>
<td>.94</td>
<td>.87</td>
</tr>
<tr>
<td>PAP (5 items)</td>
<td>3.33</td>
<td>1.1</td>
<td>.81</td>
<td>3.23</td>
<td>1.1</td>
<td>.74</td>
<td>3.43</td>
<td>1.1</td>
<td>.83</td>
<td>3.26</td>
<td>1.1</td>
<td>.82</td>
</tr>
<tr>
<td>PAV (8 items)</td>
<td>3.26</td>
<td>1.1</td>
<td>.83</td>
<td>3.19</td>
<td>1.0</td>
<td>.82</td>
<td>3.21</td>
<td>1.0</td>
<td>.83</td>
<td>3.12</td>
<td>.97</td>
<td>.78</td>
</tr>
<tr>
<td>MEND (11 items)</td>
<td>4.39</td>
<td>.91</td>
<td>.93</td>
<td>4.4</td>
<td>.91</td>
<td>.91</td>
<td>4.3</td>
<td>.93</td>
<td>.94</td>
<td>4.38</td>
<td>.91</td>
<td>.98</td>
</tr>
<tr>
<td>PEND (5 items)</td>
<td>3.28</td>
<td>1.1</td>
<td>.80</td>
<td>3.26</td>
<td>1.1</td>
<td>.79</td>
<td>3.26</td>
<td>1.1</td>
<td>.82</td>
<td>3.13</td>
<td>1.1</td>
<td>.81</td>
</tr>
</tbody>
</table>

**Note:** MG = student mastery goal orientation; PAP = student performance-approach orientation; PAV = student performance-avoidance orientation; MEND = student perceptions of teachers’ mastery goal endorsement; PEND = student perceptions of teachers’ performance goal orientations.

Achievement Variable

Measures of achievement for the study represent scores on the MAP mathematics test (Cronin, 2005), measured semiannually beginning in the fall of 2006.

M_ACH 

*scaled measure of mathematics achievement on MAP assessments*

General and specific research questions

1. Do perceptions of school-wide teacher achievement goal endorsements predict variations in students’ achievement goal orientations beyond the effects of age?

1a. To what extent are students’ mastery, performance-approach and performance-avoidance goal orientations related to each other over time?

1b. Does mastery goal endorsement predict students’ mastery, performance-approach or performance-avoidance goal orientations?
1c. Do variations in mastery goal endorsement predict variations in student mastery, performance-approach or performance-avoidance goal orientations over time?

1d. Does performance goal endorsement predict students’ mastery, performance-approach or performance-avoidance goal orientations?

1e. Do variations in performance goal endorsement predict variations in students’ mastery, performance-approach or performance-avoidance goal orientations over time?

2. Do students’ achievement goal orientations predict achievement outcomes on standardized mathematics assessments?

2a. Does student mastery goal orientation predict student mathematics achievement?

2b. Do variations in student mastery goal orientation predict variations in student mathematics achievement over time?

2c. Does student performance-approach orientation predict student mathematics achievement?

2d. Do variations in student performance-approach goal orientation predict variations in student mathematics achievement over time?

2e. Does student performance-avoidance orientation predict student mathematics achievement?

2f. Do variations in student performance-approach goal orientation predict variations in student mathematics achievement over time?

Figure 2 presents a theoretical framework for the general and specific research questions of the study. Results from research question 1 investigate the relationships
among students’ achievement goal orientations over time, and also the extent to which school goal endorsement practices predict student achievement goal orientations. Results from research question 2 investigated the extent to which varying achievement goal orientations predict mathematics achievement.

Figure 2. Theoretical framework identifying specific research questions

Data Analysis

The data for this study represented nested variables over time at three levels: the achievement level, the student goal orientation level, and the school goal endorsement level. This presented several methodological challenges before any inferential statistical model could be tested. The first challenge was to represent teacher practices as legitimate school-level variables. The second challenge was to represent the initial status and changes in independent variables (e.g. school goal endorsement in phase 1; student achievement goal orientations in phase 2) over time. The simultaneous representation of initial status and change in statistical analyses is necessary to determine whether changes in independent variables over time are related to changes in dependent variables over
time (Shim et al., 2008). The following section will identify the specific challenges faced when organizing the data and how those challenges were addressed.

Establishing Goal Endorsement as a School Level Variable

As previously stated, a limitation of this research is the correlational nature of the study, particularly as it pertains to relationships between school context and student motivational outcomes. Because of the hierarchical nature of the analysis (e.g. students nested within schools), school context variables were created to represent data at a level beyond the individual student. It is reasonable to assume that student individual differences would influence student perceptions of teacher practices. To create a school level variable, school mastery goal endorsement and performance-approach endorsement variables represent the average rating of those practices among all students within a given grade level in a particular school each year.\(^1\) This aggregation will create a more genuine school-level variable that is less influenced by individual differences (Kunter & Baumert, 2006; Ludtke, Trautwein, Kunter, & Baumert, 2006; Trautwein, Ludtke, Marsh, Kaller, & Baumert, 2006). That is, determining the average perception of all students in a given grade level in a particular school is a more accurate representation of the salient climate features experienced by all students than each students’ individual perceptions of teacher practices.

Pooling perceptions at a level beyond the individual creates a context variable in which all students within the study are nested. The decision to pool at the grade level

---

\(^1\) Given the language in the student survey (e.g. *Teachers in this school*...), it was possible that teacher practices were perceived at the building level rather than the grade level. Both aggregation methods were used. Aggregating at the grade level, however, explained the greatest proportion of variance in the HLM model. All findings are discussed relevant to teacher practices aggregated at the grade level within schools.
within each school was made to create a context variable at a level closest to the student that the data allowed. Methodologically, this pooling procedure allows for an analysis of the ways in which changing school contexts are related to changes in students’ individual goal orientations across years. From a practitioner’s standpoint, linking context variables to student motivation outcomes can provide educators an understanding of the ways in which general perceptions of observable teacher practices influence student motivation without the need to assess perceptions of every student within a given context.

Specifically, school goal endorsement practices (both mastery and performance endorsement) were calculated as follows:

\[
\text{School Goal Endorsement}_{ijk} = \frac{\sum_{jk=1}^{n} \text{GoalEndorsement}_{ijk}}{n_{jk}},
\]

such that the goal endorsement experienced by student \(i\) in grade \(j\) and school \(k\) is the mean school goal endorsement perception of all students in grade \(j\) and school \(k\) in a given school year.

Representing changes in independent variables over time

The specific challenge within this study was to represent both the initial status of independent variables and also the extent to which those variables deviated, on an annual average, from their initial status across the study. This was a challenge unique to this study, since no prior research gathered contextual data are more than two points in time.

To represent changes within this study, measures from year 1 in the study represented initial status. Deviation scores were created to represent the average annual deviation between initial status and subsequent status at each point in time across the
study. The computation method for creating deviation scores is presented here using school mastery goal endorsement (MEND) as an example:

\[
MEND_{Dev_i} = \frac{(MEND_{Time2} - MEND_{Time1}) + (MEND_{Time3} - MEND_{Time1}) + (MEND_{Time4} - MEND_{Time1})}{3},
\]

such that the deviation score for the mastery endorsement experienced by individual student \( i \) across four years of the study represents the average annual change in teachers’ mastery goal endorsement practices. This method seems most fit to describe changes in motivation variables over time. These deviation scores allow all change to be modeled relative to initial status, rather than simply to the preceding year. An alternative was to consider a method in which change is only considered in reference to the preceding year. In a study with only two observation points (e.g. T. Urdan & Midgley, 2003), modeling change from the preceding year may be a reasonable approach. That method, however, does not adequately measure changing contexts when observations are made at more than two points in time. Calculating differences from year-to-year masks the changes that students experience across the entire study, since initial context is not the benchmark against which all subsequent years are measured.

To clarify the differences in methods, Table 4 presents data for four hypothetical students who all experienced declines in mastery goal endorsement contexts at least once across four observations.
Table 4: Hypothetical data comparing two methods of measuring change in independent variables: average deviation from Time 1 v. average deviation from preceding time.

<table>
<thead>
<tr>
<th>Student</th>
<th>TIME</th>
<th>Mastery Goal Endorsement (range: 1 – 6)</th>
<th>Change Measures</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Average Deviation</td>
<td>Average Deviation</td>
</tr>
<tr>
<td>A</td>
<td>1</td>
<td>5.0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B</td>
<td>2</td>
<td>5.0</td>
<td>-0.34</td>
<td>0</td>
</tr>
<tr>
<td>C</td>
<td>3</td>
<td>4.0</td>
<td>-1.0</td>
<td>-0.5</td>
</tr>
<tr>
<td>D</td>
<td>4</td>
<td>4.0</td>
<td>-1.0</td>
<td>-0.34</td>
</tr>
</tbody>
</table>

The hypothetical example from Table 4 highlights the ways in which calculating average deviation from the preceding time overlooks the long-term effects of changed contexts. Student A experienced no changes in mastery goal endorsement, so the two methods yield identical results. Student D experienced a decline in mastery goal endorsement of 1.0 from year one to year 2. In the subsequent years, the student remained in the lower-mastery endorsement context. The method of determining changes from preceding years only yields an average deviation score of -0.34. That method, however, discounts the fact that Student D remained in a learning environment for 3 consecutive years which represented a lower level of mastery goal endorsement than the student experienced in the first year of the study. Calculating the average deviation from year 1 in the study accurately accounts for Student D’s experience across all four years, resulting in an average deviation score of -1.0 units annually.

The experiences of Student B would also be overlooked if differences were considered only from a preceding time perspective. The mastery goal endorsement context for student B declined by 1.0 in Year 2, and then returned to its Year 1 level in subsequent years. Calculating average deviation from initial status recognizes the fact that, for one of the four years, Student B experienced a different learning context.
In Phase One of the study, average deviation from Time 1 scores were created for school mastery goal endorsement and school performance goal endorsement. In phase two of the study, average deviation from Time 1 scores were created for student mastery, performance-approach and performance-avoidance goal orientations.

Phase One Independent and Dependent Variables

The dependent variables in phase one of the study were:

- student mastery goal orientation
- student performance-approach goal orientation
- student performance-avoidance goal orientation

The independent variables in phase one of the study were:

- teachers’ mastery goal endorsement in year 1 of the study
- teachers’ performance goal endorsement in year 1 of the study
- the average annual deviation from year 1 of teachers’ mastery goal endorsement across the study
- the average annual deviation from year 1 of teachers’ performance goal endorsement across the study
- student grade level in year one of the study.

Phase One Model Specification

Pearson correlation coefficients were calculated to determine the relationships between each of the motivation variables in the study across four years. This will answer specific research question 1a. Rather than simply identifying individual significant
relationships within a matrix of correlations, findings and discussion will address
consistent patterns or trends in correlations across all years in the study.

To answer the remaining specific research questions related to general research
question 1, the first phase of the study used a two-level individual growth model as a
method of analysis. Individual growth modeling using Hierarchical Linear Modeling
(HLM) allows for the modeling of growth over time, can accommodate missing data
within a series of repeated measures, and allows for the nesting of data within a
hierarchical structure (Bryk & Raudenbush, 2002). The dependent variables within the
study are student mastery, student performance-approach and student performance-
avoidance goal orientations. Independent variables are student age (grade level), initial
school mastery goal endorsement, mastery goal endorsement deviation, initial school
performance goal endorsement, and performance goal endorsement deviation. Three
HLM models were fitted in phase one: one model for each of the student achievement
goal orientation outcomes. For clarity purposes, the model is presented here once with
students’ mastery goal orientations as the outcome. The other two models are identical,
with the only change being the dependent variables of performance-approach and
performance-avoidance goal orientations.

Individual growth analysis calls for the fitting of an unconditional level-1 model,
where repeated observations of the outcome variable (e.g. mastery, performance-
approach, performance-avoidance) over time are analyzed without the addition of level-2
variables. Results from the unconditional model indicate whether significant differences
in the level-1 intercept (i.e. initial status) exist between individuals, and whether
significant variations in the rates of change over time (i.e. slopes) exist between
individuals. Significance is determined through a chi-squared statistic. Additionally, the unconditional model yields $\sigma^2$, an estimate of within student variance in the outcome variable (in this case, $\sigma^2$ is an estimate of the changes in slope within students), and $\tau$, an estimate of the variance between students. Lastly, an intraclass correlation, $\rho$, can be calculated to represent the proportion of variance in student goal orientations which is between students (Bryk & Raudenbush, 2002).

Level-1 analysis within the individual growth model determines whether variations exist between initial mastery goal orientation or patterns of change (growth) over time. The level-1 model is:

$$MG_i = \pi_{0i} + \pi_{1i}a_i + e_i$$

Within the level-1 model, $MG_i$ is the mastery goal orientation of student $i$ at time $t$. The intercept, $\pi_{0i}$, is considered the true measure of the achievement goal orientation at the beginning of the study (Year 1), and $\pi_{1i}$ is the slope (change) in mastery orientation during a fixed unit of time (Bryk & Raudenbush, 2002). Within phase one of the study, one unit of time is 1 year. Within the level-1 model, it is assumed that errors, $e_i$, are independent and normally distributed with common variance, $\sigma^2$.

Predictor variables in Level-1 become outcomes in the Level-2 model. The relationships between independent variables and the dependent variable are tested through their relationships with these Level-2 outcomes. The model for $\pi_{0i}$ is

$$\pi_{0i} = \beta_{00} + \beta_{01}(GR)_i + \beta_{02}(MEND_{Time})_i + \beta_{03}(PEND_{Time})_i + r_{0i},$$

where

$\pi_{0i}$ is the initial mastery goal orientation of student $i$

$\beta_{00}$ is the constant common to all observations
\( \beta_{01} \) is the effect of student grade level (age) on the initial mastery goal orientation of student \( i \)

\( \beta_{02} \) is the effect of initial school mastery goal endorsement on the initial mastery goal orientation of student \( i \)

\( \beta_{03} \) is the effect of initial school performance goal endorsement on the initial mastery goal orientation of student \( i \)

\( r_{0i} \) is a level-2 random effect with variance \( \pi_{00} \)

The model for \( \pi_{1i} \) is

\[ \pi_{1i} = \beta_{10} + \beta_{11}(MEND\_Dev)_{i} + \beta_{12}(PEND\_Dev)_{i} + \beta_{13}(GR)_{i} + r_{1i} \]

where

\( \pi_{1i} \) is the rate of change (slope) of mastery orientation of student \( i \) across all observations

\( \beta_{10} \) is the constant common to all observations

\( \beta_{11} \) is the effect of average annual deviations in mastery goal endorsement on the slope of student mastery goal orientation for student \( i \)

\( \beta_{12} \) is the effect of average annual deviations in performance goal endorsement on the slope of student mastery goal orientation for student \( i \)

\( \beta_{13} \) is the effect of student grade level (age) on the slope of student mastery goal orientation for student \( i \)

\( r_{1i} \) is a level-2 random effect with variance \( \pi_{01} \)

In this model, \( \pi_{0i} \) is a baseline indicator of student mastery goal orientation, which may be related to student grade level and the initial goal endorsement context of student \( i \)’s grade level and school. Analyzing effects of goal endorsement deviation on \( \pi_{1i} \) provides an indication of the relationship between changing school contexts and rates of change in student goal orientations. Significant effects of contextual variables on the level-2 outcomes indicate that goal endorsement is related to motivational outcomes after
controlling for the individual difference of student age. This would support the theoretical assumption that achievement goal orientation is a state that can be influenced by the goals endorsed within a learning context (Ames, 1992; Ames & Archer, 1988; Fryer & Elliot, 2007; T. Urdan & Midgley, 2003). If goal endorsement deviation fails to significantly effect $\omega_i$, results then suggest achievement goal orientation is trait-like, such that variations in context are not related to rates of change in orientation beyond the effects of age.

Phase Two Dependent and Independent Variables

The phase two dependent variable is student mathematics achievement as measured through scaled scores on the Measures of Academic Progress (MAP) test in mathematics. The independent variables are:

- student mastery goal orientation in year 1 of the study
- student performance-approach goal orientation in year 1 of the study
- student performance-avoidance goal orientation in year 1 of the study
- the student’s average annual deviation from year 1 of student mastery goal orientation across all years of the study
- the student’s average annual deviation from year 1 of student performance-approach goal orientation across all years of the study
- the student’s average annual deviation from year 1 of student performance-avoidance goal orientation across all years of the study
- student grade level (age) in year 1 of the study
Phase Two Model Specification

An individual growth model using two-level HLM (Bryk & Raudenbush, 2002) was used to answer all specific research questions related to general research question two. In phase two of the study, the dependent variable of student mathematics achievement was predicted by the independent variables of student mastery, performance-approach and performance-avoidance orientations from Year 1, along with the average annual deviation scores for student mastery, performance-approach and performance-avoidance goals across the study. The Level-1 model is:

\[ M_{Ach_i} = \pi_{0i} + \pi_{1i}t + e_{it} \]

Within the level-1 model, \( M_{Ach_i} \) is the standardized mathematics achievement of student \( i \) at time \( t \). The intercept, \( \pi_{0i} \), is the initial mathematics achievement level of student \( i \) at the beginning of the study (Year 1), and \( \pi_{1i} \) is the slope (change) in mathematics achievement during a fixed unit of time (Bryk & Raudenbush, 2002).

Within phase two of the study, achievement measures were gathered semi-annually, such that one unit of time represents approximately 6 months. Within the level-1 model, it is assumed that errors, \( e_{it} \), are independent and normally distributed with common variance, \( \sigma^2 \). As previously explained (see p. 68), Chi Squared analysis results from an unconditional level-1 model indicate if significant differences in initial achievement and growth trajectories exist among individuals. Additionally, \( \sigma^2 \), \( \tau \) and \( \rho \) values are presented to represent within-student variance, between-student variance and an estimate of proportion of variance, respectively.
Predictor variables in Level-1 become outcomes in the Level-2 model. The relationships between independent variables at the dependent variable are tested through their relationships with these Level-2 outcomes. The model for $\pi_{0i}$ is

$$\pi_{0i} = \beta_{00} + \beta_{01}(GR) + \beta_{02}(MG_{time}) + \beta_{03}(PAP_{time}) + \beta_{04}(PAV_{time}) + r_{0i},$$

where

- $\pi_{0i}$ is the initial math achievement of student $i$
- $\beta_{00}$ is the constant common to all observations
- $\beta_{01}$ is the effect of student grade level (age) on the initial math achievement of student $i$
- $\beta_{02}$ is the effect of initial mastery goal orientation on the initial math achievement of student $i$
- $\beta_{03}$ is the effect of initial performance-approach orientation on the initial math achievement of student $i$
- $\beta_{04}$ is the effect of initial performance-avoidance orientation on the initial math achievement of student $i$
- $r_{0i}$ is a level-2 random effect with variance $\pi_{00}$

The model for $\pi_{1i}$ is

$$\pi_{1i} = \beta_{10} + \beta_{11}(MG_{Dev}) + \beta_{12}(PAP_{Dev}) + \beta_{13}(PAV_{Dev}) + \beta_{14}(GR) + r_{1i},$$

where

- $\pi_{1i}$ is the rate of change (slope) of mastery orientation of student $i$ across all observations
- $\beta_{10}$ is the constant common to all observations
- $\beta_{11}$ is the effect of average annual deviations in student mastery goal orientation on the slope of math achievement for student $i$
- $\beta_{12}$ is the effect of average annual deviations in student performance-approach goal orientation on the slope of math achievement for student $i$
- $\beta_{13}$ is the effect of average annual deviations in student performance-avoidance goal orientation on the slope of math achievement for student $i$
\( \beta_{14} \) is the effect of student grade level (age) on the slope of math achievement for student \( i \)

\( r_{1i} \) is a level-2 random effect with variance \( \pi_{01} \)

Similar to the approach to analysis in phase one, significant relationships between the independent variables and \( \pi_{0i} \) in phase two results indicate whether variations in students’ initial goal orientations predict variations in initial levels of math achievement. Significant relationships between independent variables and \( \pi_{1i} \) indicate the extent to which deviations in students’ achievement goal orientations are related to rates of change in students’ mathematics achievement on standardized tests over time.

In summary, findings and discussions from analyses will address: consistent patterns of relationships between students’ achievement goal orientations; relationships between teacher goal endorsement practices and student goal orientations; relationships between deviations in teacher goal endorsement practices and rates of change in student goal orientation; relationships between student goal orientations and student achievement on standardized mathematics tests; and relationships between deviations in student goal orientations and rates of change in students mathematics achievement on standardized mathematics tests.
CHAPTER FOUR
RELATIONSHIPS AMONG TEACHER PRACTICES AND
STUDENT ACHIEVEMENT GOAL ORIENTATIONS

Results from phase one of the study will be presented in this chapter. Phase one addressed general research question 1: *Do perceptions of school-wide teacher achievement goal endorsements predict variations in students’ achievement goal orientations beyond the effects of age?* Within this chapter, I will address results related to research questions 1a through 1e.

1a. *To what extent are students’ mastery, performance-approach and performance-avoidance goal orientations related to each other over time?*

The survey data in this study represent measures of student achievement goal orientations and perceptions of teacher practices at four points in time, from 2006 through 2009. These measures represented 12 outcomes at the student achievement goal level alone (three goal orientations measured four times over four years). Rather than identify individual significant relationships between variables, I chose to identify and discuss patterns that emerged throughout years in the study. There were three patterns
considered when analyzing trends in correlations between achievement goal orientation variables. The first of the three patterns considered were within-year relationships between the three student achievement goal orientations (mastery, performance-approach and performance-avoidance). The second pattern considered was relationships within the same orientation across years in the study. The final pattern analyzed was the relationships that existed between particular orientations in a given year and other orientations in subsequent years. Identifying and understanding these consistent trends provides insight into the relationships between student achievement goal orientations at given points in time, and also the ways in which profiles of student goal orientations at a particular point in time are related to profiles of student goal orientations at later points in time.

Table 5 presents a matrix of Pearson two-tailed correlations between students’ goal orientations from 2006 through 2009 included in the phase one longitudinal analysis (n = 834), along with descriptive statistics of each variable. All orientations were measured on a 6-point Likert-type scale. For clarity, only significant relationships (p < .05 or p < .01) are shown in the table and shared in this section. Descriptive statistics indicate that across all years, students within the study reported higher levels of mastery orientation (range: 4.40 – 4.92), relative to a performance-approach orientation (range: 3.13 – 3.27) or a performance-avoidance orientation (range: 3.03 – 3.23).

Within-year relationships among student achievement goal orientations

This analysis of patterns addressed whether relationships between achievement goal variables in each year were similar at different points in time. That is, did
relationships among goal orientations measured in 2006 look similar to relationships among goal orientations in 2007, 2008 and 2009? To clearly identify the relationships under consideration, the clusters within years are highlighted in Table 5. Significant relationships between students’ achievement goal orientations were found within each given school year.
### Table 5. Correlations between students' achievement goal orientations within and across school years

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</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>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MG06</td>
<td>4.92 (.86)</td>
<td><strong>.167</strong></td>
<td><strong>-.427</strong></td>
<td>.550**</td>
<td>.099**</td>
<td><strong>-.296</strong></td>
<td>.403**</td>
<td><strong>-.232</strong></td>
<td>.337**</td>
<td><strong>-.129</strong></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>PAP06</td>
<td>3.27 (1.1)</td>
<td><strong>.248</strong></td>
<td></td>
<td>.072*</td>
<td>.363**</td>
<td>.144**</td>
<td>.326**</td>
<td>.150**</td>
<td>.108**</td>
<td>.216**</td>
<td>.138**</td>
</tr>
<tr>
<td>3</td>
<td>PAV06</td>
<td>3.03 (1.1)</td>
<td><strong>-.333</strong></td>
<td></td>
<td>.084*</td>
<td>.485**</td>
<td><strong>-.270</strong></td>
<td>.135**</td>
<td>.334**</td>
<td><strong>-.170</strong></td>
<td>.087**</td>
<td>.272**</td>
</tr>
<tr>
<td>4</td>
<td>MG07</td>
<td>4.84 (.91)</td>
<td></td>
<td><strong>.147</strong></td>
<td><strong>-.364</strong></td>
<td>.535**</td>
<td></td>
<td><strong>-.234</strong></td>
<td>.447**</td>
<td></td>
<td><strong>-.139</strong></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>PAP07</td>
<td>3.16 (1.0)</td>
<td></td>
<td></td>
<td></td>
<td>.403**</td>
<td>.127**</td>
<td>.085*</td>
<td>.352**</td>
<td>.128**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>PAV07</td>
<td>3.10 (1.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>-.230</strong></td>
<td>.155**</td>
<td>.480**</td>
<td><strong>-.199</strong></td>
<td>.144**</td>
<td>.438**</td>
</tr>
<tr>
<td>7</td>
<td>MG08</td>
<td>4.69 (.94)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>.232</strong></td>
<td><strong>-.238</strong></td>
<td>.496**</td>
<td></td>
<td><strong>-.143</strong></td>
</tr>
<tr>
<td>8</td>
<td>PAP08</td>
<td>3.30 (1.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>.334</strong></td>
<td>.144**</td>
<td>.399**</td>
<td>.168**</td>
</tr>
<tr>
<td>9</td>
<td>PAV08</td>
<td>3.23 (1.0)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>-.256</strong></td>
<td>.128**</td>
<td>.423**</td>
</tr>
<tr>
<td>10</td>
<td>MG09</td>
<td>4.40 (.96)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>.314</strong></td>
<td><strong>.088</strong></td>
</tr>
<tr>
<td>11</td>
<td>PAP09</td>
<td>3.13 (1.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>.457</strong></td>
</tr>
<tr>
<td>12</td>
<td>PAV09</td>
<td>3.22 (.89)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: n = 834 students; ** = correlation is significant at p < .01; * = correlation is significant at p < .05. MG = student mastery goal orientation; PAP = student performance-approach goal orientation; PAV = student performance-avoidance orientation. Measures from given years are identified with two-digit affixes (e.g. MG06 = student mastery goal orientation in 2006).
In 2006, student mastery-goal orientation was positively related to student performance-approach goal orientation \((r = .167, p < .01)\), and negatively related to student performance-avoidance orientation \((r = -.427, p < .01)\). There was a positive relationship between student performance-approach and student performance-avoidance orientations \((r = .248, p < .01)\).

Similar relationships were found between achievement goal orientations within subsequent years. Student mastery goal and performance-approach goal orientations were positively related in 2007 \((r = .147, p < .01)\), 2008 \((r = .232, p < .01)\) and also in 2009 \((r = .314, p < .01)\). Student mastery goal and performance-avoidance goal orientations were negatively related in 2007 \((r = -.364, p < .01)\), 2008 \((r = -.238, p < .01)\) and 2009 \((r = -.088, p < .05)\). Performance-approach and performance-avoidance orientations were positively related in 2007 \((r = .196, p < .01)\), 2008 \((r = .334, p < .01)\), and 2009 \((r = .457, p < .01)\).

The consistency in this first pattern of correlations suggests that relationships among orientations would be consistent at any given point in time. That is, measuring and understanding one particular goal orientation in a student at a given point in time allows for reasonable inferences to be made about other goal orientations.

Within-goal relationships across years

The purpose of studying within-goal relationships across years is to understand the nature of goal stability within students in the study. Significant relationships within specific achievement goal orientations persisted across years in the study. Figure 3 shows the relationships within the same variables across years in the study from Table 5.
(e.g. relationships between all mastery goal measures from 2006 through 2009), using Pearson correlation coefficients.

Figure 3: Relationships within student goal orientations across years (from Table 5).

Mastery goal orientation 2006 - 2009

Performance-approach goal orientation 2006 - 2009

Performance-avoidance goal orientation 2006 - 2009

n = 834 students; ** = correlation is significant at p < .01.

Mastery goal orientations measured in a given year were positively related to mastery goal orientations in subsequent years. Mastery goal orientation in 2006 was positively related to mastery goal orientation in 2007 (r = .550, p < .01), 2008 (r = .403, p < .01) and 2009 (r = .337, p < .01). Mastery goal orientation in 2007 was positively related to mastery goal orientation in 2008 (r = .535, p < .01) and 2009 (r = .447, p < .05). Mastery goal orientations in 2008 and 2009 were also similarly related (r = .496, p < .01). This pattern suggests initial student mastery goal orientation is related to student mastery goal orientation in subsequent years, even as far as three years from the initial measurement.
Performance-approach goal orientation in 2006 was positively related to performance-approach goal orientation in 2007 ($r = .363$, $p < .01$), 2008 ($r = .326$, $p < .01$), and in 2009 ($r = .216$, $p < .01$). Performance-approach goal orientation in 2007 was positively related to performance-approach goal orientation in 2008 ($r = .403$, $p < .01$) and 2009 ($r = .352$, $p < .01$). The relationship between performance-approach goals in 2008 and 2009 was also positive ($r = .399$, $p < .01$). Similar to patterns that existed in student mastery goal orientation, these results suggest student performance-approach goal orientation is positively related to student performance-approach orientation in future years.

Performance-avoidance goal orientation in 2006 was positively correlated with performance-avoidance orientation in 2007 ($r = .485$, $p < .01$), 2008 ($r = .334$, $p < .01$), and in 2009 ($r = .272$, $p < .01$). Performance-avoidance orientation in 2007 was positively related to performance-avoidance orientation in 2008 ($r = .480$, $p < .01$) and 2009 ($r = .438$, $p < .01$). Lastly, the relationship between performance-avoidance orientation in 2008 and 2009 was also positive ($r = .423$, $p < .01$).

Relationships among goal orientations across years

Significant relationships across achievement goal orientations and school years were also found in the study. Figure 4 shows the relationships between students’ mastery goal orientations and performance-approach and performance-avoidance orientations in subsequent years. A positive relationship existed between student mastery goal orientation in 2006 and student performance-approach orientation in 2007 ($r = .099$, $p <
No other significant relationships existed between mastery goal orientations and performance-approach goal orientations in subsequent years.

**Figure 4: Significant relationships between student mastery goal orientations and performance-approach and performance-avoidance goal orientations in subsequent years**

Negative relationships between mastery goal orientations and performance-avoidance orientations in all subsequent years did exist. Mastery goal orientation in 2006 was negatively related to performance-avoidance orientation in 2007 ($r = -0.296, p < .01$), 2008 ($r = -0.232, p < .01$) and 2009 ($r = -0.129, p < .01$). Mastery goal orientation in 2007 was negatively related to performance-avoidance orientation in 2008 ($r = -0.234, p < .01$) and 2009 ($r = -0.139, p < .01$). Lastly, mastery goal orientation in 2008 was negatively related to performance-avoidance orientation in 2009 ($r = -0.143, p < .01$).

Figure 5 indicates the relationships between performance-approach goal orientations and mastery and performance-avoidance goal orientations in subsequent years. Performance-approach goals in 2006 were positively related to mastery goal
orientation in 2007 ($r = .072, p < .05$), and in 2009 ($r = .108, p < .01$); no such relationship existed in 2008.

**Figure 5**: Significant relationships between student performance-approach goal orientations and performance-avoidance and mastery goal orientations in subsequent years.

![Diagram showing significant relationships between goal orientations](image)

$n = 834$ students; ** = correlation is significant at $p < .01$, * = correlation is significant at $p < .05$.

A performance-approach goal orientation in 2007 was not significantly related to mastery goal orientation in 2008; it was, however, positively related to a mastery goal orientation in 2009 ($r = .085, p < .05$). Performance-approach goals in 2006 were positively related to performance-avoidance goals in 2007 ($r = .144, p < .01$), 2008 ($r = .150, p < .01$) and 2009 ($r = .138, p < .01$). 2007 performance-approach goal orientation was positively related to performance-avoidance goal orientations in 2008 ($r = .127, p < .01$) and 2009 ($r = .128, p < .01$). Lastly, student performance-approach goal orientation in 2008 was positively related to student performance-avoidance orientation in 2009 ($r = .168, p < .01$).
Performance-avoidance goal orientations were significantly related to mastery and performance-approach orientations in subsequent years. Figure 6 depicts those relationships.

Figure 6: Significant relationships between performance-avoidance orientations and performance-approach and mastery goal orientations in subsequent years.

There was a negative relationship between student performance-avoidance orientation in 2006 and student mastery goal orientation in 2007 ($r = -0.333$, $p < .01$), 2008 ($r = -0.279$, $p < .01$) and in 2009 ($r = -0.170$, $p < .01$). Performance-avoidance orientation in 2007 was similarly related to mastery goal orientation in 2008 ($r = -0.239$, $p < .001$) and 2009 ($r = -0.199$, $p < .01$). Performance avoidance orientation in 2008 was negatively related to mastery goal orientation in 2009 (-0.256, $p < .01$). Student performance-avoidance goals in 2006 were positively related to student performance-approach goal orientations in 2007 ($r = 0.084$, $p < .05$), 2008 ($r = 0.135$, $p < .01$) and 2009 ($r = 0.087$, $p < .01$). Student performance-avoidance orientation in 2007 was positively related to student performance-approach orientation in 2008 ($r = 0.155$, $p < .01$) and 2009 ($r = 0.144$, $p < .01$).
p < .01). Lastly, performance-avoidance orientation in 2008 was positively related to student performance-approach orientation in 2009 (r = .128, p < .01).

Relationships among school context and student achievement goal orientations

The following section will present the findings from Phase One of the study related to specific research questions 1b through 1e. These questions address the relationships between school context and student achievement goal orientation. These specific research questions were addressed through the application of three individual growth models using hierarchical linear modeling (HLM) (Bryk and Raudenbush, 2002). Dependent variables within the models included three student achievement goal orientations (mastery, performance-approach and performance avoidance) measured over four consecutive school years.

As discussed in Chapter 3, individual growth analysis calls for the fitting of an unconditional level-1 model, where repeated observations of the outcome variable (e.g. mastery, performance-approach, performance-avoidance) are analyzed without the addition of level-2 variables. Results from the unconditional model indicate whether significant differences in the level-1 intercept (i.e. initial status) exist between individuals, and whether significant variations in the rates of change over time (i.e. slopes) exist between individuals. Significance is determined through a chi-squared statistic. Additionally, the unconditional model yields $\sigma^2$, an estimate of within student variance in the outcome variable (in this case, $\sigma^2$ is an estimate of the changes in slope within students), and $\tau$, an estimate of the variance between students. Lastly, an
intraclass correlation, $\rho$, can be calculated to represent the proportion of variance in student goal orientations which is between students (Bryk & Raudenbush, 2002).

Table 6 indicates the results of three unconditional model analyses in Phase One of the study. The intraclass correlation for the mastery goal model ($\rho = 0.469$) suggests that approximately 47% of the variance in mastery goal orientation outcomes is between students. Intraclass correlations for performance-approach goals ($\rho = 0.339$) and performance-avoidance goals ($\rho = 0.392$) suggest that approximately 34% and 39% percent of the variations in achievement goal outcomes, respectively, is between students. Chi-square tests were significant for all unconditional models, justifying the inclusion of level-2 variables into the analysis.

### Table 6. Final estimation of fixed effects and variance components for unconditional models

<table>
<thead>
<tr>
<th>Model parameter</th>
<th>Coefficient</th>
<th>SE</th>
<th>$t$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mastery goals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>4.956</td>
<td>0.030</td>
<td>163.44**</td>
</tr>
<tr>
<td>Slope</td>
<td>-0.172</td>
<td>0.012</td>
<td>-14.165**</td>
</tr>
<tr>
<td><strong>Performance-approach goals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>3.257</td>
<td>0.035</td>
<td>93.938**</td>
</tr>
<tr>
<td>Slope</td>
<td>-0.029</td>
<td>0.015</td>
<td>1.961†</td>
</tr>
<tr>
<td><strong>Performance-avoidance goals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>3.057</td>
<td>0.036</td>
<td>83.967**</td>
</tr>
<tr>
<td>Slope</td>
<td>0.067</td>
<td>0.014</td>
<td>4.819**</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Random Effect</th>
<th>SD</th>
<th>Variance Component</th>
<th>Chi-square</th>
<th>$\rho$(rho)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mastery goals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.634</td>
<td>$\tau = 0.402$</td>
<td>3539.645**</td>
<td>0.469</td>
</tr>
<tr>
<td>Slope</td>
<td>0.675</td>
<td>$\sigma^2 = 0.456$</td>
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<td></td>
</tr>
<tr>
<td><strong>Performance-approach goals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.616</td>
<td>$\tau = 0.379$</td>
<td>2391.415**</td>
<td>0.339</td>
</tr>
<tr>
<td>Slope</td>
<td>0.859</td>
<td>$\sigma^2 = 0.738$</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Performance-avoidance goals</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.633</td>
<td>$\tau = 0.400$</td>
<td>2800.774**</td>
<td>0.392</td>
</tr>
<tr>
<td>Slope</td>
<td>0.788</td>
<td>$\sigma^2 = 0.621$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. df = 790. ** = p < .01; † = p < .05 without robust standard errors and p = .05 with robust standard errors.
Independent variables included in level 2 of the model included student grade level, teacher mastery goal and performance goal endorsement from 2006, along with the extent to which, on average, students experienced variations in such endorsements as they progressed through grade levels and buildings. As discussed in chapter 3, teacher mastery goal endorsement and teacher performance goal endorsement variables represent the average perception of students in a particular building within a particular grade level in a given year.

Table 7 presents descriptive statistics for the dependent and independent variables in the three HLM models used in Phase One. Three variables are listed in the Level 1 portion of the table because they represent the dependent variables in each of the three models.

Table 7. Descriptive statistics for Phase One HLM analyses

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
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<tbody>
<tr>
<td>Level 1</td>
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</tr>
<tr>
<td>MG</td>
<td>4.71</td>
<td>0.94</td>
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<td>6.00</td>
</tr>
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<td>3.21</td>
<td>1.05</td>
<td>1.00</td>
<td>6.00</td>
</tr>
<tr>
<td>PAV</td>
<td>3.15</td>
<td>1.01</td>
<td>1.00</td>
<td>6.00</td>
</tr>
<tr>
<td>Level 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GR</td>
<td>3.09</td>
<td>1.74</td>
<td>1.00</td>
<td>6.00</td>
</tr>
<tr>
<td>MEND 2006</td>
<td>4.61</td>
<td>0.88</td>
<td>1.00</td>
<td>5.17</td>
</tr>
<tr>
<td>PEND 2006</td>
<td>2.98</td>
<td>1.06</td>
<td>1.00</td>
<td>6.00</td>
</tr>
<tr>
<td>DevMEND</td>
<td>-0.29</td>
<td>0.16</td>
<td>-0.80</td>
<td>0.06</td>
</tr>
<tr>
<td>DevPEND</td>
<td>0.24</td>
<td>0.25</td>
<td>-0.26</td>
<td>0.89</td>
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</tbody>
</table>

Note: n = 791 students included in Level 2 analyses. MG = student mastery orientation; PAP = student performance-approach orientation; PAV = student performance-avoidance orientation; MEND = school-wide mastery goal endorsement; PEND = school-wide performance goal endorsement; DevMEND = average annual deviation of school-wide mastery goal endorsement from year 1; DevPEND = average annual deviation of school-wide performance goal endorsement from year 1. Grade level is adjusted such that a value of 1 = 4th grade.

Descriptive statistics show student perceptions of teacher mastery goal endorsement (M = 4.61, sd = 0.88) were higher than perceptions of performance goal endorsement (M = 2.98, sd = 1.06) in year 1 of the study (2006). The average student
grade level (age) in year 1 of the study was 3.09 (6th grade). Deviation variables indicate declines in teachers’ mastery goal endorsement in each subsequent year of the study (M = -0.29, sd = 0.16). Conversely, teachers’ performance goal endorsement practices increased annually at a rate of 0.24 (sd = 0.25). Considering the range within the endorsement variables (minimum = 1, maximum = 6, df = 5), annual changes of this magnitude represent a change of approximately 5% in school context annually, or 20% across the four years of the study, with mastery goal endorsement decreasing and performance-approach goal endorsement increasing at similar rates.

Table 8 presents the findings from the HLM analyses in Phase One. Results presented in the table are used to address specific research questions 1b through 1e.
Table 8. Teacher practices and student age as predictors of student achievement goal orientation

<table>
<thead>
<tr>
<th>Model parameter</th>
<th>Coefficient</th>
<th>SE</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mastery goals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>3.94</td>
<td>0.264</td>
<td>14.933**</td>
</tr>
<tr>
<td>Grade Level 2006</td>
<td>-0.114</td>
<td>0.017</td>
<td>-6.868**</td>
</tr>
<tr>
<td>MEND 2006</td>
<td>0.307</td>
<td>0.043</td>
<td>7.180**</td>
</tr>
<tr>
<td>PEND 2006</td>
<td>-0.015</td>
<td>0.030</td>
<td>-0.504</td>
</tr>
<tr>
<td>Rate of change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.104</td>
<td>0.045</td>
<td>-2.294*</td>
</tr>
<tr>
<td>Grade Level 2006</td>
<td>0.016</td>
<td>0.009</td>
<td>1.882</td>
</tr>
<tr>
<td>DevMEND</td>
<td>0.577</td>
<td>0.043</td>
<td>3.272**</td>
</tr>
<tr>
<td>DevPEND</td>
<td>0.209</td>
<td>0.116</td>
<td>1.794</td>
</tr>
<tr>
<td><strong>Performance-approach goals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.123</td>
<td>0.232</td>
<td>9.171**</td>
</tr>
<tr>
<td>Grade Level 2006</td>
<td>-0.018</td>
<td>0.021</td>
<td>-0.857</td>
</tr>
<tr>
<td>MEND 2006</td>
<td>0.102</td>
<td>0.037</td>
<td>2.739**</td>
</tr>
<tr>
<td>PEND 2006</td>
<td>0.241</td>
<td>0.030</td>
<td>8.020**</td>
</tr>
<tr>
<td>Rate of change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-0.056</td>
<td>0.055</td>
<td>-1.017</td>
</tr>
<tr>
<td>Grade Level 2006</td>
<td>0.019</td>
<td>0.011</td>
<td>1.825</td>
</tr>
<tr>
<td>DevMEND</td>
<td>0.362</td>
<td>0.197</td>
<td>1.840</td>
</tr>
<tr>
<td>DevPEND</td>
<td>0.305</td>
<td>0.129</td>
<td>2.355*</td>
</tr>
<tr>
<td><strong>Performance-avoidance goals</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.089</td>
<td>0.200</td>
<td>10.431**</td>
</tr>
<tr>
<td>Grade Level 2006</td>
<td>0.169</td>
<td>0.019</td>
<td>8.711**</td>
</tr>
<tr>
<td>MEND 2006</td>
<td>-0.076</td>
<td>0.032</td>
<td>-2.350*</td>
</tr>
<tr>
<td>PEND 2006</td>
<td>0.268</td>
<td>0.026</td>
<td>10.194**</td>
</tr>
<tr>
<td>Rate of change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>0.243</td>
<td>0.048</td>
<td>5.110**</td>
</tr>
<tr>
<td>Grade Level 2006</td>
<td>-0.059</td>
<td>0.009</td>
<td>-6.290**</td>
</tr>
<tr>
<td>DevMEND</td>
<td>0.228</td>
<td>0.178</td>
<td>1.285</td>
</tr>
<tr>
<td>DevPEND</td>
<td>0.291</td>
<td>0.118</td>
<td>2.464*</td>
</tr>
</tbody>
</table>

**p < .01; *p < .05. Note: df = 787 for initial level; df = 3165 for linear change. MEND = school-wide mastery goal endorsement; PEND = school-wide performance goal endorsement; DevMEND = average annual deviation of school-wide mastery goal endorsement from year 1; DevPEND = average annual deviation of school-wide performance goal endorsement from year 1.
Table 9 presents the final estimation of variance components in the fitted models.

Table 9. Final estimation of variance components in fitted HLM models

<table>
<thead>
<tr>
<th>Variance Component</th>
<th>Chi-square</th>
<th>ρ (rho)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>τ = 0.281</td>
<td>2723.081**</td>
<td>0.384</td>
</tr>
<tr>
<td>σ² = 0.449</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance-approach goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>τ = 0.329</td>
<td>2179.608**</td>
<td>0.309</td>
</tr>
<tr>
<td>σ² = 737</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Performance-avoidance goals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>τ = 0.275</td>
<td>2244.053**</td>
<td>0.318</td>
</tr>
<tr>
<td>σ² = 0.590</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**p < .01

Table 10 presents a comparison of intraclass correlations (ρ) between the unconditional and fitted HLM models for each dependent variable in the study. A decrease in ρ in the fitted model indicates more of the variance between students is being explained in the fitted Level-2 model. Additionally, Bryk & Raudenbush (2002) provide an estimate of the proportion of the variance between students specifically explained by the level 2 model. This is calculated by comparing the τ estimates across the unconditional and fitted models with the following equation:

\[
\left(\tau_{\text{unconditional}} - \tau_{\text{fitted}}\right)/\tau_{\text{unconditional}}^2
\]

Table 10. Intraclass correlations between unconditional and fitted HLM models and estimates of proportion of variance explained in fitted models.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Unconditional Model</th>
<th>Conditional Model</th>
<th>Proportion of variance explained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastery Goals</td>
<td>.469</td>
<td>.402</td>
<td>.384</td>
</tr>
<tr>
<td>Performance-approach goals</td>
<td>.339</td>
<td>.397</td>
<td>.309</td>
</tr>
<tr>
<td>Performance-avoidance goals</td>
<td>.392</td>
<td>.400</td>
<td>.318</td>
</tr>
</tbody>
</table>

2 The unconditional τ value is an indicator of the total parameter variance in student goal orientation potentially explainable by the fitted Level-2 model.
Results presented in Table 10 indicated that the fitted HLM model decreased the amount of between-student variation in outcomes, as indicated through the change in rho (ρ) statistics. Additionally, the proportion of variance explained in the outcome variables of the fitted models was .301 (30%) for student mastery goal orientation, .132 (13%) for student performance-approach goal orientation, and .313 (31%) for student performance-avoidance goal orientation. These results suggest that the fitted two-level HLM was best suited to explain variance in student mastery and performance-avoidance goal orientations, but that a moderate amount of the variance in student performance-approach goal orientations was also explained through these teacher practices.

The purpose of the specific research questions in Phase One is to investigate relationships between school context (teacher practices) and student achievement goal orientations beyond the effects of student age. Because age itself is added into the model, but not addressed within the specific research questions, a brief discussion at this point will highlight the role that student age plays within the Phase One HLM models.

Grade level in year 1 of the study was positively related to initial status in student mastery goal orientation (β = -.114, p < .01), but unrelated to the rate of change (slope) in student mastery goal orientation over time. Grade level was not a significant predictor of either the initial status or the rate of change in student performance-approach orientation. Significant relationships did exist between age and both the initial student performance-avoidance orientation (β = .169, p < .01) and the rate of change of performance-avoidance orientation over time (β = -.059, p < .01). These findings suggest older students tend to be less mastery oriented and more performance-avoidance oriented than younger students, but that the rate of change in performance-avoidance orientation among
students – increasing .243 units each observation – was slightly slower for older students than for younger students.

Before addressing findings related to school context and student achievement goal orientation, it is helpful to reiterate that the teacher goal endorsement variables within the study represent the pooled average perception of all students within a given grade level in a particular school. Teacher goal endorsement practices, therefore, represent the general perceptions of all students, and are more representative of a climate variable than perceptions reported only at the student level.

Findings presented here refer to results presented in table 8.

1b. Does mastery goal endorsement predict students’ mastery, performance-approach or performance avoidance goal orientations?

Results indicate that teacher mastery goal endorsement is positively related to initial student mastery goal orientation ($\beta = .307, p < .01$) and initial student performance-approach orientation ($\beta = .102, p < .01$), and that teacher mastery goal endorsement is negatively related to initial student performance-avoidance orientation ($\beta = -.076, p < .05$). The findings suggest a 1-unit (20% with $df = 5$) increase in teacher mastery goal endorsement is related to an increase in student mastery goal orientation of 0.307 units (6%), an increase in student performance-approach goal orientation of 0.102 units (2%), and a decrease in student performance-avoidance orientation of 0.076 units (-1.5%).
1c. Do variations in mastery goal endorsement predict variations in students' mastery, performance-approach or performance-avoidance goal orientations over time?

Variations in mastery goal endorsement context across years in the study are measured through the deviation variable created for teacher mastery goal endorsement (DevMEND). Because deviations were measured based on the average difference in context relative to year 1 of the study, the deviation variable is not included as a predictor of initial status in student goal orientation. Findings are related to the relationships between deviation variables and rates of change (slopes) in the outcome variables.

A positive relationship existed between DevMEND and the rate of change in student mastery goal orientation ($\beta = .577, p < .01$). DevMEND was unrelated to rates of change in student performance-approach or performance-avoidance orientations. That is, average annual increases in the endorsement of mastery goals were related to increased rates of change in student mastery goal orientation, but were unrelated to rates of change in student performance-approach or performance-avoidance goal orientation.

1d. Does performance goal endorsement predict students’ mastery, performance-approach or performance-avoidance goal orientations?

Teacher performance goal endorsement in year 1 of the study was not significantly related to student mastery goal orientation. Teacher performance goal endorsement was positively related to the initial status of student performance-approach goal orientation ($\beta = .241, p < .01$) and student performance-avoidance goal orientation ($\beta = .268, p < .01$). The findings indicate that a 1-unit increase (20%) in performance goal endorsement would be related to a 0.248-unit increase (5%) in student performance-
approach orientation and a 0.268-unit increase (5.4%) increase in student performance-avoidance orientation.

1e. Do variations in teacher performance goal endorsement predict variations in students’ mastery, performance-approach or performance-avoidance goal orientations?

Variations in performance goal endorsement context across years in the study are measured through the deviation variable created for teacher performance goal endorsement (DevPEND). DevPEND was not significantly related to the rate of change (slope) in student mastery goal orientation over time. There was a positive relationship between DevPEND and the rate of change in student performance-approach goal orientation (β = .305, p < .05). A positive relationship also existed between DevPEND and the rate of change in student performance-avoidance goal orientation (β = .291, p < .05). These findings suggest that annual increases in teacher performance goal endorsement are related to increased growth rates in both student performance-approach and performance-avoidance orientations.

Summary of relationships among teacher practices and student goal orientations

Overall, the findings from research question 1a suggest that consistent relationships exist within any given school year between students’ mastery, performance-approach and performance-avoidance achievement goal orientations. Positive relationships exist between mastery goals and performance-approach goals, and between performance-approach goals and performance-avoidance goals within a given year. Relationships between mastery goals and performance-avoidance goals are consistently
negative within school years. Relationships within the same achievement goal measures across years were also significant and stable across years in the study.

Findings from specific research question 1a also reveal patterns of significant relationships between achievement goal orientations over time. A consistent, negative relationship existed between student mastery goal orientations and student performance-avoidance orientations in subsequent years. A consistent, positive relationship existed between student performance-approach and performance-avoidance orientations in subsequent years. An inconsistent, positive relationship existed between some measures of performance-approach orientation and subsequent mastery goal orientations. A consistent, negative relationship existed between student performance-avoidance orientations and student mastery goal orientations in subsequent years. Conversely, a consistent, positive relationship existed between student performance-avoidance orientations and student performance-approach orientations in subsequent years.

There were significant relationships between mastery goal endorsement and student mastery goal orientation in the study. These relationships are in reference to initial measures in year 1, and also to relationships between changing contexts and rates of change in student mastery goal orientation. Figure 7 shows the mastery goal orientation of students situated in school contexts that could be characterized as high- and low-mastery endorsing contexts (upper and lower quartiles) in 2006 who experienced, on average, either small annual decreases in mastery goal endorsement across the study (DevMEND = -0.1) or large annual decreases in mastery goal endorsement across the study (DevMEND = -0.5).
Initial mastery goal endorsement was associated with initial student mastery goal orientation. Deviations in mastery goal endorsement contexts across years in the study were significantly related to the rate of change in student mastery goal orientation. Results indicate that differences in initial status attributed to mastery endorsing context are magnified or negated depending on changes in context as students progress through the schooling experience.

Mastery goal endorsement was also positively related to initial student performance-approach goal orientation and negatively related to initial student performance-avoidance goal orientation. Deviations in mastery goal endorsement were not associated with rates of change in either performance-approach or performance-avoidance orientations.
Performance goal endorsement context in 2006 was positively related to the initial status of both student performance-approach goal orientation and student performance-avoidance goal orientation. Increases in performance goal endorsing contexts (DevPEND) were positively related to the rate of change in student performance-approach and student performance-avoidance goal orientations.

Figure 8 depicts the initial performance-approach orientation of students in high- and low-performance goal endorsement context (upper and lower quartiles), along with the trajectories of those students based on the average changes in performance endorsement practices across years in the study (upper and lower quartiles). The slopes of the four lines indicate the relationships between context and performance-approach orientation. There is a negative slope over time for students who experienced little annual change in performance goal endorsement across years in the study (DevPEND = 0.009). The slope representing rate of change in performance-approach goal orientation for students who experienced relatively high increases in school performance goal endorsement (DevPEND = 0.47) is positive, regardless of initial performance-goal orientation status.
Figure 8. Relationships between performance endorsement and student performance-approach orientation

![Graph showing relationships between performance endorsement and student performance-approach orientation](image)

**Note:** Patterns presented in the figure above represent four types of contextual experiences of students within the study and the relationships between those experiences and students' performance-approach goal orientations. Students who began the study in a relatively high performance-endorsing climate reported higher levels of initial performance-approach goal orientation than students who began the study in a relatively low performance-endorsing climate. The slopes of lines represent the relationship between rates of change in student performance-approach goal orientation over time and changes in teacher performance goal endorsement.

Figure 9 represents the relationships between performance endorsement practices and student performance-avoidance goal orientation. Changes in school context in which the endorsement of performance goals became more salient across years in the study were related to increases in the rate at which students adopted performance-avoidance goal orientations.
Figure 9. Relationships between performance endorsement and student performance-avoidance orientation

Note: Patterns presented in the figure above represent four types of contextual experiences of students within the study and the relationships between those experiences and students’ performance-avoidance goal orientations. Students who began the study in a relatively high performance-endorsement climate reported higher levels of initial performance-avoidance goal orientation than students who began the study in a relatively low performance-endorsement climate. The slopes of lines represent the relationship between changes in teacher performance goal endorsement and rates of change in student performance-avoidance goal orientation over time.

Figure 10 presents a summary of the overall results of the Phase One HLM analyses. Lines represent significant relationships between goal endorsement contexts and achievement goal orientations.

Figure 10. Summary of relationships among teacher practices and student goal orientations

Results presented in Figure 10 indicate the endorsement of mastery goals in schools is positively related to student mastery and – to a lesser degree – performance-
approach goal orientations, and negatively related to student performance-avoidance goal orientation. Consistent annual increases in teachers’ endorsement of mastery goals were positively related to the rate of growth in student mastery goal orientation over time. The endorsement of performance goals within school contexts is positively related to student performance-approach and performance-avoidance goal orientations. Additionally, consistent annual increases in teachers’ endorsement of performance goals were positively related to the rate of growth in student performance-approach and student performance-avoidance goal orientations.
Results from Phase Two of the study will be presented in this chapter. Phase Two addressed general research question 2: *Do students’ achievement goal orientations predict achievement outcomes on standardized mathematics assessments?*

Within this chapter, I will address specific research questions 2a through 2f. Phase Two HLM model results serve as the basis for answering the research questions. Within the Phase Two model, the dependent variable is student mathematics achievement as measured through scores on the Measures of Academic Progress, or Math RIT scores, gathered twice annually (fall and spring) from 2006 through 2009.

As discussed in Chapter 3 and 4, individual growth analysis calls for the fitting of an unconditional level-1 model, where repeated observations of the outcome variable over time are analyzed without the addition of level-2 independent variables. Results from the unconditional model indicate whether significant differences in the level-1 intercept (i.e. initial status) exist between individuals, and whether significant variations in the rates of change over time (i.e. slopes) exist between individuals. Significance is
determined through a chi-squared statistic. Additionally, the unconditional model yields $\sigma^2$, an estimate of within-student variance in the outcome variable, and $\tau$, an estimate of the variance between students. Lastly, an intraclass correlation, $\rho$, can be calculated to represent the proportion of variance in student mathematics achievement which is between students. Table 11 presents the results of the unconditional model.

Results from the unconditional model indicated significant differences existed between students (chi-square = 28969.25, $p < .01$), justifying the inclusion of level-2 independent variables in the model. The intraclass correlation in the model ($\rho = 0.859$) suggests approximately 86% of the variation in math RIT scores is between students.

<table>
<thead>
<tr>
<th>Table 11. Final estimation of fixed effects and variance components for the unconditional model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Final estimation of fixed effects</strong></td>
</tr>
<tr>
<td>Model parameter</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>Slope</td>
</tr>
<tr>
<td><strong>Final estimation of variance components</strong></td>
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<tr>
<td>Random Effect</td>
</tr>
<tr>
<td>Intercept</td>
</tr>
<tr>
<td>Slope</td>
</tr>
</tbody>
</table>

Note. df = 790. ** = $p < .01$; † = $p < .05$ without robust standard errors and $p = .05$ with robust standard errors.

Independent variables included student grade level, student mastery, performance-approach and performance-avoidance goal orientations in 2006, and the extent to which, on average, students’ goal orientations deviate from initial status annually. Table 12 displays the descriptive statistics for the Phase Two HLM. Within the study, the average math RIT score was 232.25 (sd = 15.85). The average student grade level (age) was 3.09 (sixth grade) in 2006, with most students ranging in age from $4^{th}$ grade through $8^{th}$ grade.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>SD</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>Math RIT</td>
<td>232.25</td>
<td>15.85</td>
<td>174</td>
</tr>
<tr>
<td></td>
<td>GR</td>
<td>3.09</td>
<td>1.73</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>MG 2006</td>
<td>4.92</td>
<td>0.87</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>PAP 2006</td>
<td>3.27</td>
<td>1.08</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>PAV 2006</td>
<td>3.04</td>
<td>1.10</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>DevMG</td>
<td>-0.28</td>
<td>0.80</td>
<td>-3.12</td>
</tr>
<tr>
<td></td>
<td>DevPAP</td>
<td>-0.07</td>
<td>1.04</td>
<td>-3.80</td>
</tr>
<tr>
<td></td>
<td>DevPAV</td>
<td>0.16</td>
<td>1.02</td>
<td>-4.07</td>
</tr>
</tbody>
</table>

Note: n = 774 students included in Level 2 analyses. MG = student mastery goal orientation; PAP = student performance-approach goal orientation; PAV = student performance-avoidance goal orientation; DevMG = average annual deviation of student mastery goal orientation from year 1; DevPAP = average annual deviation of student performance-approach goal orientation from year 1. DevPAV = average annual deviation of student performance-avoidance goal orientation from year 1. Grade level is adjusted such that a value of 1 = 4th grade.

Descriptive statistics indicate students reported higher levels of mastery goal orientation (M = 4.92, sd = 0.87) than performance-approach goal orientation (M = 3.27, sd =1.08) or performance-avoidance goal orientation (M = 3.04, sd = 1.10) in 2006. On average, student mastery goal orientation declined 0.28 units each year (M_{DevMG} = -0.28, sd = 0.8). Student performance-approach goal orientation declined slightly each year (M_{DevPAP} = -0.07, sd = 1.04), and student performance-avoidance goal orientation increased annually (M_{DevPAV} = 0.16, sd = 1.02).

Relationships between student goal orientations and mathematics achievement

Table 13 shows the results of the Phase Two HLM model with the included independent variables. Results for specific research questions 2a through 2f will reference Table 13.
As in Chapter Four, a brief discussion of the relationship between student age and mathematics achievement will be presented prior to the results for the specific research questions. Results indicate that grade level in 2006 was predictive of increased math RIT scores ($\beta = 6.126, p < .01$), suggesting that, all other factors being equal, students separated by one grade level in school would be predicted to have RIT scores that were different from each other by six scaled points. Another interpretation of this relationship is that 6 RIT points is the equivalent of 1 year’s growth in achievement within the sample population.

There was a negative relationship between student grade level and the rate of change (slope) in math achievement ($\beta = -0.371, p < .01$). That is, the slope in older students’ growth in mathematics achievement was less than that of younger students’ growth.

<table>
<thead>
<tr>
<th>Model parameter</th>
<th>Coefficient</th>
<th>SE</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>208.348</td>
<td>4.492</td>
<td>43.381**</td>
</tr>
<tr>
<td>Grade Level 2006</td>
<td>6.126</td>
<td>0.308</td>
<td>19.868**</td>
</tr>
<tr>
<td>MG 2006</td>
<td>2.002</td>
<td>0.716</td>
<td>2.797**</td>
</tr>
<tr>
<td>PAP 2006</td>
<td>-0.923</td>
<td>0.466</td>
<td>-1.983*</td>
</tr>
<tr>
<td>PAV 2006</td>
<td>-1.951</td>
<td>0.527</td>
<td>-3.701**</td>
</tr>
<tr>
<td>Rate of change</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>3.133</td>
<td>0.133</td>
<td>23.490**</td>
</tr>
<tr>
<td>Grade Level 2006</td>
<td>-0.371</td>
<td>0.044</td>
<td>-8.332**</td>
</tr>
<tr>
<td>DevMG</td>
<td>0.262</td>
<td>0.083</td>
<td>3.148**</td>
</tr>
<tr>
<td>DevPAP</td>
<td>-0.075</td>
<td>0.06</td>
<td>-1.245</td>
</tr>
<tr>
<td>DevPAV</td>
<td>-0.003</td>
<td>0.067</td>
<td>-0.05</td>
</tr>
</tbody>
</table>

**p < .01; *p < .05. Note: df = 774 for initial level; df = 4565 for linear change. MG 2006 = Student mastery goal orientation in 2006; PAP 2006 = student performance-approach goal orientation in 2006; PAV 2006 = student performance-avoidance goal orientation in 2006; DevMG = average annual deviation from 2006 in student mastery goal orientation; DevPAP = average annual deviation from 2006 in student performance-approach goal orientation; DevPAV = average annual deviation from 2006 in student performance-avoidance orientation.
2a. Does student mastery goal orientation predict student mathematics achievement?

Results from Table 13 indicate that student mastery goal orientation in 2006 was positively related to student mathematics achievement ($\beta = 2.002$, $p < .01$). This suggests that a 1-unit increase (20%) in student mastery goal orientation in 2006 would be related to an increase of 2 points in student math RIT score.

2b. Do variations in student mastery goal orientation predict variations in student mathematics achievement over time?

Deviations in student mastery goal orientation (DevMG) were positively related to the rate of change in student mathematics achievement over time ($\beta = 0.262$, $p < .01$). These results suggest that average annual increases in student mastery goal orientation are related to increased growth rates in student achievement. Figure 11 depicts the ways in which both mastery goal orientation in 2006 and deviations in mastery goal orientation across the study were predictive of initial mathematics achievement and rates of change in mathematics achievement over time. Students whose mastery goal orientation was high relative to others in the study (75th percentile) had math RIT scores significantly higher than students whose mastery goal orientation was low relative to others in the student (25th percentile). The significant relationship between DevMG and the rate of change in math RIT scores over time is depicted by the ways in which students with the same initial math RIT scores at Time = 1 display different slopes in growth across the six observations in the study.
2c. *Does student performance-approach orientation predict student mathematics achievement?*

Results from Table 13 indicate a significant, negative relationship between student performance-approach goal orientation in 2006 and student mathematics achievement as measured through math RIT scores ($\beta = -0.923$, $p < .01$). These results suggest that a 1-unit (20%) increase in student performance-approach orientation would be related to a decrease of approximately 1 RIT point in student math score.

2d. *Do variations in student performance-approach goal orientation predict variations in student mathematics achievement over time?*

Deviations in student performance-approach goal orientation (DevPAP) were not significantly related to the rate of change in student math RIT score over time ($\beta = -0.075$, *ns*). These results suggest there is no relationship between growth in mathematics
achievement and consistent annual changes in student performance-approach goal orientation over time.

Figure 12 depicts the relationship between initial student performance-approach goal orientation and initial student mathematics achievement, and the null relationship between deviations in performance-approach goal orientation and mathematics achievement.

Figure 12. Initial student performance-approach goal orientation as a predictor of student mathematics achievement.

In Figure 12, students whose performance-approach goal orientations were high, relative to others in the study (75th percentile), scored lower than students whose performance-approach goal orientations were low, relative to others in the study (25th percentile). Student trajectories follow similar patterns across the study regardless of changes in performance-approach goal orientation.
2e. Does student performance-avoidance orientation predict student mathematics achievement?

Table 13 indicates that a significant, negative relationship existed between student performance-avoidance orientation in 2006 and math RIT scores (β = -1.951, p < .01). This relationship suggests a 1-unit (20%) increase in student performance-avoidance orientation would be related to a decrease in math RIT score of approximately 2 points.

2f. Do variations in student performance-avoidance goal orientation predict variations in student mathematics achievement over time?

No significant relationship was found between deviations in student performance-avoidance orientation (DevPAV) and the rate of change in student mathematics achievement measured through RIT scores (β = -0.003, ns). These results suggest that consistent annual increases or decreases in student performance-avoidance goal orientation would not be predictive of variations in the rate of change in mathematics achievement over time.

Figure 13 depicts the relationships between student performance-avoidance orientation, and student mathematics achievement.

**Figure 13.** Initial student performance-avoidance goal orientation as a predictor of student mathematics achievement.
In Figure 13, students who reported high performance-avoidance goal orientations relative to others in the study (75th percentile) scored significantly lower than students who reported low performance-avoidance goal orientations relative to others in the study (25th percentile). Student trajectories follow similar patterns across the study regardless of average annual deviations in performance-avoidance orientations.

Table 14 presents the final estimation of variance components in the fitted Phase Two HLM model. The intraclass correlation ($\rho = 0.812$) indicates that an estimated 81% of the variance in mathematics achievement between students remains unexplained.

<table>
<thead>
<tr>
<th>Variance Component</th>
<th>Chi-square</th>
<th>$\rho$ (rho)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math RIT score</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\tau = 153.388$</td>
<td>20391.902**</td>
<td>0.812</td>
</tr>
<tr>
<td>$\sigma^2 = 35.554$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**$p < .01$**

Table 15 presents a comparison of intraclass correlations ($\rho$) between the unconditional and fitted HLM models in Phase Two. A decrease in $\rho$ in the fitted model indicates more of the variance between students is being explained in the fitted Level-2 model. Additionally, Bryk & Raudenbush (2002) provide an estimate of the proportion of the variance within students specifically explained by the level 2 model. This is calculated by comparing the $\tau$ estimates across the unconditional and fitted models with the following equation: $(\tau_{\text{unconditional}} - \tau_{\text{fitted}})/\tau_{\text{unconditional}}$.³

³ The unconditional $\tau$ value is an indicator of the total parameter variance in student goal orientation potentially explainable by the fitted Level-2 model.
Table 15. Intraclass correlations between unconditional and fitted HLM models and estimates of proportion of variance explained in fitted models.

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Unconditional</th>
<th>Conditional</th>
<th>Proportion of variance explained</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( \rho )</td>
<td>( \tau )</td>
<td>( \rho )</td>
</tr>
<tr>
<td>Math RIT</td>
<td>.859</td>
<td>220.41</td>
<td>.812</td>
</tr>
</tbody>
</table>

Comparison between the unconditional and conditional estimated variance components indicates that the fitted Phase Two model reduced the between-student variance by approximately 5%. A comparison of \( \tau \) estimates from the unconditional and fitted models indicates that approximately 30% of the within-student variance is explained by the inclusion of the level-2 achievement goal orientation variables.

**Summary of relationships between achievement goals and mathematics achievement**

The purpose of Phase Two within the study was to investigate the relationships between student achievement goal orientations and mathematics achievement as measured through a standardized mathematics test. Students within the study ranged in age from 4th grade through 9th grade at the beginning of the study. Descriptive statistics indicated that students reported higher levels of mastery goal orientation at the beginning of the study than performance-approach or performance-avoidance goal orientations. On average, students within the sample reported annual declines in both mastery and performance-approach goal orientations, and increases in performance-avoidance goal orientations. Figure 14 depicts the significant relationships found between achievement goal orientations and mathematics achievement, and between deviations in goal orientations and rates of change in mathematics achievement over time.
Significant relationships existed between students’ initial achievement goal orientations and students’ standardized mathematics achievement. A mastery goal orientation was positively related to mathematics scores. Both performance-approach and performance-avoidance goal orientations in 2006 were negatively related to student mathematics scores.

Consistent increases in annual mastery goal orientation were positively related to rates of growth in students’ mathematics achievement over time. No significant relationships were found between average annual deviations in performance-approach or performance-avoidance goal orientations and rates of change in mathematics achievement.

Overall, the two-level model reduced the amount of unexplained between-student variances by an estimated 5%. The model explained an estimated 30% of the within-student variance in mathematics achievement.
CHAPTER VI

SUMMARY, CONCLUSIONS, DISCUSSION AND RECOMMENDATIONS

This chapter will present a general overview of the findings from the current research study, along with a discussion and recommendations for theory and practice. Findings will be discussed relative to contemporary Achievement Goal Theory (Barron, 2000; Grant & Dweck, 2003). Within the summary, conclusion and discussion sections, I will address both phases of the research study separately and collectively, in order to present a synthesis of the relationships among teacher practices, student motivation and student mathematics achievement. Recommendations will be provided for both educational research and practitioners. Lastly, limitations of the current study will be highlighted.

Summary of the Findings

This section will summarize the relationships that were found among teacher practices, student achievement goal orientations and student academic achievement using an Achievement Goal Theory framework. The study was designed and conducted in two phases. The first phase involved an investigation into relationships among teacher
practices and student goal orientations from 2006 through 2009. The second phase of the study investigated the relationships between student achievement goal orientations and student mathematics achievement during the same period of time. Teacher practices in the study were identified as mastery-goal endorsing or performance-goal endorsing. Student achievement goals were defined through the triarchic model of mastery, performance-approach and performance-avoidance goal orientations. Student mathematics achievement was measured through student scores on an adaptive, computerized mathematics test administered semi-annually from 2006 through 2009.

In advance of the summary of findings, it is important to reiterate a few elements of the study. First, this was a longitudinal study, spanning four academic school years. Participants within the study were, on average, in 6th grade at the beginning of the study. Second, teacher practices within the study were pooled at given grade levels within given buildings. This was done to create a climate or context variable less influenced by individual student differences. These pooled or aggregated variables represent the context experienced by all students in a particular cohort (i.e. a grade level of students in a particular building). While the focus of this study was on student mathematics achievement, the practices are not intended to reflect those of only mathematics teachers, but rather the general instructional practices that were most salient across a given grade level in each school in a particular year. Lastly, due to the nature of the achievement measure, neither teachers nor students were able to prepare for these assessments specifically. The items presented to students during the assessment are drawn from a random bank of items. This outcome measure of academic achievement is a scaled variable with a range of approximately 100 points.
Figure 15 presents the hierarchical findings from the study, and will serve as a reference for many of the points addressed in the summary. For clarity purposes, only significant relationships are identified.

Figure 15. Theoretical Framework representing overall findings from the study

Note: Solid lines represent positive relationships. Dotted lines represent negative relationships.

Relationships among student achievement goal orientations

There was a persistent, negative relationship between student mastery and performance-avoidance orientations each year in which surveys were administered. A positive relationship existed between student mastery and performance-approach goal orientations. Lastly a positive relationship also existed between student performance-approach and performance-avoidance orientations each year of the study.

Aside from revealing consistent within-year patterns of relationships among student goal orientations, findings also indicated some of these relationships persist over time, such that some goal orientations are likely to be related to other goal orientations in
subsequent years. Initial student mastery goal orientation was negatively related to student performance-avoidance orientation is all subsequent years of the study. That is, students with higher mastery orientations in younger grades were less likely to hold performance-avoidance goal orientations even three years into the future. A reciprocal relationship was also found, in which student performance-avoidance orientations were negatively related to student mastery orientations in subsequent years. Student performance-avoidance goal orientations were positively related to student performance-approach orientations in subsequent years. A reciprocal relationship also existed, in which performance-approach orientations were positively related to performance-avoidance goal orientations in subsequent years.

There was not a consistent relationship between student mastery goal orientations and performance-approach goal orientations in subsequent years, nor did a consistent relationship emerge between performance-approach goal orientations and mastery goal orientations in subsequent years. The relationships between goal orientations across years differed from within-year relationships in this way. Whatever positive relationship that existed between mastery and performance-approach goal orientations at a particular point in time, the relationship did not extend beyond that point in time to influence orientations in subsequent years.

Teacher practices and student achievement goal orientations

There is a significant relationship between teacher practices and student achievement goal orientations beyond the effects of student age. That is, school
motivational context was significantly related to student achievement goal orientation regardless of the grade level of students within the study.

Teacher mastery goal endorsement in the first year of the study was positively related to initial student mastery goal orientation and initial student performance-approach orientation, and negatively related to student performance-avoidance orientation. The endorsement of mastery goals at the beginning of the study was most directly related to student mastery goal orientations.

Performance goal endorsement was positively related to initial student performance-approach goal orientation and to initial student performance-avoidance goal orientation. The relationship between performance goal endorsement and student performance-approach orientation was nearly identical to the relationship between performance goal endorsement and student performance-avoidance orientation. Performance goal endorsement in the first year of the study was not significantly related to initial student mastery goal orientation.

Changes in teacher practices were modeled through deviation variables. These variables represent the average annual changes in teacher practices experienced by students, relative to the first year of the study. This reference to the first year of the study assumes that students do not forget practices from previous years, and that the effects of experiencing several years of a changed school context are cumulative.

Deviations in teacher mastery goal endorsement across years in the study were positively related to the rate of change in student mastery goal orientation. That is, students who experienced school contexts where mastery goal endorsement became more salient adopted mastery goals at a faster rate. Average annual increases in mastery goal
endorsement were unrelated to rates of change in student performance-approach or performance-avoidance orientations.

Deviations in teachers’ performance goal endorsing practices were positively related to rates of change in students’ performance-approach and performance-avoidance goal orientations. Students who experienced contexts in which the endorsement of performance goals became more salient adopted performance-approach and performance-avoidance goals at higher rates. Changes in performance goal endorsement were unrelated to rates of change in students’ mastery goal orientations.

Student achievement goal orientations and mathematics achievement

All three measures of student achievement goal orientations in year one of the study were significantly related to students’ initial mathematics achievement. While student mastery goal orientation in 2006 was positively related to mathematics achievement, student performance-approach and performance-avoidance orientations were both negatively related to mathematics achievement.

Deviation variables were created for goal orientations to match deviation scores in teacher practices. That is, the mastery goal deviation variable represents the average difference between a student’s goal orientation in year one of the study and his goal orientation in subsequent years. A positive deviation score indicates that a particular goal orientation increased, on average, each year of the study.

Positive deviations in student mastery goal orientation were positively related to student growth (rate of change) in mathematics achievement. Positive deviations in student performance-approach and performance-avoidance goal orientations were
unrelated to student growth in mathematics achievement. These findings suggest that accelerated growth in mathematics achievement in this study was only associated with increases in student mastery goal orientation over time.

Overall, the findings indicate that when students are oriented toward mastery goals, and when they become increasingly mastery oriented over time, there is an accompanying increase in initial mathematics achievement and growth in mathematics achievement. When students hold a performance orientation, either approach or avoidance, there appears to be a negative effect on initial mathematics achievement. Changes in performance-related goal orientations appear to be unrelated to rates of change in mathematics achievement.

**Conclusion and Discussion**

In this section I will discuss findings from the current study relative to existing Achievement Goal Theory research in three parts. The discussion will first address relationships among student achievement goal orientations within and across years. Secondly, I will discuss relationships among teacher practices and student achievement goal orientations. Lastly, I will discuss relationships among student achievement goal orientations and mathematics achievement. The discussion will center on the ways in which the current study supports or challenges some conventional assumptions in Achievement Goal Theory.
Relationships among student achievement goal orientations

Three consistent patterns of relationships among achievement goal orientations emerged from the study. The first pattern was the relationships among goal orientations at a given point in time. These were identified as within-year relationships. The second pattern was the stability of goal orientations in students across years. These patterns were identified as within-goal relationships. Lastly, relationships emerged between goal orientations across years in the study, such that some goal orientations in a particular year were predictive of other goal orientations in subsequent years. Each of these relationships will be discussed relative to contemporary Achievement Goal Theory within this section.

Consistent patterns of moderate relationships across all years of the study support the theoretical assumption that achievement goal orientations are distinct, though correlated, constructs (Grant & Dweck, 2003). Each orientation directs energy and behavior at the attainment of a distinct goal or state. A mastery orientation is directed at attaining increasing levels of competence, and at acquiring new learning. A performance-approach orientation directs the individual to demonstrate current levels of competence, skills and learning relative to the competence of others or to publicly recognized standards. A performance-avoidance orientation is directed at avoiding a demonstration of a lack of competence, either relative to others or to publicly recognized standards.

The negative relationship between mastery and performance-avoidance goal orientations in this study supports the theoretical assumption that these goals do indeed stand in opposition to each other, such that the presence or increase of one is likely to
lead to the absence or decrease of the other. A mastery goal orientation is one in which
the desired state is one of growth and improvement: the development of competence.
Attempting to acquire new learning involves risk, however. Students whose goals are
aimed at developing increasing levels of competence must be willing to risk initial
failure, and even the demonstration of a lack of competence through help-seeking (Butler,
1998; Butler & Neuman, 1995; Ryan & Gheen, 1998; Ryan & Pintrich, 1997; Ryan et al.,
2001), before the new skill is mastered. This motivation stands in opposition to a
performance-avoidance goal orientation, in which effort is directed at avoiding the
demonstration of a lack of competence (Bartels & Magun-Jackson, 2009; Chen et al.,
2009; Middleton & Midgley, 1997). Conversely, when a student is motivated to avoid
demonstrating a lack of competence, engaging in new learning where initial failure is
almost guaranteed decreases the likelihood that the avoidant student will achieve his goal.

The patterns of moderate, positive relationships between mastery and
performance-approach goal orientations also align with contemporary theory and
research. Both orientations are directed to approach, rather than avoid, a particular goal.
Mastery goals have been consistently characterized as adaptive (Ablard & Lipschultz,
1998; Agbuga & Xiang, 2008; Ames & Archer, 1988; Archer & Scevak, 1998), as have
performance-approach goals in the revised Achievement Goal Theory framework (Barron
& Harackiewicz, 2001, 2003; Harackiewicz et al., 1998; Harackiewicz et al., 2000;
Harackiewicz et al., 2002). The goals have also been hypothesized to have an additive
relationship, such that their combined adoption may lead to even greater achievement on
multiple measures than either could independently (Pintrich, 2000b). It is not surprising,
therefore, that when students within this study held goals directed at developing
increasing levels of competence they also, to some degree, adopted goals directed at the
demonstration of that competence. Conversely, it is also consistent with the theory that
students whose primary orientation lies in the demonstration of competence might also
view the development of new levels of competence in line with their goals. In that way,
they would be more able to demonstrate competence when the opportunity arises.

The aforementioned negative relationship between students’ mastery and
performance-avoidance goal orientations, and the positive relationship between
performance-approach and mastery goal orientations, are both reasonable and consistent
with contemporary theory and research. Of interest within these findings is the
consistent, positive relationship between student performance-approach and performance-
avoidance goal orientations among students within the study. Since both orientations are
performance-oriented, it seems reasonable that they would be related. Given the
consistently maladaptive nature of a performance-avoidance orientation (e.g., Elliot &
Covington, 2001; Leondari & Gonida, 2007; Middleton & Midgley, 1997), this
relationship raises concerns about the benefits of a performance-approach goal
orientation. That is, if there is a moderately strong correlation between a performance-
approach and a performance-avoidance orientation, it is reasonable to assume that any
positive achievement-related outcomes associated with a performance-approach
orientation (e.g., Harackiewicz et al., 1997; Harackiewicz et al., 1998; Harackiewicz et
al., 2000; Harackiewicz et al., 2002; Harackiewicz et al., 2008), may also carry with them
the unintended side-effects of a performance-avoidance orientation (Elliot, Cury et al.,
2006; Leondari & Gonida, 2007; Midgley & Urdan, 2001; Shih, 2005; T. Urdan, 2004).
The results from the current study clarify findings from previous research in which
“students who espoused performance goals...were more susceptible to anxiety than those who focused more exclusively on mastery goals” (Daniels et al., 2008, p. 599), since avoidance orientations have been so consistently associated with negative emotions such as anxiety (Elliot & McGregor, 2001; Elliot & Sheldon, 1997; A. J. Elliott & McGregor, 2001).

Aside from revealing consistent within-year patterns of relationships among student goal orientations, findings also indicated some of these relationships persist over time. These findings suggest that not only are students’ goal orientations stable (Bong, 2002; Fryer & Elliot, 2007; Muis & Edwards, 2009), they may also reliably predict other goal orientations in subsequent years. Performance-related goal orientations (approach and avoidance) were predictive of each other in subsequent years. This is consistent with previous research, in which middle school students holding a high performance-approach orientation were more likely to adopt a performance-avoidance orientation in subsequent years (Middleton et al., 2004). Whatever positive relationship that exists between mastery and performance-approach goal orientations at a particular point in time, the relationship does not appear to extend beyond that point in time to influence orientations in subsequent years.

Teacher practices and student achievement goal orientations

The endorsement of mastery goals at the beginning of the study was most closely related to increases in students’ mastery goal orientations, and was as likely to produce an increase in student performance-approach goal orientation as it was to produce a decrease in performance-avoidance goal orientation. Historically, it has been assumed that the
endorsement of mastery goals was predictive of increases in both mastery and performance-approach goals, and with decreases in performance-avoidance goals. This study expands the work of Midgley, Anderman et al (1995), where such relationships were restricted only to middle school students. Relationships in this study were found beyond the effects of student age.

Performance goal endorsement practices were more highly predictive of increases in student performance-avoidance orientations than with increases in student performance-approach orientations. These results support findings from previous research that found teacher performance goal endorsement is related to student avoidance strategies (Turner et al., 2002), and that the endorsement of performance was as likely to produce an avoidance as an approach performance orientation (Church et al., 2001).

Average annual increases in mastery goal endorsement were unrelated to rates of change in student performance-approach or performance-avoidance orientations. Increases over time in teachers’ endorsement of mastery goals are only related to increased rates of change in students’ mastery goal orientations, suggesting that increased mastery goal endorsement acts as a multiplier, magnifying the initial mastery goal orientation of students (Shun & Youyan, 2008).

Average annual increases in the endorsement of performance goals are related in almost equal measure to increased rates of change in both performance-related goal orientations. These findings are also consistent with previous research which found that students who experience changes in school context in which the endorsement of mastery goals becomes increasingly salient, they respond with increased rates of performance-
approach (Lyke & Kelaher Young, 2006; Murayama & Elliot, 2009) and performance-avoidance (Gonida et al., 2009) orientations.

Findings from this study support and extend the work of Wolters (2004). That earlier study found positive relationships between perceptions of performance goal endorsement and student performance-approach and performance-avoidance orientations, with measures taken at one point in time. This study yielded similar results, and also identified the ways in which increases in the endorsement of performance goals is related to the growth rate of student performance-approach and performance-avoidance orientations over time.

Student achievement goal orientations and mathematics achievement

A primary purpose of this study was to identify relationships between student-level achievement goal orientations and trends in adolescent student achievement on a standardized mathematics assessment. This represents an underexplored aspect of Achievement Goal Theory research for two reasons. First, the math test was an achievement measure for which neither students nor teachers can explicitly prepare, and is therefore more representative of a student’s global level of mathematics achievement than local assessments or grades. Secondly, the longitudinal nature of the study using individual growth curve analysis (Bryk & Raudenbush, 2002) allows for an investigation into relationships between student goal orientations and achievement at one point in time (e.g. initial status), and across academic years (e.g. rate of change). One other study (Shim et al., 2008) employed a similar methodology with an outcome measure of student
GPA, but no other study has applied this methodology to student achievement on a
standardized measure.

Mastery goal orientation in the study represents the only adaptive pattern of
motivation. That is, only a mastery goal orientation was predictive of increased
mathematics achievement. Both goal orientations related to performance represent
maladaptive patterns of motivation, although the magnitude of those relationships
suggests that performance-avoidance goal orientations are more than twice as detrimental
to initial achievement as performance-approach goal orientations. Increases in student
mastery goal orientation were positively related to student growth (rate of change) in
mathematics achievement. Deviations in student performance-approach and
performance-avoidance goal orientations were unrelated to student growth in
mathematics achievement.

Overall, the findings of relationships between goal orientations and mathematics
achievement indicate that when students are oriented toward mastery goals, and when
they become increasingly mastery oriented over time, there is an accompanying increase
in initial mathematics achievement and growth in mathematics achievement. When
students hold a performance orientation, either approach or avoidance, there appears to be
a negative effect on initial mathematics achievement. Changes in performance-related
goal orientations appear to be unrelated to growth in mathematics achievement over time.

Previous research has identified positive relationships between student mastery
goal orientation and affective and behavioral outcomes (e.g., Pintrich, 2000b), and
between performance-approach goal orientations and academic achievement on
curriculum-based measures (e.g., Wolters, 2004). Student performance-avoidance goal
orientation has been related to decreases in persistence, interest and achievement (Church et al., 2001; Wolters, 2004). While some researchers (e.g., Barron & Harackiewicz, 2003; Harackiewicz et al., 2000; Harackiewicz et al., 2008) have found positive relationships between performance-approach goal orientations at one point in time and student grade point average at subsequent points in time, when goal orientation measures and achievement measures have been gathered at multiple points over time, the positive effects of performance-approach goals disappear (Shim et al., 2008).

Limitations in the existing body of research have been related to measurement and methodological issues. That is, local measures of achievement such as GPA and course exams may favor performance-approach oriented students who engage in shallow learning strategies (e.g. memorizing what will be on the test). Previous research has also seldom gathered repeated measures of student achievement goal orientations and academic achievement, with the exception of Shim, Ryan et al. (2008), whose findings also pointed to the limited benefit of performance-approach goals for academic growth.

Findings from this study provide an alternative lens to some conventionally held views regarding the adaptive nature of student achievement goal orientations. It has been held that, although a mastery goal orientation may be related to positive affective measures, a performance-approach goal orientation was a necessary ingredient for academic achievement itself (Barron & Harackiewicz, 2003; Harackiewicz et al., 2000; Harackiewicz et al., 2002; Harackiewicz et al., 2008; Wolters, 2004). Within this sample of adolescent students and using the metric of a more global assessment of mathematics achievement, however, it appears as though a mastery goal orientation holds the most promise for overall achievement and growth.
Understanding behaviors typically associated with student achievement goal orientations can help to explain these findings. Students holding a mastery goal orientation tend to persist in the face of challenges, seek help, and engage in deep learning strategies and self-regulated behaviors (Dupeyrat & Mariné, 2005; Grant & Dweck, 2003; Greene & Miller, 1996; Karabenick, 2003). These behaviors seem most adaptive when the outcome variable is a global assessment of mathematics achievement. That is, since mastery oriented students may follow their own content-related interests to the detriment of course grades (e.g., Harackiewicz et al., 2008), these behaviors may lead more directly to global mathematics achievement.

Conversely, students holding a performance-approach goal orientation tend to engage in cheating behaviors (Butler & Shibaz, 2008), shallow learning strategies (e.g., cramming, studying only what might be on a test), and may avoid seeking help or challenges (Elliot, Cury et al., 2006; Elliot, Gable, & Mapes, 2006; Elliot et al., 2005; Elliot & Thrash, 2001; A. J. Elliott & McGregor, 2001; Middleton et al., 2004; Middleton & Midgley, 1997). These behaviors have been consistently related to higher course grades, GPA and scores on locally generated tests (Barron, 2000; Barron & Harackiewicz, 2001; Harackiewicz et al., 1998; Harackiewicz et al., 2000; Harackiewicz et al., 2002; Wolters, 2004), but do not appear to be an adaptive orientation when the measure of achievement is one for which students can not explicitly study or cram. Given the relationship within this study between performance-approach and performance-avoidance goal orientations, it is also reasonable to conclude that some students who were highly performance-approach oriented may have also been oriented toward increased levels of performance-avoidance goal orientations, and therefore may
have been engaging in some of the negative behaviors associated therewith (Bartels & Magun-Jackson, 2009; Butler, 1998; Butler & Neuman, 1995; Elliot, 1999; A. J. Elliott & McGregor, 2001).

Recommendations

Outcomes of this research provide recommendations for both practitioners and researchers. While an ultimate goal of research is to bridge gaps between theory and practice, it is beneficial to separate the recommendations at this time.

Recommendations for future research

One recommendation is that future studies should consider the ways in which student achievement goals are measured. As Pintrich (2000b) stated, goals should be defined as “continuous predictors...thereby providing a much more accurate estimation of the effects of different goals” (p. 553). Future studies should also measure student goal orientations at multiple points if they are to be considered genuinely longitudinal in nature. Failing to measure student goal orientations at multiple points may fail to capture the true contributions of goal orientations to achievement. Single measures of goal orientations fail to identify the ways in which individual goal orientations can vary over time, and the ways in which they can be viewed as states influenced by context (for a discussion, see DeShon & Gillespie, 2005), as was the case in this study.

A second recommendation for future research is to carefully consider the ways in which achievement is defined within studies. I chose a standardized measure of mathematics achievement because “standardized test scores provide different information
about students’ learning and achievement than do grades” (Shim et al., 2008). Results from this study provide evidence contrary to previous research regarding the adaptive nature of mastery goals when the outcome is academic achievement. This study was also among the first to operationalize achievement through standardized test scores with adolescents. Based on the negative relationships among performance-related goals and achievement, and the positive relationships between mastery goals and achievement, it is no longer reasonable to assume that mastery goals are only adaptive when the outcome measures are affective (e.g. interest, persistence, engagement).

In fact, results from this study suggest that mastery goals deserve a more prominent position in theoretical conversations regarding academic achievement when the valued outcome is a standardized measure, as opposed to a local measure. While mastery goals have always been linked with adaptive patterns of behavior and positive affective outcomes, there has been a persistent belief that a performance-approach goal orientation is needed to some degree to promote academic achievement (Barron & Harackiewicz, 2003; Harackiewicz et al., 1997; Harackiewicz et al., 2000; Harackiewicz et al., 2002). This study highlights the importance of considering the ways in which achievement is defined in future research. While it may be true that students earn higher grades when oriented to approach performance, this study raises questions as to the amount of actual content area learning that is associated with each goal orientation. Within this study, only a mastery goal orientation was predictive of achievement on a standardized measure.

A final recommendation is made for researchers to carefully consider the design of future studies. Achievement Goal Theory research has been hindered by
methodological and design elements in the past. Early research was clinical in nature involving experimental design elements (e.g. Deiner and Dweck 1980), but was limited by small sample sizes. Larger studies such as the current research project are limited in that they do not employ a true experimental design. Future work in this field might benefit from employing the current study’s longitudinal, hierarchical methodology while also finding a more precise method for establishing measures of teacher practices or school contexts. Assigning students to treatment groups, as in a true experimental design, is often difficult in public education. One might consider, however, conducting research on a smaller scale, such as with after-school programs, in which teacher practices and the learning environment could be more controlled and manipulated to create varying goal contexts. This type of research design, coupled with contemporary multilevel statistical methodologies (e.g. HLM, Bryk & Raudenbush, 2002) can allow for greater inferences of causality.

Recommendations for educators

If the desired outcome of instruction is to promote academic achievement and growth among students, encouraging students to adopt mastery goal orientations appears to be the best means to attain such an outcome. Within this study, only a mastery goal orientation was predictive of initial mathematics achievement, and growth in mathematics achievement beyond that of a typical student was only predicted through increases in student mastery goal orientation.

The path to promoting this adaptive mastery goal orientation among students is through the explicit endorsement of mastery goals themselves. Within the study, students
responded to mastery goal endorsement with increased reports of mastery goal orientation, slight increases in performance-approach orientation, and with decreases in performance-avoidance orientation. Given the long-term relationships between goal orientations found at the student level, mastery goal endorsement may not only lead to increased student mastery goal orientations over time, it may also act as a immunization against future performance-avoidance goal orientations at the student level. That is, since student mastery goal orientations were negatively related to student performance-avoidance goal orientations in subsequent years, endorsing the adoption of mastery goals at any time can decrease the likelihood that students will adopt performance-avoidance goals at later points in time. Given the positive relationship between mastery goals and achievement, and the negative relationship between performance-avoidance goals and achievement, the building-wide practice of endorsing mastery goals is the practice most likely to lead to increased mathematics achievement and growth among students.

Within this study, there does not appear to be any benefit associated with the endorsement of performance goals. The endorsement of performance goals is related to increases in both student performance-approach and performance-avoidance goal orientations, which are both associated with decreased mathematics achievement. Focusing on getting the right answers and recognizing students who earn the highest grades does not appear to lead to optimum motivation or increased academic achievement when the measure of that academic achievement is a standardized mathematics test. In fact, relationships among teacher practices and student goal orientations indicate that the endorsement of performance goals is as likely to lead to students holding a performance-avoidance orientation as it is a performance-approach orientation. Since both orientations
are associated with decreased academic achievement – avoidance being twice as detrimental as approach – the practice of endorsing performance goals appears unjustified.

As national policy debates continue to center on standardized measures of student achievement, this study should place renewed emphasis on the adaptive nature of mastery goals and the endorsement of those goals in classrooms and schools. The current findings should also serve as a caution to those who espouse the benefits of performance-related goals. When the measure is standardized mathematics achievement, holding any performance-related goal orientation seems likely to inhibit the very achievement we seek to promote.

**Limitations of the Study**

As with any study which is correlational in nature, one cannot infer causality from these findings. Findings must be interpreted with caution. A second limitation of this study is that it was conducted with students in one particular school district who were predominantly white and middle-class. While generalizations could be made between students in this district and other suburban districts with similar demographic characteristics, it is impossible to determine whether the relationships among teacher practices, student goal orientations and mathematics achievement would be found in districts which serve a more diverse student population. Indeed, some research has found that variations exist in the interpretation of how these goals are operationalized among students of different cultural backgrounds (Witkow & Fuligni, 2007).
A final limitation in this study is that achievement was defined through a single metric, namely scores on a standardized mathematics test. While this represents a new measure in the field of Achievement Goal Theory research, another approach might have been to include traditional measures of achievement (e.g., GPA) or measures from other content areas (e.g., reading) within the same study. Including multiple measures of student achievement within the same study could more adequately identify the contributions of varying achievement goal orientations to a variety of student achievement outcomes.
APPENDIX A

November 24, 2009
Mr. [Redacted]
Superintendent
Berea City Schools
390 Fair St.
Berea, Ohio [Redacted]

Dear Mr. [Redacted],

I am writing to request permission to use student data from the Berea City School District for the purpose of conducting doctoral research. Specifically, I am requesting permission to use student survey and achievement data from 2006-2009. The nature of the data I am requesting to use includes:

- Demographic information
- Achievement data (MAP scores)
- Student survey data (responses from the district’s annual student survey)

The identity of specific students, school buildings or the district itself will not appear in my dissertation and will not be shared with any other parties. If you are willing to permit the use of this student data, I will work directly with your information technology department to ensure I am using it according to these guidelines.

If you have questions regarding this research, you can contact me at the above address/phone number. You can also contact my advisor, Dr. Joshua Bagaka’s, at Cleveland State University [j.bagakas@csuohio.edu]. Please respond to this request in writing.

Thank you in advance for your consideration.

Sincerely yours,

Matt Deevers
December 4, 2009

Mr. Matt Deovers
Director of Educational Programs
2260 Frost Road
Streetsboro, Ohio 44241

Dear Matt,

In accordance with school district policy I am authorizing your use of archived student data for the purpose of conducting educational research. The data you may use includes demographic, survey and academic achievement results from 2006 through 2009. Student identities and records will not be shared with any other party.

Good luck with your project.

Sincerely,

[Signature]
Superintendent

DKW:sh
APPENDIX B

Survey Constructs and Specific Items

Student Mastery Goal Orientation
• It’s important to me that I learn a lot in school.
• One of my goals is to learn as much as I can in school.
• It’s important to me that I really understand my school work.
• For me, learning is more important than getting the best grade in the class.
• It’s important to me that I improve my skills in school.

Student Performance-Approach Goal Orientation
• It’s important to me that other students think I am good at my school work.
• One of my goals is to show others that school work is easy for me.
• It is important to me that I get better grades than other students on my school work.
• It’s important to me that I look smart compared to other students in my school.
• It’s important to me that I don’t look like I’m confused in class.

Student Performance-Avoidance Goal Orientation
• If I don’t know something in class, I try to hide it.
• I only like to do school work that is easy for me.
• If I had my choice, I would choose school work that I already know how to do.
• I’d rather do school work that I’m already good at rather than learn something new.
• I’d rather “take the easy way out” when it comes to school work.
• I don’t like to learn a lot of new things in school.
• If I had my choice, I would choose school work that I already know how to do.
• When I take a test, I care more about what grade I earned than what I understood.
APPENDIX B (Continued)

Survey Constructs and Specific Items

School Mastery Goal Endorsement
- In this school, teachers say it’s okay to make mistakes as long as we are learning
- The teachers in this school want us to understand our work, not just memorize it
- Teachers in this school really want us to learn new things and to enjoy school
- In this school, students are recognized for how much they improve their skills
- My teachers let me know what I do well in school and how I can improve
- Teachers in this school let me know how I can improve my skills
- Teachers in this school look at homework/tests to understand how students are thinking
- Teachers in this school ask us to explain how we get our answers
- Teachers in this school want us to work through hard problems until we understand them
- Teachers in this school make time to help students with their school work
- Teachers in this school really try to understand students when they need help with work

School Performance Goal Endorsement
- In this school, getting good grades is more important than learning new things.
- In this school, teachers point out the students who have the highest grades.
- In this school, getting the right answers is more important than understanding the work.
- Teachers in this school focus more on grades than on learning.
- Students who get the highest grades in this school get special privileges.
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