

THE EFFECTS OF TEMPERAMENT AND SCHOOLING ON ACHIEVEMENT
MOTIVATION IN FIRST-GRADE CHILDREN

by

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DEDICATION

This work is dedicated to:

- Mac Smith, for always teaching by example.
- My parents, for emphasizing the importance of education.

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ABSTRACT

THE EFFECTS OF TEMPERAMENT AND SCHOOLING ON ACHIEVEMENT MOTIVATION IN FIRST-GRADE CHILDREN

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George Mason University, 2008

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As early as first grade, children begin to present differentiated achievement motivation patterns—mastery goals (engaging in a task for challenge) and performance goals (engaging in a task to demonstrate competence) (Dweck, 1986). Some children remain stable in their achievement goals over time, while others will change their goal patterns. This study longitudinally investigated changes in children’s achievement goals over the course of first-grade, with a specific focus on the role of temperament and the school context. With a better understanding of how temperament and the school context impacts children’s achievement motivation, we can identify different achievement trajectories for children early in their academic career. For this study, 47 first-grade children were recruited from a local school system in Northern Virginia. A multi-method approach was utilized to assess achievement motivation, temperament, and academic performance

using several measures; a commonly used Puzzle Task (Smiley and Dweck), a puppet measure based on the Berkeley Puppet Interview (Measelle, Ablow, Cowan, & Cowan, 1998), and the Children's Behavior Questionnaire (Putnam & Rothbart, 2006). Results indicated that changes in children's achievement motivation were evident, with more children becoming performance oriented over time. Additionally, results indicated that multiple temperament patterns and academic contexts interacted to shape children's achievement goals over the course of first-grade.

1. INTRODUCTION

Motivating students to achieve in school has been a topic of great practical interest for teachers and parents, and of great theoretical concern for researchers (Tuckman, 1999). Motivation relevant to performance on tasks has been measured via achievement motivation (Wigfield, Eccles, Schiefele, Roeser, & Davis-Kean, 2006). Researchers have particularly been interested in studying achievement motivation because of its links with children's educational outcomes, specifically children's choices about which tasks and activities to do, the persistence in which they pursue those activities, the intensity of their engagement in them, and their performance on those activities (Eccles, Wigfield, & Schiefele, 1998; Gottfried, 1990). Depending on their motivation, some individuals approach particular activities with great persistence, whereas others seek to avoid these activities. Therefore, because achievement motivation influences the ways in which individuals' react to challenging situations (Dweck, 1986), it has implications for the ways in which children learn or react to the challenges of learning something new.

With regard to developmental change, there are important variations in children's achievement motivation over time, with potential affects from the school environment and temperament. Researchers have suggested that once children enter the school environment, their overall motivation declines to compete with the demands and

challenges of school (Ames & Archer, 1988; Ryan, Gheen, & Midgley, 1998). Particularly with the transition to elementary school, children are more likely to encounter critical feedback, difficult tasks, and cues that convey the importance of demonstrating superior ability (Butler, 2005). In turn, children may begin to modify their achievement motivation in order to keep up with these demands (Wigfield & Eccles, 1994). In general, much of the literature has focused on the transition from elementary to middle school, leaving a gap in the literature for examining achievement motivation at the beginning of elementary school.

Additionally, temperament may be playing a role in children's achievement motivation. Researchers have argued that temperament and achievement motivation demonstrate different functions in the motivational process; temperament is viewed as an instigator of particular tendencies, whereas achievement motivation is viewed as a cognitive form of regulation that gives focus and direction to those general tendencies (Posner & Rothbart, 2007). Therefore, different combinations of temperament behaviors may predispose children to develop different patterns of achievement motivation. Consequently, in order for parents and teachers to work with children's motivational styles, it is important to take into account individual differences in their temperamental characteristics (Posner & Rothbart, 2007). In general, the literature examining the relationship between achievement motivation and temperament has been fairly limited; therefore, more research is needed in this area to understand how to account for individual differences in young children's temperament with regards to their achievement motivation.

Furthermore, questions about assessment for achievement motivation, schooling, and temperament will be explored. Generally, questionnaires and teacher/parent reports have been utilized for assessing achievement motivation, schooling and temperament in older children; although, for younger children observational measures have been used because of potential problems with their abilities to provide accurate self-reports (Harter, 1990). However, researchers have found that when young children are engaged in age-appropriate activities, they are more likely to provide accurate self-reports (Ceci & Bruck, 1993). Thus, to examine whether children can provide accurate and/or consistent self-reports and to understand whether child reports are consistent with observational measures and parent reports, a multi-method approach was used implementing observational measures, child interviews, parent reports, and teacher reports. A summary of construct definitions is provided in Appendix A.

2. LITERATURE REVIEW

The literature review is presented in four sections. The first section introduces the literature on achievement motivation. The second section presents an overview of temperament during childhood. The third section provides a review of the literature examining the relationship between achievement motivation and temperament. The final section provides a review of the relationship between achievement motivation and schooling. The chapter concludes with a statement of the research problem, the research questions, and predictions.

Achievement Motivation

Overview of Achievement Motivation

Motivation supports and directs actions and thus, has relevance to many developmental outcomes (Wigfield et al., 2006). Specifically, motivation relevant to task performance has been studied extensively in the literature by means of achievement motivation. Typically, achievement motivation theorists have explained this construct in terms of what initiates, sustains, and terminates behavior in achievement situations. In particular, achievement motivation has been captured by examining achievement goal orientations, which researchers argue are relatively strong predictors of academic success (Pintrich & Schunk, 1996). These goal orientations have been studied within the context of achievement goal theory, which emerged during the late 1970's, as researchers began

investigating motivation in competence-relevant settings. Achievement goal theory has been a prominent social cognitive theory of motivation, which suggests that there are two primary achievement goal orientations or reasons for why students engage in achievement behavior—mastery and performance (Dweck & Legget, 1988).

A *mastery goal orientation* involves engagement in an activity or task for the purpose of improvement or learning (Dweck, 1986), and is characterized by challenge seeking and high, effective persistence in the face of obstacles (Ames, 1984; Diener & Dweck, 1978; Dweck & Reppucci, 1973; Nicholls, 1978). Alternatively, a *performance goal orientation* involves engagement for the purpose of demonstrating competence, gaining favorable judgments, and avoiding the demonstration of a lack of ability (Dweck, 1986; Elliot & Dweck, 1988; Elliot & Harackiewicz, 1996; Grant & Dweck, 2003).

Recently, researchers (Elliot & Harackiewicz, 1996; Middleton & Midgley, 1997) have demonstrated a theoretical and empirical distinction within the performance goal orientation category. These researchers suggest that the performance goal category may consist of two separate components; a performance-approach and a performance-avoidance goal orientation. According to this conceptualization, the *performance-approach component* focuses on attaining favorable judgments of competence relative to others, while the *performance-avoidance component* involves avoiding unfavorable judgments of competence. This distinction has been captured via questionnaires with adolescents and adults (Elliot & Harackiewicz, 1996; Elliot, McGregor, & Gable, 1999; Middleton & Midgley, 1997); however, no equivalent task has been created to measure this distinction in young children. Consequently, the present study and the following

review will focus on the dichotomous mastery versus performance achievement goal orientations.

Adaptive and Maladaptive Nature of Achievement Goal Orientations

The literature suggests that children with mastery goals differ significantly from those with performance goals. Mastery oriented individuals are more likely to adopt complex strategies once they perceive they are failing a task (Diener & Dweck, 1978). These individuals are also more likely to engage in adaptive behaviors, such as persistence, focusing attention, and appropriate help seeking (Miller, Behrens, Greene, & Newman, 1993). Additionally, a mastery orientation has also been related with better teacher-student relationships, which may indicate that these students are more likely to approach teachers when faced with difficult tasks (Ames & Archer, 1988).

On the other hand, results of studies concerning performance goals have not been as consistent (Elliot, 1999; Midgley, Kaplan, & Middleton, 2001). A number of studies have suggested that when performance goals are salient, students are likely to report a maladaptive pattern of outcomes, such as experiencing negative affect in response to difficulty and challenge, using low-level learning strategies, and attributing failure to low ability (Dweck & Leggett, 1988). Other studies, however, have found no relation between performance goals and negative outcomes, and some have found positive relations between performance goals and outcomes such as academic efficacy, grades, and test scores (Midgley et al., 2001). Despite the inconsistencies in research findings, performance goals have generally been perceived as less desirable motivational

orientation than mastery goals (Ames, 1992; Dweck & Leggett, 1988), and general recommendations have been made to schools on enhancing mastery goals (Ames, 1990).

Differential Achievement Motivation Patterns

For many years Dweck and her colleagues (Burhans & Dweck, 1995; Dweck & Leggett, 1988; Kamins & Dweck, 1999) have strived to explain the basis of differential motivational goal patterns. Some possibilities have been proposed, including perceived ability (Dweck, 1999), the kinds of feedback children receive from socializers, reactions to critical feedback, and beliefs about their self-worth (Chang & Burns, 2005).

From the earliest conception of achievement goal orientations, there has been a strong presumption that mastery and performance goals are related to beliefs about the nature of ability and intelligence (Kaplan, Middleton, Urdan & Midgley, 2002). Dweck and her colleagues have shown that those displaying a mastery goal orientation hold an *incremental* view of intelligence—the belief that intelligence and ability are malleable qualities that can be enhanced with effort. On the contrary, those exhibiting a performance goal orientation often hold an *entity* view of intelligence—a belief that intelligence and ability are fixed qualities that are difficult to change (Dweck, 1999; Dweck & Leggett, 1988). Similarly, Nicholls (1984, 1990) argued that a mastery goal orientation corresponds with an *undifferentiated* conception of ability—the belief that ability and effort are positively correlated, with increased effort resulting in increased ability. In contrast, a performance goal orientation is associated with a *differentiated* conception of ability—the view that ability and effort are inversely related such that greater effort implies low ability. Furthermore, Dweck and Lennon (2001) found that

student's perceptions that their parents had an entity view of intelligence predicted their own views of intelligence, as measured by parental feedback about achievement outcomes. This suggests that children have the ability to distinguish between fixed versus malleable or differentiated versus undifferentiated views of intelligence/ability from an early age. This is important to note, as it provides much insight into the basis of differential motivation patterns in young children.

Additionally, the importance of the kind of feedback children receive was demonstrated by Kamins and Dweck (1999). They found that children show more performance based behavior after person praise or criticism (e.g., criticizing attributes of the child) than after process praise or criticism (e.g., focus on effort and behavior). Similarly, Hokoda and Fincham (1995) found that mothers of performance oriented children when compared to mothers of mastery oriented children, gave fewer positive affective comments to their children, were more likely to respond to their children's lack of confidence in their ability by telling them to quit, were less responsive to their children's bids for help, and did not focus on mastery goals.

In terms of children's reactions to criticism, Heyman, Dweck, and Cain (1992), found that when criticized, some children were more likely to think the criticism indicated they were innately bad, whereas other children did not internalize the criticism in this manner. Heyman et al. (1992) suggested that children who respond to criticism negatively may be more likely to adopt a performance goal pattern later in life. Research on the types of- and reactions to criticism are important when understanding different achievement goal patterns in young children. This becomes especially salient when

examining achievement motivation during the start of school, since feedback becomes highly relevant in terms of teacher and parent expectations and grading.

Self-worth contingencies were noted by Burhans and Dweck (1995). Their findings indicated that young children's self-worth beliefs may be related to the development of a mastery or performance goal orientation. They noted that younger children may foster a performance goal orientation through their self-conceptions of worth—good or bad, based on social comparison, and whether they feel their worth is contingent on their performance. Findings regarding self-worth are important since schools often focus on the demonstration of relative competence. Children who do less well than their peers are more at risk for losing self-worth, and can develop strategies to mask or protect their sense of competence (Covington, 1992; Covington & Dray, 2002).

Achievement Motivation and Young Children

For decades researchers have debated about when and how achievement goal orientations emerge in children. Previous developmental research has suggested that the performance and mastery goal patterns do not surface in children less than 10 years of age. Specifically, this research suggests that when children are faced with failure while working on a task, younger children will not demonstrate negative affect (Rholes, Blackwell, Jordan, & Walters, 1980) or performance decrements (Rholes et al., 1980). A few reasons have been noted for this view. First, some researchers have argued that a performance orientation depends on blaming high-effort failures on low ability, and according to some studies, younger children do not make these attributions (Nicholls, 1978; Nicholls & Miller, 1984). Second, some researchers have argued that a

performance orientation is linked to predictions of failure for the future, and that young children do not make such predictions (Stipek, 1984; Stipek, Roberts, & Sanborn, 1984). Therefore, previous findings were in agreement that individual differences in achievement goal orientations were not evident in young children.

Recent empirical evidence, however, suggests that when tasks are developmentally appropriate and meaningful, and outcome cues are salient, young children can exhibit different reactions to personal success or failure on tasks (Cain & Dweck, 1995; Smiley & Dweck; 1994). Heckhausen (1987) found that children between 2 ½ and 3 ½ years start to show self-evaluative, nonverbal expressions following a successful or unsuccessful action. The earliest indicators of achievement motivation were facial expressions of joy after success and sadness after failure. Several months later, children showed postural expressions of pride and shame following success and failure. When competing with others, 3- to 4-year-old children initially displayed expressions of joy after winning and sadness after losing; pride and shame were only displayed when children looked at their competitors.

Stipek, Recchia, and McClintic (1992) found that 2-year-olds reacted more to others' evaluations by seeking approval when they did well and turning away when they did poorly. After about age 3, children were able to evaluate their own performance, without needing to see adult reactions. They also engaged in more autonomous self evaluation. Additionally, children 3 and older reacted more strongly to winning and losing than did younger children. Similar work by Lewis, Alessandri, and Sullivan (1991)

found that 3-year-olds in their study showed inappropriate expressions of shame in response to failure at difficult tasks.

Dweck and her colleagues have investigated individual differences in reactions to failure within age groups, with results indicating that some young children react quite negatively to failure, displaying a performance goal orientation early on. Heyman, Dweck, and Cain (1993) found that young children between the ages of 5 and 8 years were able to use task-performance information to judge their own ability. In their study, children as young as 5 and 6 perceived negative failure feedback as an indication that they were bad people.

In their study with preschoolers, Smiley and Dweck (1994) assessed whether differential achievement goal orientations were evident in young children. Preschoolers were categorized as having either a mastery or performance goal orientation based on their preference and reason for choosing a challenging puzzle or a non-challenging puzzle. They discovered that some children were enthusiastic and engaged even when challenged with an insoluble puzzle, whereas other children reacted negatively and tended to disengage from the task. Results indicated that 58% of children had mastery goals, while 42% displayed a performance goal orientation. Furthermore, these differences were independent of ability and predicted affective behavior during the tasks and emotional ratings after the tasks. Children with mastery goals reported higher amounts of positive affect and high confidence, while children with performance goals accompanied with low confidence were most likely to show negative emotions and disengagement during tasks.

A more recent study by Ziegert, Kistner, Castro, and Robertson (2001) replicated Smiley and Dweck's findings with kindergartners and first graders. They found individual differences in children's responses to challenging situations; furthermore, these differences were able to predict motivation patterns 5 years later. Taken together, these findings suggest that individual differences in achievement motivation are evident even in younger children.

Temperament

Although researchers within the developmental literature have not shared an overall definition of temperament (Goldsmith et al., 1987), temperamental traits are generally conceived of as individual differences in behavior that appear early in life (Shiner, 1998) and are reflected in orientations toward or away from objects, people, and challenging events (Hwang & Rothbart, 2005). Typically, traits with strong emotional underpinnings have been salient in most models of temperament (Hartup & van Lieshout, 1995). Overall, several models of temperament have been proposed; however, for the purpose of this literature review, the three major models which provide the basis for the study of temperament will be described.

Models of Temperament

One of the earliest models of temperament came from clinical work by Thomas and Chess, who were concerned with the style (how) rather than the content (what) or purpose (why) of behavior (1977). Inspired by differences in their own children, Thomas and Chess studied individual differences in infants' "primary reaction patterns" in their New York Longitudinal Study (NYLS). They began observing samples of children as

young as 3 to 6 months of age and also interviewed parents about their infants' behavior in varying contexts. Infant reactions and parent interviews were coded into categories, yielding nine NYLS dimensions of temperament—Activity Level, Approach/Withdrawal, Adaptability, Mood, Threshold, Intensity, Distractibility, Rhythmicity, and Attention Span/Persistence (Thomas & Chess, 1977).

Since the publication of the NYLS research, factor-analytic studies of the nine dimensions of temperament have revealed intercorrelations among some dimensions and low internal reliability among others. A review of infancy research has shown that a smaller number of dimensions exist than were originally found by Thomas and Chess, including Activity Level, Positive Affect and Approach, Fear, Frustration, and Attentional Persistence (Rothbart & Mauro, 1990). These newer dimensions noted by Rothbart and Maruro (1990) are important because they do not support “style” temperament dimensions as Thomas and Chess had noted, but rather emotional and attentional systems that initiate motivational and self-regulative qualities as early as infancy (Hwang & Rothbart, 2005).

It is important to note that since the NYLS dimensions were developed for clinical purposes, there were no attempts to make the scales conceptually independent (Rothbart, Ahadi, Hershey, & Fisher, 2001). Consequently, research using instruments based on the NYLS dimensions have frequently identified fewer dimensions of temperament variability than were originally hypothesized (Martin, Wisenbaker, & Huttunen, 1994; Rothbart & Mauro, 1990). Nevertheless, this work on infant temperament has significantly shaped later temperament work and prompted the

development of parent and teacher questionnaire measures based on the NYLS dimensions (Keogh, Pullis, & Cadwell, 1982; Windle & Lerner, 1986).

A second model of temperament is the emotionality-activity-sociability-impulsivity (EASI) model developed by Buss and Plomin (1975). This model provides a contrast to the NYLS conceptualization regarding both dimensions and measurement. Buss and Plomin (1984) described several factors necessary for a trait to be considered a temperament dimension: There must be evidence of substantial heritability, the trait must appear within the first year of life, traits must be relatively stable during childhood, and they must have an enduring impact on personality development. Based on these criteria, the following four traits were chosen; emotionality, activity, sociability, and impulsivity. However, further factor analysis of selected items from the EASI and NYLS models with children ages 1 to 6 revealed the following factors; emotionality, soothability, activity, attention span, and sociability (Rowe & Plomin, 1977). This factor analysis indicates that there seems to be some overlap between salient temperament dimensions from each of the models.

One question has surfaced regarding the four EASI dimensions: Are some traits more heritable than others? Generally, twin studies of children have shown evidence of genetic influences of the four EASI traits; however, studies with dizygotic twins (who share half of their genes with one another) have shown correlations near zero in all studies. To further understand this issue, results from a small number of twin studies examining other temperament traits in early childhood including the NYLS dimensions have indicated that all traits demonstrated heritability, except Rhythmicity and Pleasure

(Goldsmith, Buss, & Lemery, 1997). Therefore, the four EASI traits may not be as distinct in their heritability as once proposed (Shiner, 1998). Overall, this research indicates that the proposed temperament dimensions of the NYLS and the EASI models are not complete in describing temperament.

The third model of temperament, developed by Rothbart and her colleagues is based on theoretical and empirical research of temperament, tied closely to neurobiological functioning (Rothbart & Derryberry, 1981). In this model, temperament is defined as constitutional differences in reactivity and self regulation in the domains of affect, activity, and attention (Rothbart & Bates, 1998; Rothbart & Derryberry, 1981). The term *constitutional* refers to the biological bases of temperament, influenced over time by heredity, maturation, and experience. *Reactivity* refers to responsiveness to change in the external and internal environment, while *self-regulation* refers to processes such as effortful control and orienting that function to modulate reactivity. This model also emphasizes that temperament describes tendencies or dispositions that are not continually expressed but require appropriate eliciting conditions (Rothbart & Bates, 2006). For instance, fearful children are not always fearful; rather fear is elicited in certain situations.

Based on the approach by Fiske (1966), the model by Rothbart and her colleagues uses theory to identify central constructs of temperament such as emotional reactivity, arousability, and self-regulation. These central constructs are then divided into subconstructs, and questionnaire items are generated to specifically reflect each component. This theory-driven model allows for the identification of an individual's

characteristic affective qualities, such as the quality and intensity of emotional reactivity (Derryberry & Rothbart, 1997; Rothbart & Bates, 2006) rather than individual differences based on behavioral responses (Buss & Plomin, 1975; Thomas & Chess, 1977).

Currently, the model of temperament by Rothbart and her colleagues has been utilized quite heavily in the literature for two major reasons. First, this framework broadens the possibility of identifying temperament dimensions to include those that do not appear within the first year of life. Second, this approach promotes the application of research in areas such as emotion and cognition to refine temperament dimensions. For these reasons, this model of temperament will also be used for this proposed study.

Parent and Child Reports of Temperament

Typically, children's temperament has been assessed with parent reported questionnaires, which have tapped into parent's extensive knowledge regarding their child in several different contexts over long periods of time (Rothbart and Bates, 2006). However, some researchers have argued that these reports of temperament may have problems with bias and inaccuracy (Kagan, 1994). So, are parent reports of temperament useful? One argument for the use of parent reports of temperament is that they provide a useful vantage point for observations. By definition temperament dimensions tap a child's pattern of responses, and parents are in a good position to report their child's behavior on multiple occasions, including both frequent and rare behaviors (Rothbart & Bates, 2006). A pattern of strong validity correlations for parent reports of temperament can be found in the existing literature. Matheny, Wilson, and Thoben (1987) aggregated maternal report scores of temperament with laboratory scores, and found fairly strong

correlations ranging between .38 to .52, suggesting that maternal reports of child temperament may be valid sources of information. Similarly, Hagekull, Bohlin, and Lindhagen (1984) found that general questionnaire scales completed by parents converged from a modest (.21) to moderately strong (.63) degree with scales based on direct observation.

Additionally, Goldsmith, Rieser-Danner, and Briggs (1991) correlated mother reports with those of day-care teachers and found strong convergence between scales from different questionnaires measuring the same construct. Correlations between mothers and teachers ranged between .11 and .50 for preschoolers, indicating that mothers and teachers provided similar reports of temperament. Together, this evidence suggests that parents are not inevitably deficient or strongly biased in their observational abilities of temperament; however, in order to account for this potential bias it is important to assess temperament in an alternative manner.

As previously mentioned, there has been some debate in the literature regarding the validity of parent reports. Even though research supports the use of parent reports, there is some evidence suggesting that parent reports of temperament may be subjective and biased, including aspects of the caregivers own personality characteristics (Rothbart and Bates, 2006) and parents' tendency to contrast one child with another (Hwang and Rothbart, 2003). To account for this potential bias, a child report of temperament will be included in this study.

Typically, the task of eliciting reliable self-reports from children has been an arduous one, further complicated by young children's short attention spans, limited

language ability, and need to respond in socially desirable ways (Irwin, 1985). Prior research has suggested that before third grade, children are not able to discriminate between the real and ideal self, reporting idealistic reports rather than more accurate ones (Harter, 1986). Despite this notion, there appears to be ample evidence that children can reliably and validly provide self-reports of past events (Friedman, 1991), including fear, anger, sadness, happiness, and surprise (Russell, 1990), and feelings of pride and embarrassment (Beizer Seidner, Stipek, and Deitch-Feshbach, 1985).

Researchers have found that when children are engaged in age-appropriate activities, they are more likely to talk openly about their experiences (Ceci and Bruck, 1993). Generally, researchers have found that puppets can serve as useful tools for interviewing young children, as they allow children to provide information on their own terms, using age-appropriate language to fit individual needs (Measelle, Ablow, Cowan, & Cowan, 1998). Earlier studies have shown that puppets were able to keep 4 to 7 year old children engaged even when discussing anxiety provoking topics, such as death (Bernhart and Prager, 1985). More recent studies have shown that puppets can be used effectively to assess young children's perceptions of themselves (Eder, 1990; Harter & Pike, 1984; Mize & Ladd, 1988). Overall, previous research provides evidence for the use of puppets as a systematic approach to assessing individual differences in children's self-perceptions.

Hwang (2003) demonstrated the use of puppets for assessing children's temperament. In her study, she adapted the Berkeley Puppet Interview (BPI: Measelle et al., 1998) to include items based on the Children's Behavior Questionnaire-short form

(Putnam & Rothbart., 2006). Hwang administered the adapted puppet measure to 100 children aged 4-7. Internal consistency ranged from low to moderate, with alpha coefficients for 9 of 12 scales ranging from .50-.66. High test-retest reliability was found for the fifteen children who completed a second interview 1-2 weeks following the initial interview. Parent and child reports were significantly correlated on five scales: Inhibitory Control, Fear, Low Intensity Pleasure, Discomfort, and Activity Level. Since, the results from this study show high parent-child reliability on reports of temperament; the use of puppets has been regarded as a useful tool for interviewing young children. Based on this evidence, a similar puppet measure will serve as a determinant of temperament based on the child's own report; allowing direct insight from the child's perspective. The parent report of temperament will serve as a determinant of children's temperament as well, since research has favored the use of this measure for providing information from the parent's vantage point.

Achievement Motivation and Temperament

Temperament offers a level of analysis and understanding that provides new perspectives on children's education, with individual differences in temperament providing the basis for motivation and learning experiences (Posner & Rothbart, 2007). According to Posner and Rothbart (2007), temperament and achievement motivation demonstrate different functions in the motivational process. Temperament is viewed as an energizer or instigator of particular tendencies, whereas achievement goal orientations are viewed as cognitive forms of regulation that give focus and direction to these general tendencies. Additionally, others have argued that achievement goal orientations can take

on a variety of foci, and these foci may or may not be directly congruent with the evoked temperament (Elliot & Thrash, 2002). For example, different combinations of temperament characteristics may predispose children to develop different patterns of achievement motivation. Although some researchers have suggested that relationships between achievement motivation and various temperament dimensions exist, in general, the literature examining the relationship between achievement motivation and temperament has been fairly limited.

Achievement Motivation and Persistence

A particular aspect of temperament that has been linked to achievement motivation is persistence, which is typically captured by the focusing attention dimension on the CBQ (Shiner, 1998). Persistence is especially important when examining the link between achievement motivation and temperament, because some researchers have argued that persistence is an aspect of temperament (Rothbart & Jones, 1998), while others have suggested that it is an intrinsic part of one's achievement motivation (Barrett & Morgan, 1995). Generally, research has shown that the negative end of this persistence-attention dimension resembles the inattention cluster of Attention-Deficit-Hyperactivity Disorder (ADHD) symptoms (Shiner, 1998). Because deficits in persistence/attention have serious implications for children's academic achievement and conduct, a great deal of research has focused on the negative end of this temperament/personality dimension, with research indicating that low levels of persistence/attention are linked with poor academic achievement (Barkley, 1997).

On the positive end, children who are high on the persistence/attention dimension are motivated by interest, take great pleasure in mastering their environments, and prefer challenging tasks to easy ones (Harter 1981; Pearlman, 1984). In personality studies with adults a similar achievement motivation trait has been identified that taps into a person's tendency to enjoy working toward high standards (e.g. Tellegen, in press), with a focus on positive affectivity rather than behavioral control and discipline (Watson & Clark, 1992). Accordingly, it is difficult to identify whether persistence/attention in children encompasses both affect and discipline or just one of the constructs. Therefore, it has been suggested that persistence and mastery motivation may in fact represent two distinct but related dimensions, with persistence tapping behavioral control and mastery motivation tapping positive emotionality (Shiner, 1998).

Achievement Motivation, Surgency, Negative Affectivity, and Effortful Control

Rothbart and Hwang (2005) have suggested that temperament dimensions of surgency-extraversion, negative affectivity, and effortful control are linked to motivation. They propose that these temperament systems are related to children's approach, avoidance, interest, and persistence in pursuing designated outcomes, and to frustration, anger and sadness, when the goals of a given motive are not met. Mastery motivation has been directly related to both approach (an aspect of surgency-extraversion) and negative affectivity. One subcomponent of negative affectivity is fear, which is related to avoidance and inhibition of action in settings that are novel or threatening (Gray, 1971). The literature has suggested that children who are high in approach and low in fear and sadness tend to launch more readily into new situations, which is typical of mastery

oriented children (Posner & Rothbart, 2007). On the other hand, strong fear and weak approach can lead to overregulation of approach; children may avoid novel situations, resulting in missed opportunities for the positive experiences of mastery (Rothbart & Jones, 1998).

If children are fearful, their estimation of their abilities and likelihood for future success may be affected, in addition to their perceptions about whether novel people or objects are a source of safety or of threat (Rothbart & Ahadi, 1994). Fearful children who rely primarily on avoidant strategies may find temporary relief from their anxiety, but their ability to learn about perceived situations of threat will be limited. They may not learn that they can effectively cope in these situations and may persist in being vulnerable and ineffective (Cortez & Bugental, 1995). Overall, this research suggests that mastery oriented children typically have higher levels of surgency-extraversion and lower levels of negative affectivity. In addition, the literature also suggests that various temperament dimensions may have an interactive effect on achievement motivation.

In addition, with development children's capacity for effortful control also increases, which has direct links to children's attentional abilities (Rothbart & Jones, 1998). For example, research has found that children high in effortful control are better able to use attention to generate possible solutions, inhibit task-irrelevant thoughts, and to persist in response to failure feedback, contrary to those with lower levels of effortful control (Rothbart & Ahadi, 1994). Attentional regulation can also strongly influence sources of input, allowing children to shift attention away from threatening stimuli and internal feelings of inefficacy and at the same time focus more readily on positive

information, which can lead to improved self-evaluations of self-efficacy and success. Finally, they can overcome reactive tendencies and learn to persist in a task, even in the midst of negative consequences (Derryberry & Rothbart, 1997).

Furthermore, Rothbart and Hwang (2005) suggest that effortful control can support both the internalization of competence-related goals and their achievement. Effortful control is also involved in the inhibition of immediate approach and to the activation of behavior that would otherwise not be performed due to the threat of failure. In general, effortful control is not a basic motivation; rather it is similar to attentional capacities, which allow for the flexible ability to shift levels of control depending on the situation (Rothbart & Hwang, 2005). Hence, effortful control seems to interact with surgency-extraversion, with the possibility that higher levels of effortful control allow children to approach or inhibit approach depending on the situation.

More recently, Patel, Olson, and Lehman (2007) have found similar results with kindergarten and first- grade children regarding the link between achievement motivation and temperament. In their study, mastery oriented children typically displayed lower levels of negative affectivity (less sadness and anger), and higher levels of inhibitory control and attention regulation (aspects of effortful control). However, contrary to previous findings, which suggest that surgency-extraversion is positively linked to mastery motivation, Patel et al. (2007) found that mastery oriented children had lower levels of surgency-extraversion. Even though it is difficult to speculate why the relationship between surgency-extraversion and mastery motivation has demonstrated

inconsistent findings, it can be concluded that various dimensions of temperament are in fact playing a role in children's tendencies toward achievement goal orientations.

Summary

Even though research examining the link between achievement motivation and temperament has been fairly limited, researchers have found some evidence suggesting that temperament does play a role in children's achievement motivation (Patel et al., 2007; Posner & Rothbart, 2007; Shiner, 1998). However, more research is needed in this area to understand how to account for individual differences in young children's temperament with regards to their achievement motivation. This information can help those individuals working directly with children to understand how differences in temperament can affect achievement goal orientations; thus, indirectly affecting the learning process. Therefore, a major goal of this study was to examine the effects of temperament on achievement goal orientations in young children over the course of first grade.

Achievement Motivation and School

Children's Transition to Elementary School

Once in school, children begin to recognize that school is not only a place where they learn, it is also a place where they are evaluated and judged (Wigfield & Eccles, 1994). Even though children are evaluated from birth in various social situations, feedback received in school is a direct reflection of children's abilities and intelligence. Once they have entered the school environment, children begin to evaluate the effectiveness of their own actions, compare it with the actions of others, and are told by

others how their behavior meets certain standards (Bjorklund, 2005). Overall, children learn through daily school experiences that they are good at some tasks and not so good at others (Bandura, 2001). As a result, children's motivation to learn changes and they begin to modify their achievement goal orientations in order to ensure positive feedback. Therefore, instead of learning, their priority becomes preserving their sense of self by avoiding situations that may weaken it further (Wigfield & Eccles, 1994).

This change in motivation can be observed in some children as early as their first year of elementary school (Stipek & MacIver, 1989; Wigfield & Eccles 1994), with some suggesting that it may be a result of the transition from preschool to early grade school (Sorenson & Maehr, 1977). Overall, this decline of motivation and shift in individual achievement goal orientations is important, as it can affect children's academic performance. In their study, Ziegert et al. (2001) noted that a change in the school setting accompanied by demands for achievement can contribute to the ways in which children think about themselves as learners and the way in which they respond to achievement challenges. In their longitudinal work with children from preschool to first grade, they found that 30% of mastery kindergarteners changed to a performance goal orientation when tested a year later. Overall, their results concluded that classification of achievement goal orientations in kindergarten was not predictive of classification in first grade, which they recognized could be due to changes in context as well as school feedback. Additionally, in a cross-sectional design by Patel et al. (2007), a larger proportion of kindergarteners displayed mastery goals than first graders.

Additional information about the varying school contexts comes from an ethnographic study with Israeli children, following their transition from kindergarten to elementary school (Baumer, 1998). Similar to the U.S., Israeli kindergarten programs allow children to spend most of their day in unstructured creative activities, with a lot of freedom to choose activities at their own discretion. On the other hand, in first grade, children spend most of their time in structured assignments with clearly defined procedures and direct instruction. Overall, these differences in kindergarten and first grade environments suggest that different learning contexts play a role in children's development and understanding of their own competence.

Baumer's study provides evidence for the idea that entrance into first grade exposes children for the first time to an environment in which they are required to demonstrate skills, abide by certain procedures, and comprehend class material along with their classmates (Butler, 2005). Further research by Stipek and Daniels (1988) found that, for 5- to 6-year-olds who attended either a "developmental" or an "academic" kindergarten, perceptions were less positive for those attending the academic kindergarten and were more highly correlated with teacher ratings of academic performance. Overall, the literature on the impact of schooling on achievement motivation provides evidence for the notion that different school environments, especially the transition to first grade can influence children's perceptions of their own competence.

The Development of Children's Competence-Related Perceptions

The previous section notes that the transition to school can affect how children understand their own competence. This understanding of competence is important because it provides valuable information about whether or not children have the ability to construe achievement-related concepts, evaluate their own competence, and/or set goals or form expectations for future success (Butler, 2005).

Contemporary theories of achievement motivation have emphasized the influence of people's sense of competence on their achievement-related strivings and behaviors throughout the lifespan (Dweck, 1986; Nicholls, 1989). Earlier reviews have indicated that competence-related perceptions, judgements, and understanding are unrealistically high, undifferentiated, and relatively unaffected by experience during the preschool years, and that they become more realistic, differentiated, and responsive during middle childhood (Harter, 1999; Nicholls, 1990; Stipek, 1984). For example, Stipek and her colleagues (Stipek, 1981; Stipek, Roberts, & Sanborn, 1984) suggested that young children's cognitive immaturity leads them to overestimate their skills on academic tasks and to have overly optimistic expectations for future performance relative to that of older children. Stipek and her colleagues suggested that this overly optimistic sense of self may be due to *wishful thinking*, a concept introduced by Piaget (1930), which suggests that when children wish for something (e.g. A's on a report card) they expect it. Typically, by the end of third or fourth grade, children's assessments of their own abilities become more realistic, and they are able to decipher the difference between wishing and realistic expectations.

Furthermore, Harter (1999) found that perceived competence tended to be high during the preschool years and to decline with age, with marked decreases between ages 7 and 9, and that perceptions became more differentiated and domain-specific with age. For instance, Harter and Pike (1984) found that 4- to 7-year-old children could make judgements about their cognitive competence, physical competence, social acceptance, and behavioral conduct, but that these judgements only loaded on two factors: cognitive-physical and social-behavioral. On the other hand, with age the number of domains increased. Lastly, correlations between children's perceived competence and actual competence, as reflected by grades or teacher ratings, also increased with age (Eshel & Klein, 1981).

Research using tasks to elicit information about performance (e.g. asking children about their confidence for future success, evaluation of performance), and observations of children's expression of affect and persistence has yielded similar findings. Regarding confidence for future success, the general conclusion is that children's report of confidence is fairly high after success and failure prior to about ages 5-6 (Nicholls & Miller, 1984). Additionally, expectations were found to decline steadily between ages 5-8 (Rholes et al., 1980).

More recent evidence suggests that earlier views of cognitive immaturity are inaccurate. The earlier views of children's competence-related perceptions reflected qualitative transformations in thought and judgement that corresponded closely with the major Piagetian shifts from preoperational to concrete operational to formal operational thought at about ages 7 and 11 years of age. However, recent studies have revealed

significant variability in achievement-related cognitions and motives between individuals and across contexts in the early years of life (Butler, 2005). Studies have shown that children as young as three can display differential affect and behavior in the event of more versus less successful mastery attempts (Stipek, Recchia, & McClintic, 1992), and seem to use information appropriately to make judgments about another child (Ruble & Dweck, 1995). Furthermore, fairly young children are able to display an understanding of various informational standards and strategies, and use them appropriately to evaluate their own competence in controlled settings (Mosatche & Bragonier, 1981).

Overall, it seems that earlier descriptions of children's cognitive abilities, especially their competence-related perceptions were somewhat inaccurate. Typically, young children are more competent than was once assumed in evaluating their own outcomes and capacities, and can use this knowledge to set goals, and monitor themselves. However, this knowledge about their own competencies increases the risk of children developing maladaptive strategies of self-doubt, and the belief that it is more important to succeed or avoid failure, than it is to learn and acquire competence (Butler, 2005).

Summary

With the transition to elementary school, children are more likely to encounter critical feedback, difficult tasks, and cues that convey the importance of demonstrating superior ability. In this case it is not surprising that the frequency of performance goal orientations increases over time (Butler, 2005). Furthermore, because the literature shows that even young children have a well developed sense of competence-related perceptions,

judgements, and understandings, the transition to school can be fairly threatening due to the strong emphasis on performance. As a result, children's motivation to learn can change, as children modify achievement goal orientations in order to ensure positive feedback (Wigfield & Eccles, 1994).

Statement of Research Problem

Even though there has been substantial research on achievement motivation, an understanding of this construct in young children is lacking. Although previous research has identified a change in achievement goal orientations among young children, we still do not completely understand how and when this change occurs. For example, much of the literature has noted that children in preschool and kindergarten tend to be more mastery oriented (Chang & Burns, 2005; Patel et al., 2007; Smiley & Dweck, 1994; Ziegert et al., 2001); however once children enter first grade, a larger proportion of performance orientated children begin to emerge (Patel et al., 2007). This latter finding is consistent with achievement motivation research with older children, which has found that the frequency of performance goals increases during middle childhood (Butler, 2005). Consequently, it seems that this shift in achievement goal orientations occurs at or possibly during the start of elementary school; however, not much research has been conducted examining this change over time at the start of school. Therefore, in order to understand if and how achievement goal orientations change over time, the first major goal of this study was to examine children's achievement motivation over the course of first grade.

Furthermore, if achievement goal orientations are changing during first grade, then the question of what affects this change? The changing school context has been noted as one possible explanation for the change in children's achievement goal orientations (Ziegert et al., 2001). As a result, the second major goal of this study was to examine how children's academic competence (a measure of the school context) affects children's achievement motivation over time. The literature shows that the transition to school can be fairly threatening as children begin to recognize that school is not only a place where they learn, it is also a place where they are evaluated and judged. As a result, children's motivation to learn can change, and children may begin to modify their achievement goal orientations in order to ensure positive feedback (Wigfield & Eccles, 1994). Essentially, this research suggests that entering an academic school context may be influencing children's achievement goal orientation. However, compared to the large body of research examining the changing school context from elementary to middle school, few studies have examined the impact of the school context at the beginning of elementary school.

Additionally, even though the changing school context may have an impact on children's achievement goal orientations, it has been suggested that affect (temperament) is also critically important to achievement motivation, because it may partially affect how children perceive others' views of their performance (Harter, 1981). So, the third major goal of this study was to examine how temperament affects achievement motivation over the course of children's first year of elementary school. Even though some research has linked aspects of temperament with achievement motivation in young children (Patel et

al., 2007; Shiner, 1998), this research has been sparse. Research has suggested that various aspects of temperament including surgency–extraversion and effortful control (Shiner, 1998) and negative affectivity (Posner & Rothbart, 2007) are related to overall academic achievement; however, not much research has examined the relationship between children’s temperament and achievement motivation, or how temperament interacts with schooling to produce change in achievement motivation.

Lastly, the question of assessment arises when examining achievement goal orientations and temperament. Typically, questionnaires have been used for assessing achievement goal orientations and temperament in older children and adults; however, for younger children observational measures have been utilized because of possible problems with children’s abilities to provide accurate self-reports (Harter, 1990). Nevertheless, researchers have found that when children are engaged in age-appropriate activities, they are more likely to talk openly about their experiences, and provide accurate self-reports (Ceci and Bruck, 1993). Thus, the fourth major goal of this study was to examine whether children can provide accurate or at least consistent self-reports of temperament, academic competence, and achievement goal orientations, and also to understand how consistent these reports are with observational measures and parent reports of the same constructs.

The study utilized a longitudinal approach in examining the relationships between achievement motivation, academic competence, and temperament over the course of the first year of elementary school. Additionally, this study used a multi-method approach in order to address the methodological issues and concerns regarding appropriate ways of

measuring achievement motivation and temperament in particular. Multiple methods of assessment were used, including observational measures, child interviews, parent reports, and teacher reports.

Research Questions and Predictions

The following section describes the research questions and predictions that were addressed by the present study. Preliminary analysis questions are presented first. Their purpose was to determine which scores will be used for subsequent analyses. Major questions and predictions are then presented by Time 1, Time 2, and change over time.

Time 1

Preliminary Analysis: Achievement Motivation

1. What is the relationship between the Patel et al (2007) and the Smiley and Dweck (1994) puzzle scores (see Appendix B)?
 - a. What is the relationship between the categorization of goal orientations based on the 1st choices and also the 2nd choices?
 - b. Is there a correlation between goal orientations based on the 1st choices of the Smiley and Dweck and Patel et al. scoring? Also, is there a correlation between goal orientations based on the 2nd choices of the Smiley and Dweck (1994) and Patel et al. (2007) scoring?

Recently, Patel et al. (2007) developed a scoring method that is more conservative than the original Smiley and Dweck (1994) scoring. The research by Patel et al. (2007) produced a smaller number of mastery oriented children with the more conservative scoring (in comparison to the Smiley and Dweck scoring). They also noted a difference

between goal orientations based on the 1st choice versus the 2nd choice on the puzzle task. As described above, the Patel et al. method has stricter guidelines for the categorization of mastery oriented children. The preliminary analyses seek to replicate these findings.

2. What is the relationship between the various measures of achievement motivation?
 - a. What is the relationship between the child report and the parent report of achievement motivation?

Although researchers have proposed that parent and child reports each include their own biases and limitations, results from several studies indicate that when children's self-reports are gathered with structured and developmentally appropriate instruments, child reports are related to parent reports of children's behavior (Arseneault, Kim-Cohen, & Taylor, 2005; Hwang, 2003; Measelle, et al., 1998). Measelle et al. (1998) correlated children's self reports of achievement motivation on the BPI with parent report, and found that mothers who saw their children as highly motivated tended to have children who perceived themselves similarly in first grade ($r = .36, df = 86, p < .01$). Based on this evidence, child and parent reports of achievement motivation should reveal a significant, although small relationship with one another.

- b. What is the relationship between the puzzle task (mastery versus performance goal orientation) and the parent report?
 - c. What is the relationship between the puzzle task (mastery versus performance goal orientation) and the child report?

To date the puzzle task has not been accompanied by any child or parent report of achievement motivation. Consequently, it is difficult to make a prediction at this time;

however, from this question we expect to gain a better understanding of whether children's task-based achievement motivation score is representative of children's and parent's perceptions of achievement motivation.

Preliminary Analysis: Temperament

3. What is the relationship between parent and child reports of temperament?

There has been some debate in the literature regarding the validity of parent reports of temperament. Some researchers suggest that parent reports of temperament may be subjective and biased (Kagan, 1994); while others note that parent reports provide a useful vantage point (Rothbart and Bates, 2006). Hwang (2003) included maternal reports of temperament assessed by the CBQ and child reports of temperament assessed by the BPI adapted to the CBQ in her study with 100 children ranging from ages 4-7. Internal consistency ranged from low to moderate, with alpha coefficients for 9 of 12 scales ranging from .50-.66. High test-retest reliability was found for the fifteen children who completed a second interview 1-2 weeks following the initial interview. Results indicated that both maternal and child reports were significantly correlated on five temperament dimensions; Inhibitory Control, Fear, Low Intensity Pleasure, Discomfort, and Activity Level. Based on this evidence, it is expected there will be some overlap between temperament in this study. The strength of the relationship will determine whether a composite measure of temperament can be calculated.

Major Research Questions

1. Are children more mastery or performance oriented at the beginning of first grade?

- a. Puzzle Task—what proportion of children are mastery or performance oriented based on the Smiley and Dweck and Patel et al. scoring methods?

This question examines achievement motivation when children first begin elementary school. Studies using the Puzzle Task have shown that very young children (preschool and kindergarten) tend to be more mastery oriented (Chang & Burns, 2005; Patel et al., 2007; Smiley & Dweck, 1994; Ziegert et al., 2001). However, once children enter first grade, larger proportions of performance orientated children begin to emerge (Patel et al., 2007). This finding is consistent with achievement motivation research with older children, which generally has found that the frequency of performance goals increases during middle childhood (Butler, 2005). Given these changes in goal orientation from preschool/kindergarten to the first grade, this study will investigate whether first graders already display more performance orientations at the beginning of school based on the Puzzle Task. Based on previous research from our lab, we expect that the Smiley and Dweck scoring system will yield larger numbers of mastery oriented children, while the more conservative Patel et al. will yield larger numbers of performance oriented children at the beginning of school.

- b. Child report—what is the mean achievement motivation score based on children's self-report of achievement motivation on the puppet measure?

Measelle et al. (1998) found that self perceptions of achievement motivation by first graders assessed by the BPI indicated that they were more mastery oriented ($M = 5.45$, $SD = 1.70$). Based on this evidence, it is expected that children in this study will also

obtain a mean score similar to that found by Measelle et al. (1998), indicating that children's self-perceptions of achievement motivation are more mastery.

- c. Parent report—what is the mean score of the parent report of achievement motivation?

Measelle et al. (1998) found a significant correlation ($r = .36$, $df = 86$, $p < .01$) between child and parent reports of achievement motivation in first grade. Since Measelle et al. (1998) found that child reports revealed higher levels of mastery orientated children, it is expected that parent reports will yield similar results.

- d. Do children's achievement goal orientations change from the 1st to 2nd choice on the Smiley and Dweck and Patel et al. scoring methods?

Patel et al. (2007) found that there are differences when achievement goal orientations are classified based on 1st choice, as opposed to the 2nd choice. Particularly, the Patel et al. scoring method revealed larger numbers of performance oriented children when classifications were based on the 2nd choice ($1^{st} = 68\%$, $2^{nd} = 86\%$). On the other hand, the Smiley and Dweck scoring for the Patel et al. (2007) sample, produced comparable proportions of performance oriented children for 1st and 2nd choice ($1^{st} = 25\%$, $2^{nd} = 21\%$). Based on these results, it seems that when scored by the Patel et al. method, the proportion of performance oriented children will increase from 1st to 2nd choice. The Smiley and Dweck scoring method should reveal similar proportions of children regardless of choice.

2. What is the relationship between children's achievement goals and temperament at the beginning of first grade?

This question examines whether mastery and performance oriented children differ on temperament characteristics. Generally, research has indicated that children's tendencies to react with fear, frustration, and positive affect can be observed early in life, but self-regulatory processes (effortful control) develop relatively later, and continue to develop during the early school years (Posner & Rothbart, 2007). This research suggests that the development of certain temperament dimensions may have some relationship to children's achievement motivation.

Additionally, Patel et al. (2007) found that in kindergarten and first grade, mastery oriented children had lower levels of shyness, anger, sadness (aspects of negative affectivity), and surgency, and higher levels of inhibitory control and attention regulation. Furthermore, some researchers have indicated that the interaction between negative affectivity (lower levels) and surgency-extraversion (higher levels) has an affect on achievement motivation.

Based on these general findings, it is expected that lower levels of negative affectivity and higher levels of attention focusing, and inhibitory control will be related to a more mastery orientation. Also, lower levels of negative affectivity and higher levels of surgency-extraversion will interactively be related to mastery motivation.

3. What is the relationship between children's achievement goals and schooling at the beginning of first grade?

This question addresses whether mastery and performance oriented children differ on various schooling characteristics (academic performance, parent rated academic competence, and self-rated academic competence). Generally, research on the effects of

academic performance on achievement motivation at the start of school has been limited. However, research has noted that prior to entering a school environment; children have limited exposure to academic evaluations (Butler, 2005). Due to this limited exposure to evaluation, it is expected that at the beginning of the first semester children with a higher sense of competence will be more mastery oriented. Due to a lack of existing literature, it is difficult to hypothesize group differences between mastery and performance oriented individuals on parent ratings of academic competence and teacher ratings of academic performance; however, it is expected that mastery children will have higher ratings on both.

Time 2

For T2, the same preliminary analyses will be performed as for T1; however, no preliminary analyses will be required for temperament, as it was only assessed at T1. Additionally, the major questions from T1 will also be evaluated at T2.

Major Research Questions

1. Are children more mastery or performance oriented at the end of first grade?

Because previous literature has noted that the frequency of performance goals increases for older children (Butler, 2005), it is expected that overall there will be a higher number of performance oriented children at T2.

2. What is the relationship between children's achievement goals and temperament at the end of first grade?

This question investigates whether mastery and performance oriented children differ on temperament characteristics at the end of first grade. Because there is limited research in this specific area it is difficult to make a prediction about this relationship; however, based on previous evidence for T1, it seems that negative affectivity may begin to play a larger role in achievement motivation, with performance oriented children showing higher levels of negative affectivity. Patel et al. (2007) found that negative affectivity emerged as the main component of temperament in 3rd grade, with performance oriented children displaying higher levels of negative affectivity; therefore, it is expected that negative affectivity may be becoming a more salient component of temperament as children age. In addition it is expected that higher levels of effortful control dimensions will be related to mastery orientation, as found by Patel et al. (2007) with older children.

3. What is the relationship between children's achievement goals and schooling at the end of first grade?

This question examines whether mastery and performance oriented individuals differ on their perceptions of academic competence and teacher rated academic performance. The literature shows that even young children have a sense of competence-related perceptions, judgements, and understandings (Butler, 2005). Because of this understanding of competence, the transition to school can be fairly threatening as children begin to recognize that school is not only a place where they learn, it is also a place where they are evaluated and judged. As a result, children's motivation to learn can change, as children modify their achievement goal orientations in order to ensure positive feedback (Wigfield & Eccles, 1994). Additionally, some studies have found

positive relations between performance goals and outcomes such as academic efficacy, grades, and test scores (Midgley et al., 2001). Based on this evidence, it is expected that a higher sense of competence will be related to higher performance goals, because children will have modified their achievement goal orientations in order to ensure positive feedback. Additionally, the relationship between teacher rated academic performance and achievement goals will be the same, with higher academic performance ratings indicating more performance goals.

4. What is the relationship between achievement motivation and both temperament and schooling?

This question addresses whether temperament and schooling interact to affect mastery and performance oriented individuals differently. In general, there is a lack of literature investigating how both temperament and academic performance interact to affect children's achievement motivation. However, research has suggested that even though temperament is fairly stable, it may interact with context to change. Therefore, the purpose of this question is to better understand how achievement motivation is affected by the interaction between temperament and academic performance. In general, it is expected that mastery oriented children will display higher levels of academic performance interacting with more positive temperament characteristics.

Change Over Time

1. How does achievement motivation change within individual children from the beginning to the end of first grade?

This question examines the developmental trajectory of achievement motivation across the first year of elementary school. Prior research within this age group has been fairly limited in looking at these long-term changes. Ziegert and colleagues (2001) conducted longitudinal achievement motivation research with kindergarteners using the Puzzle Task. A one year follow-up (using Smiley and Dweck's scoring method) indicated that 43% of children classified as performance oriented in kindergarten were similarly classified in first grade; however, 30% of children changed from a mastery to a performance goal orientation. Based on this evidence, it is expected that more children will change from mastery to performance goals from T1 to T2. It is important to note that change in children's achievement motivation will be different for each scoring method. For example, because the Patel et al. scoring is more conservative (typically there are less mastery oriented children) than the Smiley and Dweck scoring, the number of children will differ in their initial categorization, which in turn will effect how many change from one goal orientation to another.

2. Are changes or stability in achievement goals related to temperament?

As previously noted, there is limited research in this area, especially in the investigation of this relationship over time. Therefore, the purpose of this question is to better understand how changes and stability in achievement goal orientations are related to temperament. In general, it is expected that various changes and even stability in goal orientations will be differently related to temperament. It is expected that more children will change from a mastery to a performance goal orientation, as found by Ziegert et al. (2001). Accordingly, children in this specific group will have higher levels of negative

affectivity, as a performance goal orientation has been found to be positively related to performance goals (Patel et al., 2007). However, due to limited research, it is difficult to make predictions about other change or stability patterns. The following are possible combinations of changes in achievement goal orientations over time:

- a. Mastery → Performance
- b. Performance → Mastery
- c. Mastery → Mastery
- d. Performance → Performance

3. Are changes in achievement goals related to academic performance and to changes in children's sense of academic competence?

The literature has shown that direct and indirect feedback received in the school environment can affect children's achievement goal orientations. Due to this feedback, children may modify their achievement goal orientations over time to ensure positive feedback (Wigfield & Eccles, 1994). Longitudinal work by Ziegert et al. (2001) following children from preschool to first grade found that 30% of their mastery kindergarteners changed to a performance goal orientation when tested a year later, which is consistent with the finding that the frequency of performance goal orientations increases over time (Butler, 2005). Ziegert et al (2001) noted that this change could be due to changes in school contexts as well as school feedback. Additionally, Harter (1999) found that perceived competence tended to be high during the preschool years and declined with age, with marked decreases between ages 7 and 9, and perceptions became more differentiated and domain-specific with age. Overall, based on this evidence, it is expected that children with better perceptions of academic competence and higher grades

will be more likely to change to a performance goal orientation over time, because they will have better adapted to the school context.

4. What is the relationship between changes in achievement goals and both temperament and academic performance?

This question addresses whether an interaction between temperament and schooling affects changes and/or stability in achievement goals over time. There is a lack of literature investigating how both temperament and academic performance affect children's achievement goals over time. Therefore, the purpose of this question is to better understand how changes and/or stability in achievement goals are affected by the interaction between temperament and academic performance. In general, it is expected that those who remain mastery oriented will display higher levels of academic performance interacting with more positive temperament characteristics.

Summary of Research Questions

T1 & T2

1. Are children more mastery or performance oriented?
2. What is the relationship between achievement motivation and temperament?
3. What is the relationship between achievement motivation and schooling?

Change over Time

1. How does achievement motivation change over time?
2. Are changes/stability in achievement motivation related to temperament?
3. Are changes/stability in achievement motivation related to schooling?

3. METHOD

Participants

Participants were recruited from two Prince William County Public Schools, a local school system in Northern Virginia. Permission was obtained from the Prince William County Public Schools Program Evaluation Office. Once the Program Evaluation Office gave permission to conduct the research, the Supervisor of Program Evaluation provided contact information for two elementary school principals within the school system. Once principals from both schools gave permission to conduct the research, first grade teachers were contacted to participate. Once teachers agreed to participate, consent forms and questionnaire packets were sent home to parents of 375 students across both schools. Forty-nine packets (13%) were returned with consent to participate. By T2, two children moved; therefore, results at T2 and for change over time are included for 47 participants. There were approximately equal numbers of boys ($n = 25$) and girls ($n = 22$), ranging in age from 71 months to 84 months ($M = 77.13$, $SD = 3.35$). Participants were primarily from middle-income households, of whom 53.2 % were Caucasian, 19.1% were Asian/Pacific Islander, 14.9% were African American, 8.5 % were Hispanic, and 4.3% classified themselves as other.

Permission was first obtained from the school system, followed by each principal and the teachers. Once approvals were obtained, consent forms were sent home to

parents. Only after parent consent was obtained, were children approached to participate. Children were informed as were their parents that they could stop participating at any time, with no explanation. Children were compensated with a small token of appreciation (e.g. a pencil) after each testing session. Based on a power analysis following Cohen's (1992) guidelines regarding sample sizes and statistical power, it was determined that a minimum of 45 children would be required to identify a medium effect size of .30 with a .67 estimated power at a .05 level.

Measures

Achievement Motivation

Two methods for assessing children's achievement motivation were used, including an observational measure (the Puzzle Task) and an interview measure (the puppet measure).

Observational Measure

One measure of children's achievement motivation was based on the eight-piece Puzzle Task used by Smiley and Dweck (1994), and yielded information about children's achievement goal orientations. Prior research by Dweck and colleagues has typically used the eight piece Puzzle Task with preschool and kindergarten children (Cain & Dweck, 1995; Hebert & Dweck, 1985; Smiley & Dweck, 1994). However, when conducting the same Puzzle Task with first-grade children, Patel et al. (2007) found that the task was too simple for many of the first-grade children. Some children realized that the insoluble puzzles were indeed insoluble. Therefore, in order to reduce this problem, 12 piece jigsaw puzzles were used rather than the original eight piece puzzles. Overall,

the task itself has provided evidence for individual differences in young children's goal orientations (Chang & Burns, 2005; Smiley & Dweck, 1994; Ziegert et al., 2001).

Prior to completing the Puzzle Task, a pre-test puzzle with 12 fairly large removable pieces (comparable to the puzzles that will follow) was administered to establish the baseline for children's puzzle-solving time. Time of completion was recorded and used as the amount of time given on subsequent puzzles. The pre-test puzzle depicted a character from a popular children's cartoon (Bob the Builder). Prior to working on the pre-test puzzle, children were asked about their puzzle-solving ability—"Are you good at puzzles or not so good at puzzles?"

The Puzzle Task consisted of four wooden jigsaw puzzles with 12 removable pieces, and was used to measure achievement motivation. Three of the four puzzles were altered by substituting 5 correct pieces with comparable pieces from other duplicate puzzles. All puzzles were had similar drawing styles and colors; therefore, the substituted pieces gave the impression that they belonged to that specific puzzle (even though they did not). The fourth puzzle was always presented with all correct pieces. The three puzzles described above will be referred to as insoluble puzzles, while the fourth puzzle will be referred to as the soluble puzzle.

Participants were presented with the three insoluble puzzles as challenging trials followed by one soluble puzzle as a success trial. To ensure that the child did not decipher that the first three puzzles were insoluble, each child's insoluble puzzle completion time was determined by his/her individual pre-test completion time. Participants worked on the first insoluble puzzle until they were told to stop, and were not

explicitly informed that they were being timed, in order to prevent any stress caused by time constraint. The number of correctly inserted pieces was recorded, with a possible maximum of 7 correct pieces. The experimenter then placed the puzzle aside within the participant's view. To provide transitions between puzzles, the experimenter said "let's try the next one." This procedure was repeated for the remaining insoluble puzzles. Participants were then asked to retrospectively rate their emotional state on a 5-point Face Scale for each insoluble puzzle. The scale consisted of five faces, each 2 inches in diameter with only eyes, a nose, and a mouth line. These were generated in an electronic document to ensure comparable faces. The eyes and nose of each face were identical, with the mouth line ranging from a deep upward curve to a deep downward curve. Each face depicted a different emotional state described to the child from left to right as, "very sad," "a little sad," "in the middle," "a little happy," and "very happy" (see Appendix C). To ensure an understanding of the face scale, the experimenter demonstrated what each face indicated prior to recording any emotional states.

After administration of the insoluble puzzles, the fourth soluble puzzle was presented with participants working until completion. This success puzzle was intentionally placed at the end, so that success would be salient, thereby reducing the risk of participants' task preferences, expectations, and emotions being dominated by previous failure. Solution time for the soluble puzzle was recorded.

Participants were then queried about their task specific confidence for future success—"If you had lots of time right now, could you finish any of these puzzles?" Participants then reported their overall puzzle-solving ability as previously assessed

during the pre-test. In order to gauge participants' tendencies for being mastery or performance oriented, they were given the choice of re-working one of the four puzzles—"You can do any of these puzzles again [experimenter points at each], which one would you like to do?" After the decision was made, the experimenter asked the child to provide a reason for his/her choice and records the response while providing positive feedback—"good choice." Positive feedback was provided so that the child is not left questioning whether the choice is right or wrong. Participants were then given the opportunity to solve the chosen puzzle. If an insoluble puzzle was chosen, the experimenter said "I need to shuffle the pieces", and then the experimenter would provide the correct pieces without the participant's knowledge. If a soluble puzzle was chosen, the experimenter shuffled the pieces, and gave them back to the participant. Regardless of the choice, the task ensured that each child left the session with a success experience.

Participants were asked again to choose any of the previous four puzzles to re-work and to provide a reason for their choice. The experimenter then recorded the response, stating, "we've run out of time, I need to take you back to class." The experimenter then escorted the child back to the classroom.

Interview Measure

A puppet measure was used as a second measure of achievement motivation, allowing a direct measure of children's own perceptions of their achievement goal orientations. The task was based on the Berkeley Puppet Inventory (BPI) created by Measelle, Ablow, Cowan, and Cowan (1998), who based their achievement motivation questions on children's school liking and valuing (Eccles, Wigfield, Harold, & Blumfeld,

1993). For this measure, children were interviewed with two identical gender neutral hand puppets, each representing bipolar sides (positive vs. negative) of 7 achievement motivation behaviors from the original BPI listed in Appendix D. These 7 achievement motivation questions were also included in questionnaire form for parents to complete.

As suggested by Measelle et al. (1998), this measure is an age-appropriate method for interviewing young children between the ages of 4 ½ -7 ½ about self-perceptions of achievement motivation. The measure uses a combination approach of structured and clinical interviewing techniques to obtain children's self-perceptions. This exchange is shaped by the children's own communication style, as well as the style of interaction between the child and puppet.

For the interview, one experimenter acted as the puppeteer and asked the questions to the participant, while the other experimenter recorded the child's responses verbatim. In order to ensure that the children understood the interview style, the interview began with the "puppets" explaining that each will say something about themselves to the child and then, "We want to learn about you." Three to four neutral practice items (e.g. "I like/don't like pizza) were administered to acclimate children to the method. During the interview, each puppet represented bipolar sides of a question/behavior. One puppet said "I like school" while the other puppet said "I don't like school", then the child was asked "how about you [child's name]?" Once the child's response was recorded, the puppeteer would begin the next question (see Appendix E). Children were able to respond in whatever way felt comfortable for them, either verbally

or physically by pointing, since format-coding would account for any variations in responses.

Temperament

Children's Behavior Questionnaire- Short Form (Putnam & Rothbart, 2006)

Mothers completed the Children's Behavior Questionnaire-short form (CBQ-SF) for their child. The CBQ-SF is a caregiver-report instrument designed to measure temperament in children ages 3 to 7. The short version consists of 94 items measuring individual differences on 15 temperamental characteristics within the last 6 months. Items are presented on a 7-point scale ranging from 1—extremely untrue of my child, to 7—extremely true of my child. An example from the Fear scale is, "[my child] is afraid of loud noises." The alphas for the subscales range from .62 to .88 with a mean of .75. Additionally, the CBQ-SF has exhibited longitudinal stability comparable to that of the standard CBQ, ranging between .53 and .80, with a mean of .67 (Putnam & Rothbart, 2006); therefore, the CBQ-SF will only be assessed at Time 1. Three composite scores were created from the 14 temperament subscales (Approach was not included in Putnam and Rothbart's (2006) calculation of Surgency) by obtaining the mean score of the scales used to make up the composite. Composite scores include Surgency (Activity Level, High Intensity Pleasure, Impulsivity, and Shyness), Negative Affectivity (Anger, Discomfort, Fear, Sadness, and Soothability), and Effortful Control (Attentional Focusing, Inhibitory Control, Low Intensity pleasure, and Perceptual Sensitivity) (Putnam & Rothbart, 2006).

Puppet Measure for Temperament (CBQ-VSF) (Putnam & Rothbart, 2006)

The puppet measure for assessing temperament in this study was based on items from the Children's Behavior Questionnaire Very Short Form (CBQ-VSF) and was adapted to BPI methodology. The CBQ-VSF is comprised of 36 items, collapsed across 3 broad factors that have been consistently reported in previous research (Kochanska, DeVet, Goldma, Murray, & Putnam, 1994; Goldsmith et al., 1997; Rothbart et al., 2001). The interview questions are provided in Appendix F. Internal consistency coefficients for the CBQ and CBQ-VSF have exhibited moderate alphas averaging .65 (Putnam & Rothbart, 2006). Additionally, using the maternal ratings, stability correlations for scores from the very-short-form scales were .73, .70, and .63 for Surgency, Negative Affect, and Effortful Control, respectively; therefore, the CBQ-VSF was only administered at Time 1. Factors from the CBQ-VSF include Surgency/Extraversion (Impulsivity, High Intensity Pleasure, Activity Level, and Shyness), Negative Affectivity (Sadness, Fear, Anger/Frustration, Discomfort, Falling Reactivity/Soothability), and Effortful Control (Inhibitory Control, Attentional Control, Low Intensity Pleasure, Perceptual Sensitivity) (Putnam & Rothbart, 2002).

Schooling

Children's Perceptions of Academic Competence

A puppet measure was used to assess children's perceptions of academic competence. This measure included 6 items from the BPI gauging academic competence (see Appendix G). As previously stated, the puppet measure allows for direct assessment

of the child's own report of academic competence, which provides valuable information about the child's perspective.

Teacher's Perceptions of Academic Performance

Teachers were asked to complete the Academic Performance section of the Teachers Report Form (TRF) from the Child Behavior Checklist (Achenbach & Edelbrock, 1986) (See Appendix H). Ratings were obtained from teachers for each child after the Fall and Spring semesters.

Procedure

Along with the principal researcher, two undergraduate assistants were recruited for data collection. Research assistants were adequately trained on all tasks by the principal investigator.

Consent forms describing the study and questionnaires (CBQ, 7 achievement motivation items, and a demographic information form) were sent home to parents of all children in the classrooms of teachers who agreed to participate. Once parent consent was obtained and the questionnaires were returned, children were approached for participation, and completed an assent form during the first session. Time 1 data was collected during two sessions in the fall semester of 2007 from September 24th to October 5th. Both sessions took place early in the semester in order to gauge children's initial achievement motivation. Time 2 data was collected during two sessions in the spring semester of 2008 from May 5th to May 13th. Both sessions took place later in the semester, to gauge achievement motivation after a year of schooling. After each testing session, children were compensated with a small token of appreciation (e.g. a pencil).

Teachers provided ratings of children’s academic performance at the end of each semester, and were compensated with \$25 gift cards to a local book store. The principal researcher and one trained research assistant were present during all sessions of data collection.

Time 1 Data Collection

Participants were seen individually at school during both sessions. During the first session, participants were asked about their puzzle-solving ability—“Are you good at puzzles or not so good at puzzles?” Following this, the pre-test puzzle from the observational measure of achievement motivation was administered. Solution time was noted and used as the baseline time for completion of subsequent puzzles at the second session.

Following this, the puppet measure for temperament, achievement motivation, and children’s perceptions of academic competence were administered. Due to the length of the temperament measure, only half was administered in order to prevent participant fatigue.

Approximately 2-5 days later, the second session was administered, including the Puzzle Task and the latter half of the puppet measure for temperament. Participants were thanked for their time, commended on their puzzle-solving ability, and accompanied back to their classroom.

Time 2 Data Collection

Participants were once again seen individually at their school. During the first session, participants were asked about their puzzle-solving ability, and then the pre-test

puzzle from the observational measure of achievement motivation was administered. Following this, the puppet measure for achievement motivation and children's perceptions of academic competence was administered. During the last session the Puzzle Task was administered. All participants were given a small token of appreciation (e.g. pencils) after each session.

Coding

Puzzle Task Coding

Children's preference for working on an insoluble or soluble puzzle and the reason provided were primary indicators of "mastery" or "performance" goals. Two coding systems were used to assess children's achievement goal orientation; the original Smiley and Dweck (1994) coding system and a more conservative coding system developed by Patel et al. (2007). This new system was utilized in this study because it seemed to capture the relationship between goal orientations and temperament better than the original coding system (Patel et al., 2007).

Smiley and Dweck (1994) Coding

The Smiley and Dweck (1994) coding system uses the first choice and reason for the first choice to assess children's achievement goal orientation. The puzzle choice was coded based on whether an insoluble or soluble puzzle was selected. Reasons given for puzzle choice were coded into four categories: (1) Challenge—subjects positive interest in trying to solve the puzzle/maze or add to the small amount that had been accomplished; (2) Want/Like—comments referring to the child's desire or to a preference for that particular puzzle/maze; (3) No Challenge— reasons referring explicitly to the

ease of the task or the child's belief that he/she could easily complete it; and (4) No Reason—responses such as “I don't know” or “just because.” In the event that a soluble puzzle was chosen, the child was placed in the “performance” category. If an insoluble puzzle was chosen, accompanied by any of the following reasons; challenge, want/like, or a no reason response, the child was placed in the “mastery” group. However, if an insoluble puzzle was chosen with a no challenge response, then the child was placed in the “performance” group. In this coding system, the choice plays a larger role in the distinction between being labeled mastery or performance.

Patel et al.(2007) Coding

The Patel et al. (2007) coding scheme is based on the original Smiley and Dweck (1994) coding. The puzzle choice was coded based on whether an insoluble or soluble puzzle was selected. Reasons given for puzzle choice were coded into four categories: (1) Challenge—subjects positive interest in trying to solve the puzzle/maze or add to the small amount that had been accomplished; (2) Want/Like—comments referring to the child's desire or to a preference for that particular puzzle/maze; (3) No Challenge—reasons referring explicitly to the ease of the task or the child's belief that he/she could easily complete it; and (4) No Reason—responses such as “I don't know” or “just because.” Unlike the Smiley and Dweck scoring, in this scoring method if a soluble puzzle was chosen then the child was placed in the “performance” category. If an insoluble puzzle was chosen, accompanied by challenge reasoning, then the child was placed in the “mastery” group; however, if an insoluble puzzle was chosen with either, want/like, no challenge, or no reason responses, then the child was placed in the

“performance” group. This coding scheme is purposefully conservative, in order to truly capture children with a mastery goal orientation. Therefore, simply choosing an insoluble puzzle does not automatically indicate a mastery orientation.

Puppet Measure Scoring

The puppet measure for achievement motivation, temperament, and schooling were based on a previously used coding scheme by Measelle et al. (1998). All interviews were scored by two coders to ensure reliability. No differences were encountered in scoring. Responses were coded on a 7 point (1-7) Likert-scale, where the endpoints represent the extreme negative (1) and extreme positive (7) ends of perceptions. The numbers 2 and 6 represent responses that were equivalent to one of the bipolar statements made by either puppet. For example, if a child responded “I don’t like school,” then this was scored as a 2; however, if a child amplified his/her response by adding a qualifier, (e.g. “I *really* don’t like school”) then this was scored as a 1. If a child responded less negatively, (e.g. “I *kind* of don’t like school”), this was scored as a 3. Positive responses were coded on the 5-7 range; whereas, negative responses were coded on a 3-1 range. If the child indicated that he/she is “in the middle,” the response was coded a 4.

4. RESULTS

Overview of Data Reported

The results for this study are presented in three sections – Time 1 results (T1), Time 2 results (T2), and Change over Time. Results for both T1 and T2 begin with preliminary analyses of the measures used to evaluate achievement motivation, temperament, and schooling in this study, followed by a series of analyses focusing on (1) the proportion of mastery and performance oriented children at each time point and (2) the effects of temperament and schooling on achievement motivation. Finally, the Change over Time section examines both changes in achievement goals over time and the effect of temperament and schooling on these changes. All results are displayed in table format in Appendices I, J, and K.

Time 1

Preliminary Analysis: Achievement Motivation

As described in the methods section, multiple measures were used to assess the three major constructs – achievement motivation, temperament, and schooling. Achievement motivation was assessed with parent and child reports and a Puzzle Task. The Puzzle Task was coded using two previously established coding schemes (Patel et al., 2007; Smiley and Dweck, 1994). Temperament was measured using parent and child

reports, and schooling was measured using teacher, parent, and child ratings. Preliminary analyses were conducted to understand whether the measures used to assess the aforementioned constructs were related and to evaluate differences between Puzzle Task scoring methodologies (Patel et al., 2007; Smiley and Dweck, 1994).

Puzzle Task: Comparison of Patel et al. (2007) and Smiley and Dweck (1994) scoring methods

Table 1 shows the number of children whose achievement motivation classification was similar or different in the two scoring methods (i.e. Patel et al. (2007) and Smiley and Dweck (1994)). As predicted, the two scoring methods produced different proportions of mastery and performance oriented individuals. Two-way contingency table analyses showed that the proportions of mastery and performance oriented children were not the same across the two scoring methods. For the 1st choice, χ^2 (continuity correction) (1, $N = 49$) = 4.71, $p < .05$, $\phi^2 = .14$, $p < .01$; for the 2nd choice, χ^2 (continuity correction) (1, $N = 49$) = 5.97, $p < .01$, $\phi^2 = .16$, $p < .05$. Because the Patel et al. (2007) and Smiley and Dweck (1994) scoring methods produced significantly different proportions of mastery and performance oriented children, achievement motivation analyses were conducted separately for each scoring methodology.

Table 1. Number of mastery vs. performance oriented children by scoring method

Smiley and Dweck Choice 1		
	Mastery	Performance
Patel et al. Choice 1		
Mastery	7 (26%)	0 (0%)
Performance	20 (74%)	22 (100%)
Smiley and Dweck Choice 2		
	Mastery	Performance
Patel et al. Choice 2		
Mastery	13 (38%)	0 (0%)
Performance	21 (62%)	15 (100%)

Puzzle Task: Changes in achievement goal orientations from puzzle choice 1 to 2

The Puzzle Task provides children with two opportunities to solve a puzzle that they have already attempted. Previous literature shows that the puzzle choices produce different achievement goal orientations; therefore, each puzzle choice (i.e. 1st vs. 2nd) for each scoring method is treated as an individual classification of achievement goals.

Table 2 shows the number of children whose achievement goal classification changed from the 1st to the 2nd choice of the Patel et al. (2007) and Smiley and Dweck (1994) scoring methods. Results of the two-way contingency table analyses indicated that children's achievement goal classifications significantly changed from the 1st to the 2nd choice for both scoring methods (Patel et al. scoring – χ^2 (with continuity correction) (1, $N = 49$) = 5.97, $p < .02$, $\phi^2 = .18$, $p < .01$; Smiley and Dweck scoring, χ^2 (with continuity correction) (1, $N = 49$) = 12.91, $p < .001$, $\phi^2 = .32$, $p < .001$). Results indicated that more children adopted mastery goals from the 1st to the 2nd choice.

Table 2. Number of children changing goal orientation from choice 1 to choice 2

		Patel et al. Choice 2	
		Mastery	Performance
Patel et al. Choice 1			
	Mastery	5	2
	Performance	8	34
		Smiley and Dweck Choice 2	
		Mastery	Performance
Smiley and Dweck Choice 1			
	Mastery	25	2
	Performance	9	13

Summary of scoring method analyses

Both scoring methods (Patel et al. (2007) and Smiley and Dweck (1994)) produced different proportions of mastery and performance oriented children. Additionally, within each scoring method, achievement goal classification differed from 1st to 2nd choice on the Puzzle Task. Because scoring methods and choices produced different classifications of achievement goals, the main analyses will include 4 different Puzzle Task achievement goals scores for each child – Patel et al. 1st choice, Patel et al. 2nd choice, Smiley and Dweck 1st choice, and Smiley and Dweck 2nd choice).

Relationships between the various achievement motivation measures

Relationships between parent/child reports of achievement motivation with the Puzzle Task. Table 3 shows mean ratings of children’s achievement motivation as provided by parents and children, with higher scores indicating more mastery behaviors. Independent-samples *t*-tests were conducted to evaluate whether mean parent and child

ratings of achievement motivation were different for children classified as mastery or performance on the Puzzle Task. Results of the analyses indicated that parent ratings of achievement motivation did not differ for children classified as mastery or performance; Patel et al. (2007) 1st choice ($t(33) = -.55, p > .05$); Patel et al. 2nd choice ($t(33) = -1.41, p > .05$); Smiley and Dweck (1994) 1st choice ($t(33) = -.01, p > .05$); and Smiley and Dweck 2nd choice ($t(33) = .08, p > .05$).

Similarly, results of the analyses indicated that child ratings of achievement motivation did not differ for children classified as mastery or performance; Patel et al. 1st choice ($t(47) = .09, p > .05$); Patel et al. 2nd choice ($t(47) = -.53, p > .05$); Smiley and Dweck 1st choice ($t(47) = -1.44, p > .05$); and Smiley and Dweck 2nd choice ($t(47) = -1.59, p > .05$). Overall, parents and children's reports of achievement motivation were not related to children's achievement goal classification on the Puzzle Task. As no relationship was found among the various achievement motivation measures (i.e. Puzzle Task, parent report, and child report), all measures were included in the main analyses.

Table 3. Mean parent ratings by children's Puzzle Task performance

	Patel et al. scoring		Smiley and Dweck Scoring	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
Parent Report Means				
Mastery	5.75 (.91)	5.90 (.74)	5.57 (.89)	5.56 (.78)
Performance	5.53 (.83)	5.45 (.84)	5.56 (.77)	5.58 (1.00)
Child Report Means				
Mastery	5.65 (.33)	5.73 (.39)	5.56 (.57)	5.74 (.35)
Performance	5.67 (.48)	5.65 (.48)	5.75 (.33)	5.51 (.62)

Relationship between parent and child report of achievement motivation.

Correlations were performed between parent and child reports of achievement motivation. Contrary to our prediction, results yielded no relationship between the two reports ($r = .12, p > .05$); therefore, subsequent analyses were conducted on both parent and child reports of achievement motivation.

Summary of achievement motivation measures

The various achievement motivation measures – the Puzzle Task, parent reports of achievement motivation, and child reports of achievement motivation did not show any relationships with one another. Consequently, all achievement motivation measures will be included in the main analyses.

Preliminary Analysis: Temperament

Preliminary analyses were conducted to examine whether there was a relationship between parent and child reports of temperament.

Relationship between parent and child reports of temperament

Correlations of parent and child temperament ratings (both composite and individual temperament dimensions) were conducted. Only the anger dimension showed a significant correlation; when parents rated their children “high” on anger, their children were more likely to rate themselves as “low” on anger ($r = -.30, p < .05$) (see Table 4). This supports prior conclusions, indicating limited relationships between parent and child

reports of temperament (Hwang, 2003). Due to a lack of relationship between parent and child reports of temperament, subsequent analyses will include scores from both parent and child reports.

Table 4. Correlations of parent and child temperament scores

Temperament Scores	Correlation
Composite Scores	
Effortful control	-.06
Negative affectivity	-.03
Surgency	-.13
Individual Dimensions	
Activity level	.18
Anger/frustration	-.30*
Attentional focusing	-.03
Discomfort	.18
Falling reactivity/soothability	-.05
Fear	.02
High intensity pleasure	.02
Impulsivity	.02
Inhibitory control	-.03
Low intensity pleasure	.12
Perceptual sensitivity	-.21
Sadness	-.03
Shyness	-.16

* $p < .05$

Preliminary Analyses: Age and Gender

Preliminary analyses were conducted to examine the effects of age and gender on achievement motivation as assessed by the Puzzle Task and parent and child reports.

Age and gender with Puzzle Task classifications. Independent-samples *t*-tests showed no significant age differences for mastery and performance oriented children for

either scoring method or choice; Patel et al. (2007) 1st choice ($t(47) = .77, p > .05$); Patel et al. 2nd choice ($t(47) = .35, p > .05$); Smiley and Dweck (1994) 1st choice ($t(47) = -.09, p > .05$); and Smiley and Dweck 2nd choice ($t(47) = 1.12, p > .05$) (see Table 5).

Table 5. Mean age of mastery and performance oriented children

	Patel et al. scoring		Smiley and Dweck Scoring	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
Age in Months				
Mastery	76.43 (3.41)	77.08 (3.35)	76.41 (3.25)	77.00 (3.23)
Performance	77.52 (3.50)	77.47 (3.57)	77.32 (3.82)	78.20 (3.99)

Chi squares were performed to evaluate whether there were significant differences between girls' and boys'. The analyses indicated that there were no gender differences for achievement goal orientation with either scoring method (Patel et al. 1st choice ($\chi^2(1, N = 49) = 1.36, p > .05$); Patel et al. 2nd choice ($\chi^2(1, N = 49) = 2.90, p > .05$); Smiley and Dweck (1994) 1st choice ($\chi^2(1, N = 49) = 3.43, p > .05$); and Smiley and Dweck 2nd choice ($\chi^2(1, N = 49) = .05, p > .05$). Overall, achievement goal classifications did not differ by age or gender.

Age and gender with parent report of achievement motivation. Correlations were calculated between age and gender and parent reports of achievement motivation respectively. Age was significantly related to parent reports of achievement motivation ($r = .48, p < .01$). A median split was created to determine “older” versus “younger” children, with children over 6.44 classified as “older.” Generally, older children were rated as having higher levels of mastery behaviors ($M = 5.92, SD = .59$) than younger

children ($M = 5.14$, $SD = .88$). Gender was not significantly related to parent reports of achievement motivation ($r = .29$, $p > .05$). Parent ratings did not reveal significant differences in achievement motivation for girls and boys.

Age and gender with child report of achievement motivation. Correlations were performed for age and gender and children's self-report of achievement motivation respectively. Results of these analyses indicated that neither age ($r = .14$, $p > .05$) nor gender (Spearman's $r = .17$, $p > .05$) was significantly related to child reports of achievement motivation.

Summary of age and gender analyses

When achievement motivation was based on parent reports, parents rated older children higher on mastery behaviors than younger children; however, no effects of gender were found. However, when classification of achievement goals was based on either the Puzzle Task or child reports of achievement motivation there were no significant age or gender differences for mastery and performance oriented children. Overall, age differences on mastery versus performance goals were only evident when achievement motivation reports were provided by parents.

Main Analyses T1

This section provides a series of analyses showing the relationships between the three major constructs (achievement motivation, temperament, and schooling) with the assessment measures – the Puzzle Task, temperament reports provided by parents and children, academic performance ratings provided by teachers, and academic competence

ratings provided by parents, and children. The analyses focus on (1) the proportion of mastery and performance oriented children at the beginning of first grade, (2) the effects of temperament on achievement motivation, and (3) the effects of schooling on achievement motivation.

Achievement motivation at T1

Proportions of achievement motivation based on the Puzzle Task. Table 6 presents the proportions of children classified as mastery or performance oriented by the Patel et al. (2007) and Smiley and Dweck (1994) scoring methods. The Patel et al. scoring method yielded a larger number of performance oriented children regardless of puzzle choice, while the Smiley and Dweck method yielded approximately equal numbers of mastery and performance oriented children for choice 1, and a larger number of mastery oriented children for choice 2. In general, both scoring methods yielded a larger number of mastery oriented children for choice 2 than for choice 1.

Table 6. Percentage and number of mastery versus performance children at T1 by scoring method

	Patel et al.		Smiley and Dweck	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
% Mastery	14.3% (7)	26.5% (13)	55.1% (27)	69.4% (34)
% Performance	85.7% (42)	73.5% (36)	44.9% (22)	30.6% (15)

Child and parent reports of achievement motivation. Child and parent reports of children’s achievement motivation typically fell on the mastery end of the 7-point

continuum (child $M = 5.67$, $SD = .46$; parent $M = 5.56$, $SD = .83$). These findings suggest that when assessment is based on ratings, both parents and children provide ratings that indicate greater mastery behavior.

Summary of achievement motivation at T1

Puzzle Task classification of achievement goals yielded contrary findings for each scoring method; the Patel et al. (2007) scoring yielded more performance oriented children, while the Smiley and Dweck method yielded approximately equal numbers of mastery and performance oriented children for the 1st choice, and a larger number of mastery oriented children for the 2nd choice. Parent and child ratings of achievement motivation indicated greater mastery behaviors.

Relationship between achievement motivation and temperament

The relationship between achievement motivation and parent report of temperament. Multivariate analyses of variance (MANOVAs) were performed to investigate differences between mastery and performance oriented children on various temperament scores. First, MANOVAs were conducted to examine group differences in achievement motivation on three temperament composite scores (Effortful Control, Negative Affectivity, and Surgency) as provided by parent reports (see tables 7 and 8). The overall MANOVAs were not significant; Patel et al. (2007) 1st choice (Pillai's $F(1, 47) = .95$, $p > .05$); Patel et al. 2nd choice (Pillai's $F(1, 47) = .14$, $p > .05$); Smiley and Dweck (1994) 1st choice (Pillai's $F(1, 47) = .01$, $p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(1, 47) = .29$, $p > .05$). Additionally, separate MANOVAs examining

differences in achievement goals on the temperament interaction terms were not significant for any of the scoring methods.

Second, MANOVAs were conducted to examine group differences in achievement motivation on 15 individual dimensions of temperament as provided by parent reports (see tables 7 and 8). Again, the overall MANOVAs were not significant; Patel et al. (2007) 1st choice (Pillai's $F(1, 47) = .97, p > .05$); Patel et al. 2nd choice (Pillai's $F(1, 47) = .39, p > .05$); Smiley and Dweck (1994) 1st choice (Pillai's $F(1, 47) = .98, p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(1, 47) = .78, p > .05$). However, the univariate analyses revealed group differences for some individual temperament dimensions. When achievement goals were classified by the Patel et al. 1st choice scoring method, results showed that mastery individuals enjoyed high intensity pleasure activities more than performance oriented individuals, while the Smiley and Dweck method revealed that mastery individuals had higher levels of approach than their performance oriented counterparts.

Table 7. Mean parent temperament ratings on the Puzzle Task Patel et al. (2007) scoring method

	Patel et al. Choice 1			Patel et al. Choice 2		
	Mastery	Performance	F	Mastery	Performance	F
Composites Scores						
Effortful control	4.91 (.73)	5.27 (.56)	2.20	5.20 (.49)	5.22 (.63)	.02
Negative affectivity	4.22 (.67)	3.99 (.65)	.79	4.12 (.68)	3.99 (.64)	.00
Surgency	4.57 (1.22)	4.19 (.63)	1.68	4.24 (.93)	4.24 (.67)	.43
Effortful control x surgency			.00			.04
Effortful control x negative affectivity			.12			.41
Negative affectivity x surgency			3.00			.38
Individual Dimensions						
Activity level	4.88 (1.24)	4.37 (.91)	1.70	4.29 (.86)	4.50 (1.01)	.44
Anger/frustration	4.59 (1.44)	4.04 (1.07)	1.46	3.96 (1.23)	4.18 (1.10)	.35
Approach	5.43 (.57)	4.86 (.77)	3.38 ⁺	4.86 (1.03)	4.98 (.66)	.22
Attentional focusing	4.33 (1.38)	5.00 (.87)	2.91 ⁺	4.86 (1.01)	4.91 (.94)	.03
Discomfort	4.64 (.97)	4.23 (1.00)	1.02	4.54 (.76)	4.20 (1.07)	1.09
Falling reactivity/soothability	5.05 (.73)	4.79 (.97)	.43	4.55 (.91)	4.93 (.94)	1.59
Fear	4.19 (1.56)	4.18 (1.13)	.00	4.41 (1.37)	4.10 (1.12)	.66
High intensity pleasure	5.37 (1.01)	4.34 (.78)	9.58**	4.45 (1.10)	4.50 (.81)	.02
Impulsivity	4.24 (1.61)	3.88 (.94)	.70	4.03 (1.37)	3.90 (.93)	.15
Inhibitory control	4.57 (1.21)	4.97 (.98)	.93	4.88 (1.18)	4.92 (.95)	.01
Low intensity pleasure	5.67 (.50)	5.52 (.83)	.22	5.62 (.41)	5.51 (.89)	.18
Perceptual sensitivity	5.07 (1.12)	5.58 (.78)	2.31	5.42 (.80)	5.55 (.86)	.23
Sadness	4.73 (.79)	4.28 (.83)	1.81	4.25 (.93)	4.38 (.81)	.22
Shyness	4.19 (1.54)	3.83 (1.19)	.50	3.81 (1.01)	3.91 (1.31)	.06
Smile	5.93 (.84)	5.59 (.87)	.91	5.56 (1.01)	5.67 (.82)	.13

4. < .06, ** < .01, ⁺ < .10

Table 8. Mean parent temperament ratings on the Puzzle Task Smiley and Dweck (1994) scoring method

	Smiley and Dweck Choice 1			Smiley and Dweck Choice 2		
	Mastery	Performance	F	Mastery	Performance	F
Composites Scores						
Effortful control	5.20 (.54)	5.23 (.66)	.02	5.26 (.59)	5.13 (.62)	.50
Negative affectivity	4.02 (.62)	4.02 (.70)	.00	4.04 (.68)	3.96 (.58)	.17
Surgency	4.25 (.74)	4.23 (.75)	.07	4.21 (.79)	4.31 (.62)	.22
Effortful control x surgency			.02			.00
Effortful control x negative affectivity			.07			.49
Negative affectivity x surgency			.00			.00
Individual Dimensions						
Activity level	4.53 (.94)	4.32 (1.01)	.57	4.41 (.99)	4.51 (.95)	.12
Attentional focusing	4.82 (.96)	5.00 (1.00)	.40	4.89 (1.02)	4.93 (.87)	.02
Anger/frustration	4.19 (1.25)	4.03 (.97)	.25	4.01 (1.22)	4.38 (.85)	1.13
Approach	5.24 (.59)	4.57 (.81)	11.18**	5.09 (.83)	4.62 (.50)	4.07*
Discomfort	4.29 (1.04)	4.29 (.96)	.00	4.44 (1.02)	3.96 (.88)	2.49
Falling reactivity/soothability	4.96 (.78)	4.67 (1.10)	1.21	4.84 (.97)	4.81 (.91)	.01
Fear	4.23 (1.22)	4.12 (1.17)	.09	4.35 (1.24)	3.80 (1.00)	2.23
High intensity pleasure	4.65 (.90)	4.28 (.84)	2.18	4.47 (.96)	4.51 (.72)	.02
Impulsivity	3.80 (1.03)	4.09 (1.06)	.96	3.87 (1.13)	4.06 (.84)	.32
Inhibitory control	4.96 (.89)	4.85 (1.15)	.15	4.98 (1.00)	4.77 (1.03)	.44
Low intensity pleasure	5.62 (.52)	5.44 (1.04)	.62	5.63 (.53)	5.35 (1.19)	1.28
Perceptual sensitivity	5.41 (.93)	5.63 (.73)	.84	5.53 (.89)	5.47 (.75)	.06
Sadness	4.37 (.89)	4.31 (.78)	.04	4.28 (.90)	4.48 (.68)	.59
Shyness	3.98 (1.35)	3.77 (1.09)	.36	3.91 (1.23)	3.81 (1.27)	.07
Smile	5.81 (.84)	5.43 (.87)	2.34	5.70 (.89)	5.50 (.81)	.56

5. < .05, ** < .01

The relationship between achievement motivation and child reports of temperament. MANOVAs were conducted to look at group differences in achievement motivation on temperament composite scores as provided by child reports (see tables 9 and 10). The overall MANOVAs were not significant; Patel et al. (2007) 1st choice (Pillai's $F(1, 47) = .26, p > .05$); Patel et al. 2nd choice (Pillai's $F(1, 47) = .69, p > .05$); Smiley and Dweck (1994) 1st choice (Pillai's $F(1, 47) = .47, p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(1, 47) = 1.18, p > .05$). Univariate analyses for the Patel et al. 2nd choice scoring method indicated that mastery oriented individuals displayed higher

levels of Negative Affectivity than performance oriented individuals. Separate MANOVAs examining differences in achievement goals on the temperament interaction terms were not significant for any of the scoring methods.

Additionally, MANOVAs were conducted to examine group differences in achievement goals for individual dimensions of child rated temperament (see tables 9 and 10). The overall MANOVAs were not significant; Patel et al. (2007) 1st choice (Pillai's $F(1, 47) = .88, p > .05$); Patel et al. 2nd choice (Pillai's $F(1, 47) = .90, p > .05$); Smiley and Dweck (1994) 1st choice (Pillai's $F(1, 47) = .62, p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(1, 47) = .45, p > .05$). Univariate analyses for the Patel et al. 2nd choice scoring indicated that mastery oriented individuals displayed lower levels of inhibitory control than performance oriented individuals. Mastery oriented children were less likely to inhibit or suppress approach responses.

Table 9. Mean child temperament ratings on the Puzzle Task Patel et al. (2007) scoring method

	Patel et al. Choice 1			Patel et al. Choice 2		
	Mastery	Performance	F	Mastery	Performance	F
Composites Scores						
Effortful control	5.04 (.61)	5.06 (.72)	.01	4.10 (.76)	4.53 (1.19)	1.49
Negative affectivity	3.37 (.73)	3.59 (.91)	.36	4.28 (.74)	3.83 (.67)	4.08*
Surgency	4.30 (.78)	4.10 (.67)	.47	3.88 (.50)	3.93 (.55)	.10
Effortful control x surgency			.02			1.54
Effortful control x negative affectivity			.03			.00
Negative affectivity x surgency			.00			1.31
Individual Dimensions						
Activity level	3.52 (1.00)	3.33 (.97)	.23	3.26 (.92)	3.40 (.99)	.20
Anger/frustration	3.64 (1.25)	3.96 (1.59)	.26	4.23 (1.58)	3.81 (1.54)	.72
Attentional focusing	4.86 (1.33)	5.04 (1.00)	.13	4.67(1.09)	4.96 (1.36)	.50
Discomfort	3.57 (1.13)	3.77 (1.27)	.15	4.05 (1.33)	3.63 (1.22)	1.10
Falling reactivity/soothability	2.93 (1.17)	3.50 (1.57)	.85	3.38 (.1.46)	3.43 (1.56)	.01
Fear	3.43 (1.40)	3.58 (1.57)	.06	4.23 (1.36)	3.32 (1.53)	3.56 [⊥]
High intensity pleasure	5.00 (1.03)	4.88 (1.23)	.06	4.51 (.1.12)	5.04 (1.21)	1.87
Impulsivity	3.52 (1.14)	3.86 (1.08)	.59	3.79 (1.17)	3.82 (1.07)	.01
Inhibitory control	4.33 (1.53)	4.43 (1.41)	.03	3.74 (1.32)	4.66 (1.38)	4.28*
Low intensity pleasure	3.38 (1.39)	4.05 (1.56)		3.64 (1.29)	4.06 (1.63)	.71
			1.12			
Perceptual sensitivity	5.14 (1.26)	4.31 (1.54)		4.36 (1.60)	4.46 (1.51)	.04
			1.81			
Sadness	3.71 (1.00)	3.98 (1.36)	.24	4.26 (1.38)	3.82 (1.28)	1.05
Shyness	4.00 (.86)	4.47 (1.41)	.72	4.05 (1.35)	4.53 1.35)	1.19

6. < .05, ** < .01, [⊥] < .10

Table 10. Mean child temperament ratings on the Puzzle Task Smiley and Dweck (1994) scoring method

	Smiley and Dweck Choice 1			Smiley and Dweck Choice 2		
	Mastery	Performance	F	Mastery	Performance	F
Composite Scores						
Effortful control	5.01 (.71)	5.11 (.69)	.25	5.00 (.71)	5.19 (.66)	.83
Negative affectivity	3.49 (.95)	3.63 (.79)	.25	3.44 (.85)	3.79 (.94)	1.62
Surgency	4.04 (.68)	4.24 (.69)	.48	4.21 (.62)	3.96 (.80)	1.37
Effortful control x surgency			.60			.19
Effortful control x negative affectivity			.07			.13
Negative affectivity x surgency			.19			.20
Individual Dimensions						
Activity level	3.32 (.98)	3.41 (.96)	.10	3.04 (.94)	3.49 (1.04)	.38
Anger/frustration	3.91 (1.61)	3.93 (1.50)	.00	3.74 (1.53)	4.33 (.154)	1.58
Attentional focusing	4.87 (1.20)	4.89 (1.41)	.00	4.88 (1.23)	4.89 (1.45)	.00
Discomfort	4.01 (1.29)	3.41 (1.13)	2.97 ⁺	3.92 (1.33)	3.33 (.92)	2.39
Falling reactivity/soothability	3.24 (1.46)	3.63 (1.60)	.82	3.37 (1.44)	3.53 (1.72)	.12
Fear	3.50 (1.59)	3.63 (1.60)	.09	3.46 (1.47)	3.80 (1.70)	.52
High intensity pleasure	4.77 (1.24)	5.06 (1.14)	.73	4.85 (1.20)	5.00 (1.23)	.16
Impulsivity	3.63 (1.20)	4.05 (.89)	1.81	3.82 (1.13)	3.80 (1.02)	.01
Inhibitory control	4.31 (1.50)	4.55 (1.31)	.34	4.33 (1.42)	4.60 (1.41)	.38
Low intensity pleasure	3.89 (1.56)	4.03 (1.56)	.09	3.99 (1.47)	3.87 (1.75)	.07
Perceptual sensitivity	4.33 (1.62)	4.56 (1.40)	.27	4.38 (1.65)	4.56 (1.17)	.13
Sadness	4.10 (1.18)	3.74 (1.46)	.90	3.94 (1.27)	3.93 (1.43)	.00
Shyness	4.27 (1.47)	4.56 (1.21)	.55	4.45 (1.35)	4.29 (1.37)	.15

7. < .05, ** < .01, ⁺ < .10

In order to follow-up on the achievement motivation group differences on temperament, correlations were calculated on the variables that were significant or showed trends in the above MANOVAs (see Table 11). In general, two trends were evident; (1) parents rated mastery oriented children higher in approach behaviors, and (2) child ratings of temperament did not generally indicate group differences between mastery and performance oriented individuals, with differences found only for the Patel et al. (2007) 2nd choice scoring method.

Table 11. Correlations of achievement motivation assessed by the Puzzle Task and parent/child temperament ratings

Variable	Spearman's rho
Patel et al. (choice 1)	
High intensity pleasure (parent report)	.36**
Approach (parent report)	.33*
Attentional focusing (parent report)	-.20
Patel et al. (choice 2)	
Negative affectivity (child report)	.29*
Fear (child report)	.28 [†]
Inhibitory control (child report)	-.32*
Smiley & Dweck (choice 1)	
Approach (parent report)	.46**
Smiley & Dweck (choice 2)	
Approach (parent report)	.37**

* < .05, ** < .01, [†] < .06

Achievement motivation reports and temperament

Correlations were performed between parent/child reports of achievement motivation and parent/child reports of temperament. Table 12 illustrates the significant relationships found between reports of achievement motivation and reports of temperament. Overall, children who rated themselves as more mastery had parents who rated them as having higher levels of effortful control, approach, and attentional focusing. In particular, parent reports of temperament seem to capture differences in achievement motivation better than children's self-reports.

Table 12. Correlations between various reports of achievement motivation and temperament

Achievement Motivation and Temperament	Correlation
Child report of achievement motivation & parent report of temperament	
Composite Effortful Control	.32*
Approach	.35**
Attention Focusing	.29*
Parent report of achievement motivation & child report of temperament	
Activity level	.34*

* $p < .05$, ** $p < .01$

Summary of the relationship between achievement motivation and temperament

When assessment of achievement motivation was based on the Puzzle Task, parent reports of temperament indicated several achievement motivation group differences. Based on the Patel et al. 1st choice scoring method, mastery individuals enjoyed high intensity pleasure activities more than performance oriented individuals, while the Smiley and Dweck method revealed that mastery individuals had higher levels of approach than performance oriented individuals. Additionally, child reports of temperament indicated that mastery individuals displayed higher levels of negative affectivity and lower levels of inhibitory control than performance oriented individuals. When assessment of achievement motivation was based on reports, children who rated themselves higher on mastery had parents who rated them as having higher levels of effortful control, approach, and attentional focusing.

The relationship between achievement motivation and perceptions of child academic competence by parents and children

The relationship between achievement motivation based on the Puzzle Task and parent ratings of academic competence. Independent-samples *t*-tests were performed to determine whether there were group differences between mastery and performance oriented children on parent ratings of children's academic competence. Table 13 shows the mean parent ratings of children's academic competence. Although, the table suggests that for the Patel et al. (2007) scoring method parents rated mastery children as higher in academic competence, the statistical analyses demonstrated that the effect was unreliable. Independent samples *t*-tests produced no statistically significant differences on parental ratings of academic competence between mastery and performance oriented individuals; Patel et al. 1st choice ($t(33) = -.55, p > .05$); Patel et al. 2nd choice ($t(33) = -1.41, p > .05$); Smiley and Dweck (1994) 1st choice ($t(33) = -.01, p > .05$); and Smiley and Dweck 2nd choice ($t(33) = .08, p > .05$).

The relationship between achievement motivation based on the Puzzle Task and child ratings of academic competence. Independent-samples *t*-tests were performed to determine whether there were group differences between mastery and performance oriented children on children's own ratings of academic competence. Table 13 shows the mean child ratings of their own academic competence. Independent samples *t*-tests produced no statistically significant differences on children's ratings of academic competence for mastery and performance oriented individuals (Patel et al. (2007) 1st choice ($t(47) = 1.30, p > .05$); Patel et al. 2nd choice ($t(47) = .22, p > .05$); Smiley and

Dweck (1994) 1st choice ($t(47) = .34, p > .05$; Smiley and Dweck 2nd choice ($t(47) = -.08, p > .05$).

Table 13. Means for children's reports of academic competence by Puzzle Task

	Patel et al. scoring		Smiley and Dweck Scoring	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
Academic Competence Means				
Parent Report				
Mastery	5.75 (.91)	5.90 (.74)	5.57 (.89)	5.56 (.78)
Performance	5.53 (.83)	5.45 (.84)	5.56 (.77)	5.58 (1.00)
Child Report				
Mastery	5.31 (.93)	5.22 (.73)	5.53 (.62)	5.56 (.57)
Performance	5.60 (.46)	5.56 (.47)	5.58 (.45)	5.54 (.50)

The relationship between parent report of achievement motivation and children's report of academic competence. A significant correlation was obtained between parent reports of achievement motivation and children's self-reports of academic competence ($r = .56, p < .001$). This result indicates that parents who perceived their children as having higher levels of achievement motivation, indicating more mastery behaviors, have children who perceived themselves as being more academically competent.

The relationship between child report of achievement motivation and children's report of academic competence. A significant correlation was obtained between children's self-reports of achievement motivation and academic competence ($r = .31, p < .05$). This result indicates that children who perceived themselves as having higher levels of achievement motivation, indicating more mastery behaviors, also perceived themselves as being more academically competent.

Summary of the relationship between achievement motivation and academic competence

Both parent and child ratings of academic competence did not differ for mastery and performance oriented individuals when achievement goal classification was based on the Puzzle Task. When assessment of achievement motivation was based on reports, the results indicated that both child and parent perceptions of achievement motivation were significantly related to children's perceptions of their own academic competence, with higher ratings of achievement motivation being positively related to higher ratings of academic competence.

Teacher ratings and achievement motivation

Teacher ratings and Puzzle Task. Table 14 shows the mean teacher ratings of children's academic performance and classroom behaviors. The academic performance composite score was created from teacher ratings of reading, writing, math, science, and social studies, while classroom behavior ratings were created from speaking, listening, work habits, and conduct. Independent samples t-tests were performed to determine whether mean teacher ratings of academic performance and classroom behavior were different for children classified as mastery or performance on the Puzzle Task. Even though the table suggests that mastery oriented individuals, when scored by the Patel et al. (2007) scoring were rated higher by teachers on academic performance and lower on classroom behavior, results of the analyses indicated no significant differences between mean teacher ratings of mastery and performance oriented individuals. No significant group differences were found on academic performance ratings; (Patel et al. 1st choice

($t(47) = -.04, p > .05$); Patel et al. 2nd choice ($t(47) = -1.15, p > .05$); Smiley and Dweck (1994) 1st choice ($t(47) = .66, p > .05$); and Smiley and Dweck 2nd choice ($t(47) = -.45, p > .05$)), and no significant group differences were found on classroom behavior ratings (Patel et al. 1st choice ($t(47) = .92, p > .05$); Patel et al. 2nd choice ($t(47) = .49, p > .05$); Smiley and Dweck 1st choice ($t(47) = .27, p > .05$); and Smiley and Dweck 2nd choice ($t(47) = -.22, p > .05$)). Hence, our hypothesis suggesting that higher teacher ratings would be positively related to more mastery behaviors was not supported.

Table 14. Mean teacher ratings of children's academic and classroom performance by Puzzle Task

	Patel et al. scoring		Smiley and Dweck Scoring	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
	Teacher Ratings Means			
Academic Performance				
Mastery	15.00 (3.46)	15.77 (3.39)	14.70 (3.42)	15.09 (3.39)
Performance	14.95 (2.94)	14.67 (2.81)	15.27 (2.37)	14.67 (1.80)
Classroom Behavior				
Mastery	11.71 (2.43)	12.08 (2.02)	12.22 (1.95)	12.32 (1.93)
Performance	12.38 (1.67)	12.36 (1.71)	12.36 (1.59)	12.20 (1.42)

Teacher ratings and parent and child report of achievement motivation.

Correlations were performed between teacher ratings of academic performance, teacher ratings of classroom behaviors, and parent/child reports of achievement motivation. Correlations revealed that there were no significant relationships between parent reports of achievement motivation and teacher ratings of academic performance ($r = .20, p > .05$)

or classroom behaviors ($r = .24, p > .05$). Similarly, were no significant relationships were found between children's self-reports of achievement motivation and teacher ratings of academic performance ($r = .21, p > .05$) or classroom behaviors ($r = .21, p > .05$). Overall, we conclude that no relationship was found between achievement motivation and teacher ratings of children's school performance/behavior when assessed by both the behavioral measure and parent/child reports of achievement motivation.

T1 Overall Summary

Achievement motivation

Regarding children's achievement motivation, two key findings were evident. First, the two scoring methods utilized, the Patel et al. (2007) and Smiley and Dweck (1994), produced different proportions of mastery and performance oriented children. In general, the Patel et al. scoring produced a larger number of performance oriented individuals, while the Smiley and Dweck scoring produced a mastery/performance split. Second, classification of achievement motivation on the Puzzle Task, regardless of scoring method was not related to either parent or child reports of achievement motivation.

Achievement motivation and temperament

Overall, few temperament dimensions were related to children's achievement motivation. As reported by previous literature (Posner & Rothbart, 2007; Rothbart & Hwang, 2005), the Approach dimension was positively related with children's mastery goals when scored by the Smiley and Dweck (1994) method. In general, when

classification of children's achievement goals was based on the Puzzle Task, analyses indicated that mastery oriented children were higher on approach behaviors.

Achievement motivation, academic competence, and teacher ratings

Higher levels of academic competence as provided by children and their parents were related to higher levels of mastery behaviors. However, when achievement motivation classification was based on the Puzzle Task, there was no relationship with academic competence reported by children and their parents. Additionally, none of the achievement motivation scores were related to teacher ratings of academic performance and classroom behaviors.

Time 2

Preliminary Analysis: Achievement Motivation

Preliminary analyses were conducted to understand whether the measures used to assess achievement motivation and schooling at T2 were related. Previous literature suggests stability in temperament over time (Buss and Plomin, 1984); due to this, the temperament measure was not assessed again at T2. Additional preliminary analyses evaluated potential differences in the Puzzle Task scoring methodologies (Patel et al., 2007; Smiley and Dweck, 1994).

Puzzle Task: Comparison of Patel et al. (2007) and Smiley and Dweck (1994) scoring methods

Table 15 shows the number of children whose achievement motivation classification was similar or different in the Patel et al. (2007) and Smiley and Dweck

(1994) scoring methods. Two-way contingency table analyses showed that the proportions of mastery and performance oriented children were not the same across the two scoring methods. For the 1st choice, χ^2 (continuity correction) (1, $N = 47$) = 3.24, $p < .07$, $\phi^2 = .11$, $p < .05$; for the 2nd choice, χ^2 (continuity correction) (1, $N = 47$) = 3.13, $p < .07$, $\phi^2 = .10$, $p = .03$. Because the Patel et al. and Smiley and Dweck scoring methods produced different proportions of mastery and performance oriented children, analyses were conducted separately for each scoring method.

Table 15. Number of mastery vs. performance oriented children by scoring method

		Smiley and Dweck Choice 1	
		Mastery	Performance
Patel et al. Choice 1			
	Mastery	4 (19%)	0 (0%)
	Performance	17 (81%)	26 (100%)
		Smiley and Dweck Choice 2	
		Mastery	Performance
Patel et al. Choice 2			
	Mastery	9 (27%)	0 (0%)
	Performance	24 (72%)	14 (100%)

Puzzle Task: Changes in achievement goal orientations from puzzle choice 1 to 2

Table 16 shows the number of children whose achievement goal classification changed from the 1st to the 2nd choice of the Patel et al. (2007) and Smiley and Dweck (1994) scoring methods. Results of the two-way contingency table analyses indicated that children's achievement goal classifications did not change significantly from 1st to 2nd choice for the Patel et al. scoring (χ^2 (with continuity correction) (1, $N = 45$) = .95, $p >$

.05, $\phi^2 = .24$, $p < .10$). However, 1st and 2nd choice were different for the Smiley and Dweck scoring, (χ^2 (with continuity correction) (1, $N = 45$) = 5.80, $p < .05$, $\phi^2 = .40$, $p < .01$). Even though choice 1 and 2 of the Patel et al. scores were not significantly different, all scoring methods were included in the main analyses to account for potential differences.

Table 16. Number of children changing goal orientation from choice 1 to choice 2

		Patel et al. Choice 2	
		Mastery	Performance
Patel et al. Choice 1			
	Mastery	2	2
	Performance	7	36
		Smiley and Dweck Choice 2	
		Mastery	Performance
Smiley and Dweck Choice 1			
	Mastery	19	2
	Performance	14	12

Summary of scoring method analyses

Both scoring methods (Patel et al., 2007 and Smiley and Dweck, 1994) produced different proportions of mastery and performance oriented children. Within the Patel et al. (2007) scoring method, achievement goal classification did not differ from 1st to 2nd choice on the Puzzle Task, but it did differ for the Smiley and Dweck (1994) method. Although the 1st and 2nd choices for the Patel et al. scores were not statistically different, both were included in subsequent analyses to account for potential differences. The main T2 analyses will include 4 different Puzzle Task achievement goals scores for each child

(Patel et al. 1st choice, Patel et al. 2nd choice, Smiley and Dweck 1st choice, and Smiley and Dweck 2nd choice).

Relationships between various achievement motivation measures

Relationships between parent/child reports of achievement motivation with the Puzzle Task. Table 17 shows mean ratings of children's achievement motivation as provided by parents and children. Independent-samples *t*-tests were conducted to evaluate whether mean parent ratings (collected at T1) and child ratings of achievement motivation were different for children classified as mastery or performance on the Puzzle Task. Results of the analyses indicated that parent ratings of achievement motivation did not differ for children classified as mastery or performance (Patel et al. (2007) 1st choice ($t(34) = -1.54, p > .05$); Patel et al. 2nd choice ($t(34) = -1.82, p > .05$); Smiley and Dweck (1994) 1st choice ($t(34) = .38, p > .05$); and Smiley and Dweck 2nd choice ($t(34) = -.70, p > .05$)).

Similarly, results of the analyses indicated that child ratings of achievement motivation did not differ for children classified as mastery or performance (Patel et al. (2007) 1st choice ($t(45) = -.04, p > .05$); Patel et al. 2nd choice ($t(45) = -.73, p > .05$); Smiley and Dweck (1994) 1st choice ($t(45) = -.65, p > .05$); and Smiley and Dweck 2nd choice ($t(45) = -1.07, p > .05$)). Overall, parents and children's reports of achievement motivation were not related to children's achievement goal classification on the Puzzle Task. Because no relationship was found among the various achievement motivation measures (i.e. Puzzle Task, parent report, and child report), all measures were included in

the main analyses.

Table 17. Mean parent ratings by children’s Puzzle Task performance

	Patel et al. scoring 1 st Choice	Patel et al. scoring 2 nd Choice	Smiley and Dweck Scoring 1 st Choice	Smiley and Dweck Scoring 2 nd Choice
Parent Report Means				
Mastery	6.19 (.22)	6.00 (.59)	5.47 (.89)	5.58 (.76)
Performance	5.46 (.80)	5.41 (.81)	5.57 (.72)	5.37(.91)
Child Reports Means				
Mastery	5.54 (.61)	5.63 (.59)	5.58 (.44)	5.58 (.49)
Performance	5.52 (.49)	5.50 (.47)	5.48 (.54)	5.41 (.50)

Relationship between parent and child report of achievement motivation.

Correlations were performed between parent reports (collected at T1) and child reports of achievement motivation. Contrary to T1, results yielded a significant relationship between the two reports ($r = .38, p < .05$) with respective means of 5.56 and 5.53.

However, considering the small correlation, both were included in the main analyses.

Summary of achievement motivation measures

Parent and children’s reports of achievement motivation were not different for children classified as mastery or performance based on the Puzzle Task. A significant relationship was found between parent and child reports of achievement motivation, with both providing ratings indicative of more mastery behaviors. Even though parent and child reports of achievement motivation showed a significant relationship, both will be included in the main analyses to account for any potential differences.

Additional Preliminary Analysis

Age and Gender effects on Achievement Motivation

Age and gender with Puzzle Task classifications. Independent-samples *t*-tests were performed to evaluate whether age played a role in mastery and performance goals. The Patel et al. (2007) 2nd choice scoring method showed significant age differences ($t(45) = -3.43, p < .01$), with mastery oriented children being older than performance oriented individuals (see Table 18). No age differences for mastery and performance oriented individuals were found for the other scores (Patel et al. 1st choice ($t(45) = .08, p > .05$); Smiley and Dweck (1994) 1st choice ($t(45) = 1.39, p > .05$); and Smiley and Dweck 2nd choice ($t(45) = -.23, p > .05$)).

Table 18. Mean age of mastery and performance oriented children

	Patel et al. scoring		Smiley and Dweck Scoring	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
Age in Months				
Mastery	77.00 (2.94)	80.22 (3.38)	76.38 (3.04)	77.52 (3.36)
Performance	77.14 (3.41)	76.39 (2.93)	77.73 (3.51)	76.21 (3.24)

Chi squares were performed to evaluate whether there were significant differences between girls' and boys' achievement goal orientations. The analyses indicated that there were no gender differences for either scoring method or choice on any scoring method (Patel et al. (2007) 1st choice ($\chi^2 (1, N = 45) = .01, p > .05$); Patel et al. 2nd choice ($\chi^2 (1, N = 45) = .34, p > .05$); Smiley and Dweck (1994) choice 1 ($\chi^2 (1, N = 45) = .01, p > .05$);

and Smiley and Dweck choice 2 ($\chi^2(1, N = 45) = .13, p > .05$). No gender differences were found for achievement goal classifications based on the Puzzle Task.

Age and gender with child report of achievement motivation. Age and gender were correlated with children's self-report of achievement motivation. Results of these analyses indicated that neither age ($r = .25, p > .05$) nor gender (Spearman's $r = -.04, p > .05$) were significantly related to child reports of achievement motivation.

Summary of age and gender analyses

When classification of achievement goals was based on the Puzzle Task, the Patel et al. (2007) 2nd choice scoring method indicated that mastery oriented children were older than performance oriented children; all other scoring methods produced no effect of age, with no effect of gender on all four scoring methods. When achievement motivation was based on child reports of achievement motivation, no effects of age or gender were found.

Main Analyses T2

This section provides a series of analyses showing the relationships between the three major constructs – achievement motivation, temperament, and schooling, with all measures of assessment – the Puzzle Task, temperament reports provided by parents and children, academic performance ratings provided by teachers, and academic competence ratings provided by parents, and children. The analyses focus on (1) the proportion of mastery and performance oriented children at the end of first grade, (2) the effects of

temperament on achievement motivation, and (3) the effects of schooling on achievement motivation.

Achievement motivation at T2

Proportions based on the Puzzle Task. Table 19 presents the proportions of children classified as mastery or performance oriented by the Patel et al. (2007) and Smiley and Dweck (1994) scoring methods. The Patel et al. scoring method yielded a much larger number of performance oriented children regardless of puzzle choice than the Smiley and Dweck scoring method. The Smiley and Dweck scoring method yielded slightly more performance oriented individuals for choice 1 than for choice 2, and a larger number of mastery oriented children for choice 2. In general, both scoring methods yielded a larger number of performance oriented children for choice 1 than for choice 2. For the following sections, it is important to note that due to small cell sizes for the Patel et al. (2007) 1st choice scoring method, subsequent analyses conducted with this method were exploratory in nature.

Table 19. Percentage and number of mastery versus performance children at T2 by scoring method

	Patel et al.		Smiley and Dweck	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
% Mastery	8.5% (4)	19.1% (9)	44.7% (21)	70.2% (33)
% Performance	91.5% (43)	80.9% (38)	55.3% (26)	29.8% (14)

Child and parent reports of achievement motivation. As noted previously, child reports of achievement motivation taken at T2 were correlated with parent reports assessed at T1 ($r = .38, p < .05$). Scores typically fell on the mastery end of the 7-point continuum; child at T2 ($M = 5.53, SD = .49$); parent at T1 ($M = 5.56, SD = .83$). These findings reveal that when assessment is based on self-report, even at the end of first grade, children continue to provide ratings that indicate more mastery behaviors.

Summary of achievement motivation at T2

Puzzle Task classification of achievement goals yielded contrary findings for each scoring method; the Patel et al. (2007) scoring yielded more performance oriented children, while the Smiley and Dweck method yielded more performance oriented individuals for the 1st choice, and a larger number of mastery oriented children for the 2nd choice. Parent and child reports of achievement motivation indicated greater mastery behaviors.

Relationship between Achievement Motivation at T2 and Temperament Ratings from T1

Multivariate analyses of variance (MANOVAs) were performed to investigate differences between mastery and performance oriented children on various temperament scores. For all of the following MANOVAs, the temperament composite terms were analyzed first; then separate MANOVAs were run for the temperament interaction terms.

The relationship between achievement motivation and parent report of temperament. MANOVAs were conducted to examine group differences in achievement

motivation on three temperament composite scores as provided by parent reports (Effortful Control, Negative Affectivity, and Surgency) (see Tables 20 and 21). The overall MANOVAs were not significant for three of the analyses (Patel et al. (2007) 1st choice (Pillai's $F(1, 45) = .74, p > .05$); Smiley and Dweck (1994) 1st choice (Pillai's $F(1, 45) = 1.00, p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(1, 45) = 1.27, p > .05$)). However, the overall MANOVA for the Patel et al. 2nd choice was significant (Pillai's $F(1, 45) = 3.37, p < .05$). As hypothesized, univariate analyses for Patel et al. 2nd choice showed group differences for effortful control, with mastery oriented children having higher levels of effortful control than performance oriented children (see Table 20).

The overall MANOVA conducted separately on the three temperament interaction terms (Effortful Control x Negative Affectivity, Effortful Control x Surgency, and Negative Affectivity x Surgency) was marginally significant for the Patel et al. (2007) 2nd choice scoring (Pillai's $F(3, 43) = 2.57, p < .07$). Univariate analyses showed that the effortful control x negative affectivity interaction was significant ($F(1, 45) = 5.75, p < .05$). This interaction showed that children with a mastery goal orientation who were low on effortful control had higher levels of negative affectivity ($t(20) = -2.03, p < .05$) than did performance oriented children who were low on effortful control. There were no differences on negative affectivity for mastery and performance oriented groups for children who were higher on effortful control ($t(20) = -.39, p > .05$) (see Figure 1).

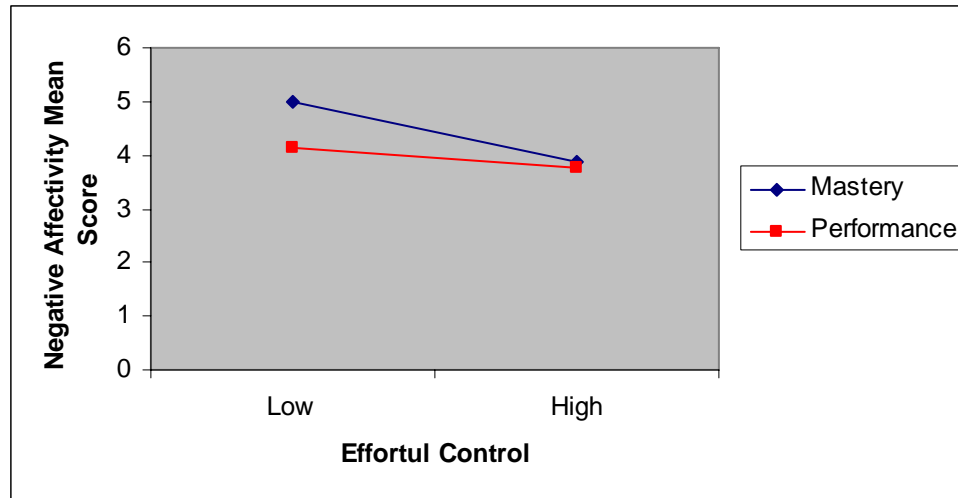


Figure 1. Interaction effect for high vs. low effortful control X mean negative affectivity scores for children classified as mastery or performance oriented (Patel et al. (2007) 2nd choice)

The overall MANOVA on the three interaction terms for the temperament composite scores for the Smiley and Dweck (1994) 1st choice was not significant (Pillai's $F(3, 43) = 1.55, p > .05$); however, the univariate analyses revealed a negative affectivity x surgency interaction ($F(1, 45) = 4.02, p < .05$). This interaction shows that children with a mastery goal orientation who were high on surgency had higher levels of negative affectivity ($t(21) = -2.46, p < .05$) than did performance oriented children who were high on surgency. There were no significant differences on negative affectivity between mastery and performance oriented groups for children who were low on surgency ($t(22) = .85, p > .05$) (see Figure 2).

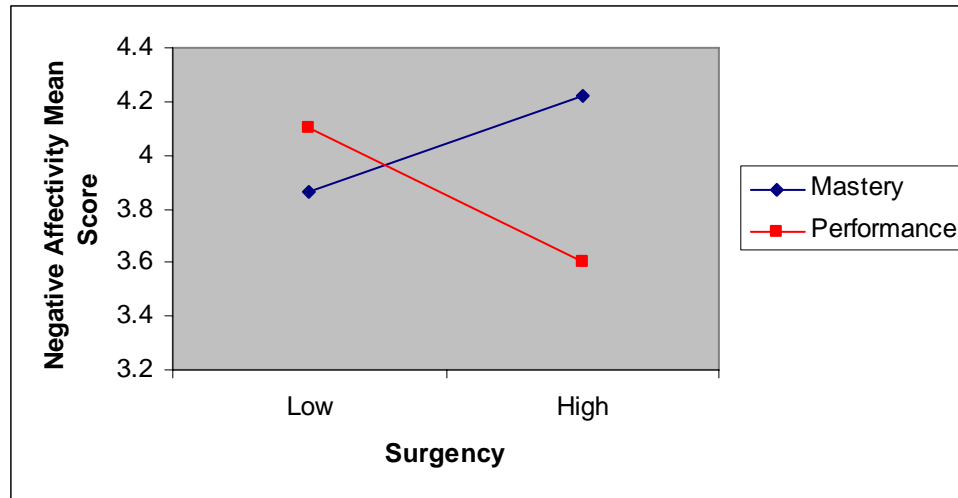


Figure 2. Interaction effect for high vs. low surgency X mean negative affectivity scores for children classified as mastery vs. performance oriented (Smiley and Dweck (1994) 1st choice)

MANOVAs were also conducted to look at group differences in achievement motivation on 15 individual dimensions of temperament as provided by parent reports (see Tables 20 and 21). Again, the overall MANOVAs were not significant (Patel et al. (2007) 1st choice (Pillai's $F(1, 45) = 1.75, p > .05$); Patel et al. 2nd choice (Pillai's $F(1, 45) = 1.16, p > .05$); Smiley and Dweck (1994) 1st choice (Pillai's $F(1, 45) = 1.25, p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(1, 45) = 1.26, p > .05$)).

However, univariate analyses revealed group differences for some individual temperament dimensions. According to parent reports of children's temperament, the Patel et al. 1st choice scoring revealed that mastery individuals enjoyed high intensity pleasure activities more than performance oriented individuals, and the Patel et al. 2nd choice scoring indicated that mastery individuals had higher levels of attentional focusing than their performance oriented counterparts. The Smiley and Dweck 1st choice scoring

revealed that mastery individuals had higher levels of approach, smiling, and activity level than performance oriented individuals, while the Smiley and Dweck 2nd choice scoring indicated that mastery individuals displayed higher levels of approach, smiling, and discomfort.

Table 20. Mean parent temperament ratings on the Puzzle Task Patel et al. (2007) scoring method

	Patel et al. Choice 1			Patel et al. Choice 2		
	Mastery	Performance	F	Mastery	Performance	F
Composites Scores						
Effortful control	4.88 (.90)	5.26 (.58)	1.42	5.69 (.55)	5.11 (.57)	7.38**
Negative affectivity	4.16 (1.04)	3.97 (.67)	1.85	4.11 (.80)	3.96 (.61)	.42
Surgency	4.71 (1.19)	4.19 (.70)	.31	4.03 (.87)	4.28 (.72)	.85
Effortful control x surgency			.12			.53
Effortful control x negative affectivity			.28			5.75*
Negative affectivity x surgency			2.74			.00
Individual Dimensions						
Activity level	5.17 (1.32)	4.37 (.90)	2.32	3.92 (.84)	4.55(.94)	3.39 [†]
Anger/frustration	4.59 (1.44)	4.08 (1.09)	.00	4.01 (1.41)	4.10 (1.08)	.04
Approach	5.29 (.48)	4.94 (.80)	.75	5.17 (.69)	4.93 (.79)	.71
Attentional focusing	4.83 (1.34)	4.92 (.97)	.03	5.50 (1.02)	4.77 (.94)	4.21*
Discomfort	5.04 (1.17)	4.16 (.95)	3.05 [†]	4.57 (1.16)	4.16 (.94)	1.30
Falling reactivity/soothability	5.46 (1.00)	4.80 (.94)	1.79	4.94 (1.15)	4.84 (.91)	.09
Fear	4.21 (1.55)	4.15 (1.18)	.00	4.55 (1.04)	4.06 (1.22)	1.23
High intensity pleasure	5.46 (.70)	4.40 (.86)	5.67*	4.54 (.82)	4.48 (.92)	.03
Impulsivity	4.33 (1.64)	3.88 (1.02)	.66	3.52 (1.11)	4.01 (1.05)	1.54
Inhibitory control	4.25 (1.42)	5.00 (.97)	2.06	5.50 (1.13)	4.81 (.95)	3.58 [†]
Low intensity pleasure	5.52 (.44)	5.53 (.84)	.00	5.95 (.30)	5.43 (.86)	3.13 [†]
Perceptual sensitivity	4.92 (1.50)	5.57 (.77)	2.20	5.79 (.59)	5.45 (.90)	1.22
Sadness	4.93 (.83)	4.27 (.83)	2.35	4.38 (.62)	4.31 (.89)	.05
Shyness	4.04 (1.79)	3.88 (1.22)	.06	3.87 (1.22)	3.91 (1.28)	.00
Smile	6.21 (.82)	5.62 (.87)	1.78	5.91 (.90)	5.61 (.84)	.86

8. < .05, ** < .01, [†] < .10

Table 21. Mean parent temperament ratings on the Puzzle Task Smiley and Dweck (1994) scoring method

	Smiley and Dweck Choice 1			Smiley and Dweck Choice 2		
	Mastery	Performance	F	Mastery	Performance	F
Composites Scores						
Effortful control	5.10 (.57)	5.32 (.62)	1.55	5.30 (.60)	5.05 (.49)	1.61
Negative affectivity	4.08 (.73)	3.91 (.57)	.81	4.05 (.67)	3.84 (.56)	1.11
Surgency	4.41 (.87)	4.09 (.60)	2.29	4.18 (.77)	4.37 (.70)	.62
Effortful control x surgency			.50			.00
Effortful control x negative affectivity			.07			3.15 [±]
Negative affectivity x surgency			4.02*			.02
Individual Dimensions						
Activity level	4.76 (.98)	4.16 (.82)	5.14*	4.42 (.98)	4.45 (.88)	.01
Attentional focusing	4.74 (1.04)	5.05 (.94)	1.56	5.01 (.99)	4.69 (1.00)	1.00
Anger/frustration	4.06 (1.33)	4.10 (.96)	.02	4.03 (1.25)	4.38 (.85)	.22
Approach	5.23 (.73)	4.76 (.76)	4.60*	5.18 (.61)	4.47 (.90)	9.79**
Discomfort	4.33 (1.09)	4.17 (.90)	.29	4.44 (1.07)	3.76 (.50)	5.12*
Falling reactivity/soothability	4.80 (1.02)	4.90 (.91)	.16	4.87 (.89)	4.83 (1.12)	.02
Fear	4.45 (1.26)	3.91 (1.10)	2.42	4.33 (1.24)	3.74 (1.01)	2.52
High intensity pleasure	4.71 (.98)	4.31 (.79)	2.35	4.45 (.94)	4.56 (.80)	.15
Impulsivity	4.18 (1.18)	3.70 (.93)	2.44	3.81 (1.12)	4.17 (.91)	1.10
Inhibitory control	4.75 (.87)	5.10 (1.11)	1.40	5.06 (.95)	4.65 (1.14)	1.59
Low intensity pleasure	5.45 (.49)	5.59 (1.00)	.34	5.54 (.86)	5.52 (.70)	.00
Perceptual sensitivity	5.47 (.99)	5.55 (.74)	.09	5.58 (.87)	5.35 (.81)	.74
Sadness	4.38 (1.13)	4.28 (.51)	.17	4.33 (.92)	4.32 (.64)	.00
Shyness	3.99 (1.28)	3.82 (1.25)	.22	3.97 (1.24)	3.71 (1.31)	.41
Smile	5.94 (.67)	5.46 (.93)	3.99*	5.86 (.67)	5.21 (1.06)	6.44*

9. < .05, ** < .01, [±] < .10

The relationship between achievement motivation and child reports of temperament. MANOVAs were conducted to examine group differences in achievement motivation on temperament composite scores as provided by child reports (see Tables 22 and 23). The overall MANOVAs were not significant (Patel et al. (2007) 1st choice (Pillai's $F(1, 45) = .16, p > .05$); Patel et al. 2nd choice (Pillai's $F(1, 45) = .11, p > .05$); Smiley and Dweck (1994) 1st choice (Pillai's $F(1, 45) = 1.19, p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(1, 45) = .24, p > .05$)). Univariate analyses also yielded non-significant findings. Additionally, separate MANOVAs examining differences in

achievement goals on the temperament interaction terms were not significant for any of the scoring methods.

Additionally, MANOVAs were conducted to look at group differences in achievement motivation on various individual dimensions of temperament as provided by child reports (see Tables 22 and 23). The overall MANOVAs were not significant (Patel et al. (2007) 1st choice (Pillai's $F(1, 45) = 1.06, p > .05$); Patel et al. 2nd choice (Pillai's $F(1, 45) = .46, p > .05$); Smiley and Dweck (1994) 1st choice (Pillai's $F(1, 44) = .63, p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(1, 45) = 1.04, p > .05$)). Univariate analyses revealed that the Patel et al. (2007) 1st choice method indicated that mastery oriented individuals had lower levels of shyness than performance oriented individuals.

Table 22. Mean child temperament ratings on the Puzzle Task Patel et al. (2007) scoring method

	Patel et al. Choice 1			Patel et al. Choice 2		
	Mastery	Performance	F	Mastery	Performance	F
Composites Scores						
Effortful control	4.79 (.90)	4.37 (1.14)	.50	4.37 (1.08)	4.42 (1.15)	.01
Negative affectivity	3.95 (.53)	3.94 (.71)	.02	4.06 (.42)	3.92 (.74)	.03
Surgency	3.96 (.51)	3.93 (.55)	.00	3.95 (.48)	3.92 (.57)	.31
Effortful control x surgency			.21			.00
Effortful control x negative affectivity			.20			.05
Negative affectivity x surgency			.03			.32
Individual Dimensions						
Activity level	3.33 (1.09)	3.39 (.96)	.01	3.37 (1.01)	3.39 (.97)	.00
Anger/frustration	3.50 (1.00)	4.00 (1.59)	.38	4.06 (1.45)	3.93 (1.59)	.04
Attentional focusing	5.75 (.74)	4.80 (1.33)	1.96	4.85 (1.23)	4.88 (1.35)	.01
Discomfort	3.08 (.50)	3.82 (1.30)	1.25	3.63 (1.22)	3.79 (1.30)	.11
Falling reactivity/soothability	3.00 (2.00)	3.52 (1.49)	.43	3.17 (.112)	3.55 (1.61)	.46
Fear	4.50 (1.00)	3.45 (1.52)	1.80	3.33 (1.32)	3.59 (1.56)	.21
High intensity pleasure	4.33 (.72)	5.00 (1.21)	1.16	5.07 (.72)	4.91 (1.28)	.13
Impulsivity	3.33 (1.09)	3.84 (1.09)	.80	3.81 (.78)	3.80 (1.16)	.00
Inhibitory control	4.50 (1.37)	4.39 (1.44)	.02	4.70 (1.24)	4.32 (1.46)	.52
Low intensity pleasure	4.08 (1.69)	3.88 (1.55)	.07	3.63 (1.58)	3.96 (1.55)	.32
Perceptual sensitivity	4.83 (1.58)	4.43 (1.55)	.24	4.30 (1.67)	4.51 (1.53)	.14
Sadness	3.66 (.66)	3.96 (1.31)	.20	4.44 (1.04)	3.82 (1.30)	1.82
Shyness	3.17 (.33)	4.54 (1.35)	4.05*	4.44 (1.49)	4.42 (1.34)	.00

10. < .05

Table 23. Mean child temperament ratings on the Puzzle Task Smiley and Dweck (1994) scoring method

	Smiley and Dweck Choice 1			Smiley and Dweck Choice 2		
	Mastery	Performance	F	Mastery	Performance	F
Composite Scores						
Effortful control	4.52 (1.09)	4.32 (1.16)	.38	4.49 (1.04)	4.21 (1.32)	.60
Negative affectivity	4.10 (.70)	3.75 (.64)	.12	3.97 (.68)	3.88 (.73)	.01
Surgency	3.96 (.51)	3.90 (.58)	2.98 [±]	3.93 (.54)	3.92 (.55)	.17
Effortful control x surgency			.35			.45
Effortful control x negative affectivity			.32			.68
Negative affectivity x surgency			1.47			.08
Individual Dimensions						
Activity level	3.44 (.94)	3.33 (1.00)	.15	3.55 (.84)	3.00 (1.15)	3.31 [±]
Anger/frustration	3.76 (1.37)	4.11 (1.69)	.60	3.86 (1.55)	4.18 (1.58)	.40
Attentional focusing	5.06 (1.17)	4.73 (1.42)	.74	4.91 (1.23)	4.81 (1.55)	.06
Discomfort	3.75 (1.34)	3.77 (1.24)	.00	3.92 (1.29)	3.38 (1.18)	1.80
Falling reactivity/soothability	3.83 (1.67)	3.19 (1.36)	2.11	3.29 (1.41)	3.93 (1.72)	1.77
Fear	3.48 (1.54)	3.60 (1.51)	.07	3.41 (1.40)	3.86 (1.75)	.87
High intensity pleasure	4.98 (1.04)	4.91 (1.32)	.04	4.88 (1.24)	5.10 (1.10)	.32
Impulsivity	3.90 (1.08)	3.72 (1.12)	.33	3.73 (1.23)	3.98 (1.03)	.51
Inhibitory control	4.40 (1.40)	4.40 (1.46)	.00	4.54 (1.37)	4.07 (1.52)	1.05
Low intensity pleasure	4.10 (1.55)	3.73 (1.56)	.64	3.98 (1.49)	3.69 (1.71)	.34
Perceptual sensitivity	4.54 (1.49)	4.41 (1.61)	.08	4.55 (1.50)	4.28 (1.68)	.28
Sadness	3.62 (1.18)	4.19 (1.30)	2.45	3.95 (1.19)	3.90 (1.48)	.01
Shyness	4.51 (1.25)	4.51 (1.25)	.14	4.43 (1.40)	4.41 (1.28)	.00

[±] < .10

Based on results from the MANOVAs, correlations were calculated on the variables that were significant or showed trends (Table 24). In general, five trends were evident when analyzing the relationship between temperament and achievement motivation; (1) the 2nd choice of both scoring systems produced more significant relationships between achievement motivation and parent rated temperament; (2) the Patel et al. (2007) 2nd choice scoring indicated that parents rated children classified as mastery higher on effortful control and various related dimensions; (3) the Smiley and

Dweck (1994) scoring indicated that parents rated children classified as mastery higher in approach behaviors and activity level; (4) as at T1, when temperament was rated by the child, no differences were found between mastery and performance oriented individuals on temperament; and (5) interactions between temperament and achievement motivation revealed that high negative affectivity was related to mastery goals for children low on effortful control and for children high on surgency.

Table 24. Correlations of achievement motivation assessed by the Puzzle Task and parent/child temperament ratings

Variable	Spearman's rho
Patel et al. (choice 1)	
Discomfort (parent report)	.22
High intensity pleasure (parent report)	.34*
Shyness (child report)	-.32*
Patel et al. (choice 2)	
Effortful Control (parent report)	.40**
Activity Level (parent report)	-.27
Attentional Focusing (parent report)	.32*
Inhibitory control (parent report)	.32*
Low Intensity Pleasure (parent report)	.35*
Smiley & Dweck (choice 1)	
Activity Level (parent report)	.29*
Approach (parent report)	.25
Smiling (parent report)	.28 [±]
Surgency (child report)	.00
Smiley & Dweck (choice 2)	
Approach (parent report)	.39**
Discomfort (parent report)	.36*
Smiling (parent report)	.31*
Activity Level (child report)	.24

* < .05, ** < .01, [±] < .06

Achievement motivation reports and temperament

Correlations were calculated between child reports of achievement motivation from T2 and parent reports of temperament from T1. Only attentional focusing revealed a relationship ($r = .47, p < .01$), with children who rated themselves as more mastery having parents who rated them as having higher levels of attentional focusing. In general, parent reports of temperament did not capture differences in children's self-report of achievement motivation.

Summary of the relationship between achievement motivation and temperament

When assessment of achievement motivation was based on the Puzzle Task, parent reports of temperament indicated several achievement motivation group differences. For the Patel et al. 1st choice, mastery individuals had higher levels of high intensity pleasure. For the Patel et al. 2nd choice scoring method, mastery individuals had higher levels of effortful control, attentional focusing, inhibitory control, and lower intensity pleasure. For the Smiley and Dweck scoring method, mastery individuals had higher approach and activity level.

Interactions between the various temperament composites indicated that (1) when achievement goals were classified using the Patel et al (2007) 2nd choice scoring method, children with a mastery goal orientation who were low on effortful control had higher levels of negative affectivity compared to those who were classified as performance oriented who were low on effortful control, and (2) when achievement goals were classified using the Smiley and Dweck 1st choice scoring method, children with a mastery

goal orientation who were high on surgency had higher levels of negative affectivity than did performance oriented children who were high on surgency.

The relationship between achievement motivation and perceptions of child academic competence by parents and children

The relationship between achievement motivation based on the Puzzle Task and parent ratings of academic competence. Independent-samples *t*-tests were performed to determine whether mean parent ratings of academic competence assessed at T1 were different for mastery and performance oriented individuals. Table 25 shows the mean parent ratings of children's academic competence. When achievement motivation was scored by the Patel et al. (2007) method, parents rated mastery children as higher on academic competence (1st choice ($t(33) = -2.17, p < .05$); 2nd choice ($t(33) = -2.22, p < .05$)). This finding is contrary to our hypothesis which predicted that performance oriented individuals would be rated higher in academic competence. When assessed by the Smiley and Dweck (1994) method, no group differences were found for academic competence; 1st choice ($t(33) = -.16, p > .05$); and 2nd choice ($t(33) = -1.63, p > .05$). In general, the Patel et al. method indicated that mastery oriented individuals had parents who perceived them as having higher levels of academic competence.

The relationship between achievement motivation based on the Puzzle Task and child ratings of academic competence. Independent-samples *t*-tests were performed to determine whether there were group differences between mastery and performance oriented children on children's ratings of academic competence (both assessed at T2).

Table 25 shows the mean child ratings of their own academic competence. Independent samples t-tests produced no statistically significant differences on children's ratings of academic competence for mastery and performance oriented individuals; Patel et al. (2007) 1st choice ($t(45) = -.80, p > .05$); Patel et al. 2nd choice ($t(45) = -1.31, p > .05$); Smiley and Dweck (1994) 1st choice ($t(45) = .22, p > .05$); and Smiley and Dweck 2nd choice ($t(45) = -1.56, p > .05$).

Table 25. Means for report of children's academic competence by Puzzle Task

	Patel et al. scoring		Smiley and Dweck Scoring	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
Academic Competence Means				
Parent Report				
Mastery	6.50 (.17)	6.21 (.47)	5.75 (.67)	5.85 (.64)
Performance	5.67 (.65)	5.62 (.67)	5.72 (.69)	5.45 (.69)
Child Report				
Mastery	5.63 (.44)	5.63 (.41)	5.33 (.66)	5.46 (.62)
Performance	5.33 (.71)	5.29 (.74)	5.38 (.73)	5.12 (.82)

The relationship between parent report of achievement motivation and children's report of academic competence. A significant correlation was observed between parent reports of achievement motivation assessed at T1, and children's self-reports of academic competence assessed at T2 ($r = .32, p < .06$). This result indicates that parents who perceived their children as having higher mean levels of mastery behaviors ($M = 5.56, SD = .82$) at T1 had children who provided higher mean ratings of their own academic competence ($M = 5.36, SD = .70$) at T2. In general, results indicated that parent reports of achievement motivation showed a relationship with children's perceptions of their own

academic competence; however, children's reports of academic competence were not related to their own reports of achievement motivation.

The relationship between child report of achievement motivation and children's report of academic competence. Contrary to T1 findings, children's self-reports of achievement motivation and academic competence at T2 were not significantly related ($r = .18, p > .05$). Although children's mean ratings of achievement motivation ($M = 5.53, SD = .49$) were similar to their mean ratings of academic competence ($M = 5.36, SD = .70$), the correlations were not significant.

Summary of the relationship between achievement motivation and academic competence

When classification of achievement goals was based on the Patel et al. (2007) scoring method, children classified as mastery oriented had parents who perceived them as having higher levels of academic competence. When assessment of achievement motivation was based on parent ratings, more mastery behaviors were positively related to children's self-ratings of academic competence. Child ratings of achievement motivation were not related to child ratings of their own academic competence.

The relationship between achievement motivation and teacher ratings

Teacher ratings and Puzzle Task. Table 26 shows the mean teacher ratings of children's academic performance and classroom behaviors. Independent samples t -tests were performed to determine whether mean teacher ratings of academic performance and

classroom behaviors were different for children classified as mastery or performance on the Puzzle Task. Even though the table suggests that mastery oriented individuals were rated higher by teachers on academic performance regardless of scoring method, results of the analyses indicated no significant differences between mean teacher ratings of mastery and performance oriented individuals. Contrary to our prediction that mastery oriented individuals would have higher teacher ratings, no significant group differences were found on either academic performance or classroom behavior ratings. Results from the academic ratings were not significant (Patel et al. (2007) 1st choice ($t(45) = -1.25, p > .05$); Patel et al. 2nd choice ($t(45) = -1.60, p > .05$); Smiley and Dweck (1994) 1st choice ($t(45) = -.12, p > .05$); and Smiley and Dweck 2nd choice ($t(45) = -.88, p > .05$)). Similarly, results from the classroom behavior ratings were non-significant (Patel et al. 1st choice ($t(45) = .14, p > .05$); Patel et al. 2nd choice ($t(45) = -1.70, p > .05$); Smiley and Dweck 1st choice ($t(45) = 1.26, p > .05$); and Smiley and Dweck 2nd choice ($t(47) = -.11, p > .05$)). The lack of significance for the Patel et al. scoring method may be due to small cell sizes for the mastery group (mastery oriented individuals by 1st choice, $N = 4$; 2nd choice, $N = 9$).

Table 26. Mean teacher ratings of children’s academic and classroom performance by Puzzle Task

	Patel et al. scoring		Smiley and Dweck Scoring	
	1 st Choice	2 nd Choice	1 st Choice	2 nd Choice
Teacher Ratings Means				
Academic Performance				
Mastery	17.75 (3.77)	17.33 (3.77)	15.81 (2.68)	16.03 (3.59)
Performance	15.56 (3.33)	15.37 (3.22)	15.69 (3.91)	15.07 (2.81)
Classroom Behavior				
Mastery	12.75 (1.50)	14.11 (2.93)	12.43 (1.80)	12.94 (2.47)
Performance	12.93 (2.47)	12.63 (2.20)	13.31 (2.75)	12.86 (2.28)

Teacher ratings and parent and child report of achievement motivation.

Correlations were calculated for the following; teacher ratings of academic performance and parent reports of achievement motivation; teacher ratings of academic performance and child reports of achievement motivation; teacher ratings of classroom behaviors and parent reports of achievement motivation; and teacher ratings of classroom behaviors and child reports of achievement motivation. Correlations revealed that there were significant relationships between parent reports of achievement motivation (assessed at T1) and teacher ratings of academic performance ($r = .34, p < .05$), but not for classroom behaviors ($r = .25, p > .05$). Similarly, significant relationships were found between children’s self-reports of achievement motivation and teacher ratings of academic performance ($r = .34, p < .05$); however, not for classroom behaviors ($r = .15, p > .05$). Overall, we conclude that children who had higher levels of achievement motivation, indicating more mastery goals, as per both parent and child reports, had higher teacher rated academic performance.

T2 Overall Summary

Achievement motivation

Regarding children's achievement motivation, two key findings were evident at T2. First, the two scoring methods utilized (Patel et al. (2007), and Smiley and Dweck (1994)) produced different proportions of mastery and performance oriented children than at T1. The Patel et al. scoring produced a larger proportion of performance oriented individuals for both choices, while the Smiley and Dweck scoring produced slightly more performance oriented individuals for choice 1. Second, similarly to T1, classification of achievement motivation on the Puzzle Task, regardless of scoring method was not related to either parent or child reports of achievement motivation.

Achievement motivation and temperament

In general, more temperament dimensions were related to children's achievement motivation at T2 than at T1. In particular, effortful control and attention started to emerge as a factor in achievement motivation when scored by the Patel et al. (2007) 2nd choice method, with mastery individuals having higher levels of effortful control. As suggested by Rothbart and Jones (1998), with development, children's capacity for effortful control also increases, which has direct links to children's attentional abilities. Children high in effortful control are better able to use attention to generate possible solutions, inhibit task-irrelevant thoughts, and persist in response to failure feedback (Rothbart & Ahadi, 1994).

Approach remained a factor in achievement motivation when scored by either choice of the Smiley and Dweck (1994) method, with mastery individuals exhibiting

higher levels of approach behaviors. As reported by previous literature (Posner & Rothbart, 2007; Rothbart & Hwang, 2005), the Approach dimension is positively related to children's mastery goals, allowing children to approach or inhibit approach depending on the situation.

Additionally, interactions between temperament and achievement motivation indicated that there were multiple mechanisms linking temperament to achievement motivation. Interactions between the various temperament composites indicated that (1) when achievement goals were classified using the Patel et al (2007) 2nd choice scoring method, mastery oriented children who were low on effortful control had higher levels of negative affectivity compared to those who were classified as performance oriented who were low on effortful control, and (2) when achievement goals were classified using the Smiley and Dweck 1st choice scoring method, mastery oriented children who were high on surgency had higher levels of negative affectivity than did performance oriented children who were high on surgency.

Achievement motivation, academic competence, and teacher ratings

Contrary to T1, at T2 when classification of achievement motivation was based on the Puzzle Task (Patel et al. (2007) scoring), those children who were classified as mastery oriented were rated higher on academic competence by parents. This indicates that by the end of first grade mastery and performance oriented individuals are perceived as differing in academic competence, with mastery individuals rated by parents as having higher levels of academic competence. Also contrary to T1, both parent and child reports of achievement motivation were positively related to teacher ratings of academic

performance, with more mastery oriented behaviors yielding higher academic performance ratings by teachers.

At the end of first grade

Overall, at the end of first grade children who are classified as mastery oriented typically (1) reduce in proportion, (2) display higher levels of effortful control and approach behaviors, (3) display higher levels of negative affectivity when they are low on effortful control, and also when they are higher on surgency, and (4) have parents who perceive them as more academically competent and teachers who rate them as having higher levels of academic performance.

Change Over Time Results

This section provides a series of analyses evaluating changes in achievement motivation over time, and the impacts that temperament and schooling have on these changes. Although previous literature has identified that a change in achievement goals occurs among young children (Chang & Burns, 2005; Patel et al., 2007; Smiley & Dweck, 1994; Ziegert et al., 2001), there is a lack of research examining changes in achievement motivation from the beginning of elementary school. The following results examine the changes in achievement motivation over time, with a particular focus on the various relationships between changes in achievement motivation, temperament, and academic performance. The results also include a section on the interaction between temperament and academic performance, as research indicates that even though

temperament is fairly stable, it may interact with the school context to change (Carey, Fox, & McDevitt, 1977; Fox & Field, 1988).

Changes in achievement goals from T1 to T2

Table 27 shows the number of children whose achievement motivation classification changed from T1 to T2 in the two scoring methods (i.e. Patel et al. (2007) and Smiley and Dweck (1994)). The Patel et al. 1st choice scoring method indicated that 10.6% of children changed from T1 to T2, with 57.1% of the children who were mastery oriented at T1 changing to performance goals at T2, while only 2.5% of children who were performance changed to mastery goals. Results from the Binomial test indicated that these percentages were significantly different from each other ($p < .01$, *Binomial test*). The Patel et al. 2nd choice scoring method indicated that 29.8% of children changed their goal orientation from T1 to T2, with 69.2% of those individuals classified as mastery at T1 changing to performance goals at T2, while only 14.7% of children who were performance changed to mastery goals; however, these percentages were not significantly different from each other ($p = .42$, *McNemar test*).

Similarly, the Smiley and Dweck 1st choice indicated that 46.8% of children changed their goal orientation from T1 to T2, with 51.9% of those individuals classified as mastery at T1 changing to performance goals at T2, while 40% changed from performance to mastery goals; these percentages were not significantly different from each other ($p = .29$, *McNemar test*). Lastly, the Smiley and Dweck 2nd choice indicated that 23.4% of children changed their goal orientation from T1 to T2, with 17.6% of those

individuals classified as mastery at T1 changing to performance goals at T2, while 38.5% changed from performance to mastery goals; these percentages were not significantly different from each other ($p = 1.00$, *McNemar test*). Although changes in the percentages of mastery and performance oriented children were not significant for most of the scoring methods, the overall results suggest that a larger proportion of children changed from mastery goals at T1 to performance goals at T2. For the following sections, it is important to note that because there were a limited number of children who changed their achievement goal orientations from T1 to T2 with the Patel et al. (2007) scoring method, analyses conducted with this method were exploratory in nature.

Table 27. Number of mastery vs. performance oriented children changing from T1 to T2

		T2 Patel et al. Choice 1	
		Mastery	Performance
T1 Patel et al. Choice 1			
	Mastery	3	4
	Performance	1	39
		T2 Patel et al. Choice 2	
		Mastery	Performance
T1 Patel et al. Choice 2			
	Mastery	4	9
	Performance	5	29
		T2 Smiley and Dweck Choice 1	
		Mastery	Performance
T1 Smiley and Dweck Choice 1			
	Mastery	13	14
	Performance	8	12
		T2 Smiley and Dweck Choice 2	
		Mastery	Performance
T1 Smiley and Dweck Choice 2			
	Mastery	28	6
	Performance	5	8

Relationship between child reports of achievement motivation over time

Paired-samples t-tests were conducted to evaluate whether child reports of achievement motivation changed from T1 to T2. The results indicated that the mean rating of achievement motivation at T1 ($M = 5.68$, $SD = .45$) was not significantly different than the mean at T2 ($M = 5.53$, $SD = .49$) ($t(46) = 1.58$, $p > .05$). Child reports of achievement motivation did not change significantly from T1 to T2.

Summary of changes in achievement motivation over time

More children changed from mastery to performance goals over the course of first grade when assessment was based on the Puzzle Task for all scoring methods except the Smiley and Dweck 2nd choice scoring, in which more children became mastery oriented. Child reports of achievement motivation did not change significantly from T1 to T2.

Effects of parent rated temperament on changes in achievement goals classified by the Puzzle Task

One-factor MANOVAs were conducted to evaluate whether changes in achievement motivation as assessed by the Puzzle Task were related to parent temperament ratings (composite scores). Change categories were created from T1 to T2 for the various Puzzle Task scores with changes from mastery to performance, performance to mastery, and those who remained mastery and those who remained performance. Because only one child changed from mastery to performance goals when classification of achievement goals was based on the Patel et al. (2007) 1st choice scoring

method, the change from mastery to performance is not included in analyses using this scoring method. The overall MANOVAs were not significant; Patel et al. 1st choice (Pillai's $F(6, 84) = .71, p > .05$); Patel et al. 2nd choice (Pillai's $F(9, 129) = 1.22, p > .05$); Smiley and Dweck 1st choice (Pillai's $F(9, 129) = .37, p > .05$); and Smiley and Dweck 2nd choice (Pillai's $F(9, 129) = .80, p > .05$) (see Table 28). Overall, changes in achievement motivation were not reflected in parent composite temperament ratings.

Additionally, four one-factor MANOVAs were conducted to examine the interactions between the three temperament composites (effortful control, negative affectivity, and surgency) and changes in achievement motivation. No significant interactions were found.

Table 28. Mean temperament ratings for achievement motivation change scores

Change in Achievement Motivation from T1 to T2					
Patel et al. Choice 1					
	Mastery → Mastery	Mastery → Performance	Performance → Performance	Performance → Mastery	F
Temperament Composites Scores					
Effortful control	4.72 (1.03)	5.06 (.54)	5.28 (.58)	--	1.33
Negative affectivity	4.52 (.93)	4.00 (.40)	3.97 (.63)	--	.96
Surgency	4.67 (1.45)	4.50 (1.26)	4.16 (.63)	--	1.04
Patel et al. Choice 2					
Effortful control	5.56 (.65)	5.03 (.32)	5.14 (.63)	5.78 (.51)	2.57 [†]
Negative affectivity	4.44 (1.07)	3.98 (.44)	3.95 (.66)	3.86 (.49)	.74
Surgency	4.04 (1.31)	4.33 (.79)	4.27 (.71)	4.02 (.48)	.29
Smiley and Dweck Choice 1					
Effortful control	5.06 (.58)	5.34 (.49)	5.30 (.78)	5.18 (.59)	.57
Negative affectivity	4.10 (.72)	3.95 (.53)	3.87 (.63)	4.05 (.79)	.30
Surgency	4.47 (.91)	4.05 (.49)	4.14 (.73)	4.32 (.86)	.83
Smiley and Dweck Choice 2					
Effortful control	5.35 (.59)	4.83 (.34)	5.22 (.54)	5.01 (.88)	1.49
Negative affectivity	4.08 (.70)	3.91 (.65)	3.79 (.53)	3.92 (.54)	.48
Surgency	4.14 (.82)	4.53 (.62)	4.25 (.77)	4.38 (.47)	.51

[†] < .08

Effects of child rated academic competence at T2 on changes in achievement goals classified by the Puzzle Task

One-way ANOVAs were conducted to evaluate whether mean scores of child rated academic competence at T2 varied across changes in achievement motivation as measured by the Puzzle Task. The ANOVAs were not significant (Patel et al. (2007) 1st choice over time ($F(2, 43) = .71, p > .05$); Patel et al. 2nd choice over time ($F(3, 43) = .89, p > .05$); Smiley and Dweck 1994) 1st choice over time ($F(3, 43) = .27, p > .05$); and

Smiley and Dweck 2nd choice over time ($F(3, 43) = 1.45, p > .05$) (see Table 29 for means).

Table 29. Child rated academic competence and changes in achievement motivation

Change in Achievement Motivation from T1 to T2				
Patel et al. Choice 1				
	Mastery → Mastery	Mastery → Performance	Performance → Performance	Performance → Mastery
Child Rated Academic Competence				
T1	5.05 (.150)	5.50 (.33)	5.60 (.47)	--
T2	5.50 (.44)	4.96 (.77)	5.37 (.70)	--
Patel et al. Choice 2				
T1	5.12 (.26)	5.70 (.18)	5.48 (1.00)	6.00 (.24)
T2	5.38 (.44)	5.31 (.67)	5.28 (.77)	5.83 (.29)
Smiley and Dweck Choice 1				
T1	5.35 (.74)	5.70 (.44)	5.65 (.43)	5.46 (.49)
T2	5.44 (.57)	5.34 (.83)	5.42 (.64)	5.17 (.80)
Smiley and Dweck Choice 2				
T1	5.56 (.61)	5.56 (.34)	5.50 (.45)	5.57 (.67)
T2	5.48 (.63)	4.83 (.89)	5.33 (.74)	5.37 (.65)

11. < .05

Effects of teacher rated academic performance and classroom behaviors at T2 on changes in achievement goals classified by the Puzzle Task

One-way MANOVAs were conducted to evaluate whether mean scores of teacher rated academic performance and classroom behaviors at T2 varied across changes in achievement motivation as measured by the Puzzle Task. The overall MANOVAs were

not significant (Patel et al. (2007) 1st choice over time (Pillai's $F(4, 86) = 1.27, p > .05$); Patel et al. 2nd choice over time (Pillai's $F(6, 86) = 1.72, p > .05$). Smiley and Dweck 1st choice over time (Pillai's $F(6, 86) = .97, p > .05$); and Smiley and Dweck 2nd choice over time (Pillai's $F(6, 86) = .35, p > .05$)). Although the overall MANOVAs were not significant, univariate analyses provided in Table 30 revealed group differences in achievement motivation change for teacher ratings of academic performance with the Patel et al. (2007) 2nd choice scoring method. A follow-up comparison using the Tukey HSD test was conducted for the Patel et al. 2nd choice scoring method for teacher rated academic performance. Comparisons showed that those who remained mastery oriented over time had significantly higher teacher ratings on academic performance than all other groups ($p < .05$).

Table 30. Changes in achievement motivation with teacher rated academic performance and classroom behaviors

Change in Achievement Motivation from T1 to T2					
Patel et al. Choice 1					
	Mastery → Mastery	Mastery → Performance	Performance → Performance	Performance → Mastery	F
Teacher Ratings at T2					
Academic Performance	18.67 (4.04)	14.50 (5.45)	15.67 (3.12)	--	1.39
Classroom Behaviors	13.00 (3.38)	12.50 (3.11)	12.97 (2.44)	--	.07
Patel et al. Choice 2					
Academic Performance	20.25 (3.59)	15.44 (4.07)	15.34 (2.99)	15.00 (1.87)	2.94*
Classroom Behaviors	15.00 (3.83)	12.33 (2.06)	12.72 (2.26)	13.40 (2.19)	1.35
Smiley and Dweck Choice					
Academic Performance	16.38 (2.60)	15.36 (4.72)	16.08 (2.84)	14.88 (2.60)	.74
Classroom Behaviors	12.69 (1.93)	12.86 (2.14)	13.83 (3.35)	12.00 (1.60)	.39
Smiley and Dweck Choice 2					
Academic Performance	16.11 (3.58)	14.67 (3.61)	15.38 (2.26)	15.60 (4.03)	.33
Classroom Behaviors	12.93 (2.63)	12.33 (1.37)	13.25 (2.81)	12.91 (2.39)	.16

12. < .05

Child report of achievement motivation over time and child rated academic competence at T2

Difference scores were created for child reports of achievement motivation from T1 to T2 and correlated with children's perceptions of academic competence at T2. Results suggested that there was no relationship between children's reports of achievement motivation over time and academic competence at the end of first grade ($r = -.01, p > .05$).

Child report of achievement motivation over time and teacher reports of academic performance and classroom behaviors at T2

Correlations were performed with the difference scores for child reports of achievement motivation from T1 to T2 and teacher ratings at T2 of academic performance and classroom behaviors. Results suggested that there was no relationship between changes in children's reports of achievement motivation and teacher rated academic performance ($r = .09, p > .05$) or classroom behaviors ($r = .03, p > .05$).

Summary of achievement motivation over time and schooling at T2

Child rated academic competence at T2 did not vary across achievement motivation change as measured by the Puzzle Task. However, teacher ratings of academic performance tended to be higher for those who remained mastery oriented over time compared to all other groups, when achievement goals was based on the Patel et al. 2nd choice scoring method. Results suggested that there was no relationship between children's reports of achievement motivation over time and child rated academic competence, teacher rated academic performance, and teacher rated classroom behaviors.

The relationship between changes in achievement motivation and changes in child rated academic competence over time

Four 4 (MM, MP, PP, PM) X 2 (T1 and T2) mixed factors ANOVAs with repeated measures on the second factor were conducted on child rated academic competence scores to evaluate whether changes in child ratings of academic competence

over the course of first grade varied as a function of changes in achievement motivation as measured by the Puzzle Task. Means for child rated academic competence ratings at T1 and T2 are presented in Table 29.

The Time main effects and Achievement Motivation x Time interaction effects were tested using the multivariate criterion of Wilk's lambda (λ). There was only one significant main effect of time, with higher mean ratings of academic competence at T1 than at T2 for Smiley and Dweck 2nd choice (Time main effect, $\lambda = .91$, $F(1, 43) = 4.04$, $p < .05$). All other Time main effects were not significant (Patel et al. (2007) 1st choice (Time, $\lambda = .99$, $F(1, 43) = .27$, $p > .05$); Patel et al. 2nd choice (Time, $\lambda = .97$, $F(1, 43) = .63$, $p > .05$); and the Smiley and Dweck (1994) 1st choice (Time, $\lambda = .94$, $F(1, 43) = 2.70$, $p > .05$)). The Achievement Motivation x Time interaction effects were not significant for any of the scoring methods; Patel et al. 1st choice (Achievement Motivation x Time interaction effect, $\lambda = .94$, $F(2, 43) = 1.37$, $p > .05$), Patel et al. 2nd choice (Achievement Motivation x Time interaction effect, $\lambda = .96$, $F(3, 43) = .57$, $p > .05$), Smiley and Dweck 1st choice (Achievement Motivation x Time interaction effect, $\lambda = .95$, $F(3, 43) = .77$, $p > .05$), and Smiley and Dweck 2nd choice (Achievement Motivation x Time interaction effect, $\lambda = .93$, $F(3, 43) = 1.04$, $p > .05$). Additionally, the between-subjects tests associated with Achievement Motivation were not significant for any of the scoring methods (Patel et al. 1st choice $F(3, 43) = .53$, $p > .05$; Patel et al. 2nd choice $F(3, 43) = 2.17$, $p > .05$; Smiley and Dweck 1st choice $F(3, 43) = .50$, $p > .05$; and Smiley and Dweck 2nd choice $F(3, 43) = .75$, $p > .05$). Means and standard deviations are reported in Table 29.

Changes in achievement motivation and teacher ratings of academic performance over time

Four 4 (MM, MP, PP, PM) X 2 (T1 and T2) mixed factors ANOVAs with repeated measures on the second factor were conducted to evaluate whether changes in teacher ratings of academic performance over the course of first grade varied as a function of changes in achievement motivation as measured by the Puzzle Task.

The Time main effects and Achievement Motivation x Time interaction effects were tested using the multivariate criterion of Wilk's lambda (λ). Results indicated significant Time main effects for all scoring methods, with higher mean teacher ratings at T2 than at T1 (Patel et al. (2007) 1st choice (Time main effect $\lambda = .86$, $F(1, 43) = 6.83$, $p < .05$); Patel et al. 2nd choice (Time main effect, $\lambda = .90$, $F(1, 43) = 4.77$, $p < .05$); Smiley and Dweck (1994) 1st choice scoring (Time main effect, $\lambda = .90$, $F(1, 43) = 5.03$, $p < .05$); and Smiley and Dweck 2nd choice scoring (Time main, $\lambda = .92$, $F(1, 43) = 3.93$, $p < .05$.) The Achievement Motivation X Time interactions were not significant (Patel et al. 1st choice (Achievement Motivation x Time interaction effect, $\lambda = .87$, $F(2, 43) = 2.05$, $p > .05$); Patel et al. 2nd choice (Achievement Motivation x Time interaction effect, $\lambda = .94$, $F(3, 43) = .87$, $p > .05$); Smiley and Dweck 1st choice (Achievement Motivation x Time interaction effect, $\lambda = .80$, $F(3, 43) = 1.64$, $p > .05$); and Smiley and Dweck 2nd choice (Achievement Motivation x Time interaction effect, $\lambda = .99$, $F(3, 43) = .22$, $p > .05$.)

The between-subjects tests associated with Achievement Motivation for academic performance are presented in Table 31, with a significant Achievement Motivation main

effect for the Patel et al. (2007) 2nd choice scoring method. Post-hoc comparisons were performed for this main effect using Tukey's HSD test. The means in Table 31 suggest that children who remained mastery oriented differed from all other groups; however, the follow-up comparisons indicated that there were only significant differences on teacher rated academic performance between those who remained mastery oriented and those who remained performance oriented ($p < .05$). This lack of significant group differences may be due to small cell sizes. In general, these findings suggest that those who remained mastery oriented had higher teacher ratings of academic performance for the Patel et al. 2nd choice scoring method.

Changes in achievement motivation and teacher ratings of classroom behaviors over time

Four 4 (MM, MP, PP, PM) X 2 (TIME 1 and TIME 2) mixed factors ANOVAs with repeated measures on the second factor were conducted to evaluate whether changes in teacher ratings of classroom behaviors over the course of first grade varied across changes in achievement motivation as measured by the Puzzle Task.

The Time main effects and Achievement Motivation x Time interaction effects were tested using the multivariate criterion of Wilk's lambda (λ). Results indicated significant Time main effects for all scoring methods, with higher mean teacher ratings at T2 than at T1; (Patel et al. (2007) 1st choice (Time main effect $\lambda = .90$, $F(1, 43) = 4.65$, $p < .05$); Patel et al. 2nd choice (Time main effect, $\lambda = .84$, $F(1, 43) = 8.23$, $p < .05$); Smiley and Dweck (1994) 1st choice scoring (Time main effect, $\lambda = .89$, $F(1, 43) = 5.56$, $p < .05$); and Smiley and Dweck 2nd choice scoring (Time main, $\lambda = .88$, $F(1, 43) = 5.82$, $p < .05$.) However, the Achievement Motivation X Time interactions were not significant

(Patel et al. 1st choice (Achievement Motivation x Time interaction effect, $\lambda = .97$, $F(2, 43) = .66$, $p > .05$); Patel et al. 2nd choice (Achievement Motivation x Time interaction effect, $\lambda = .93$, $F(3, 43) = 1.15$, $p > .05$); Smiley and Dweck 1st choice (Achievement Motivation x Time interaction effect, $\lambda = .89$, $F(3, 43) = 1.69$, $p > .05$); and Smiley and Dweck 2nd choice (Achievement Motivation x Time interaction effect, $\lambda = .98$, $F(3, 43) = .34$, $p > .05$)). The between-subjects tests associated with Achievement Motivation for classroom behaviors were not significant (see Table 31).

Table 31. Changes in achievement motivation and teacher ratings over time

Change in Achievement Motivation from T1 to T2					
Patel et al. Choice 1					
	Mastery → Mastery	Mastery → Performance	Performance → Performance	Performance → Mastery	Univariate <i>F</i>
Teacher Ratings Over Time					
Academic Performance T1	15.67 (.58)	14.50 (4.79)	15.05 (3.00)	--	.65
Academic Performance T2	18.67 (4.04)	14.50 (5.45)	15.67 (3.12)	--	
Classroom Behaviors T1	11.33 (2.08)	12.00 (2.94)	12.41 (1.73)	--	
Classroom Behaviors T2	13.00 (3.38)	12.50 (3.11)	12.97 (2.44)	--	
Patel et al. Choice 2					
Academic Performance T1	18.50 (3.51)	14.56 (2.70)	14.69 (2.97)	15.20 (2.28)	2.74*
Academic Performance T2	20.25 (3.59)	15.44 (4.07)	15.34 (2.99)	15.00 (1.87)	
Classroom Behaviors T1	13.00 (3.16)	11.67 (1.32)	12.28 (1.79)	13.00 (1.58)	
Classroom Behaviors T2	15.00 (3.83)	12.33 (2.06)	12.72 (2.26)	13.40 (2.19)	
1.14					

Smiley and Dweck Choice 1					
Academic Performance T1	15.23 (2.71)	14.21 (4.00)	15.83 (2.76)	15.00 (1.60)	
Academic Performance T2	16.38 (2.60)	15.36 (4.72)	16.08 (2.84)	14.88 (2.60)	
Classroom Behaviors T1	12.08 (2.33)	12.36 (1.60)	12.50 (2.11)	12.25 (.71)	.44
Classroom Behaviors T2	12.69 (1.93)	12.86 (2.14)	13.83 (3.35)	12.00 (1.60)	
					.52
Smiley and Dweck Choice 2					
Academic Performance T1	15.32 (3.60)	14.00 (2.00)	15.13 (1.36)	14.60 (2.41)	
Academic Performance T2	16.11 (3.58)	14.67 (3.61)	15.38 (2.26)	15.60 (4.03)	
Classroom Behaviors T1	12.46 (2.10)	11.67 (.52)	12.13 (1.89)	12.40 (.89)	.35
Classroom Behaviors T2	12.93 (2.63)	12.33 (1.37)	13.25 (2.81)	12.91 (2.39)	
					.21

13. < .05, ** < .01

The relationship between child reports of achievement motivation and academic competence over time

Correlations were performed between difference scores of children's reports of achievement motivation from T1 to T2 and difference scores for children's perceptions of academic competence from T1 to T2. Correlations were not significant, ($r = .01, p > .05$), indicating that changes in child reports of achievement motivation were not related to children's reports of academic competence over time.

Summary of changes in achievement motivation and schooling over first grade

In general, schooling did not play a role in changes in achievement motivation; however, when classification of achievement goals was based on the Patel et al. (2007) 2nd choice scoring method, children who remained mastery oriented had higher teacher ratings of academic performance compared to other groups.

Temperament and academic performance interactions

One-way MANOVAs were performed to evaluate whether interactions between temperament and academic performance varied as a function of changes in achievement goals from T1 to T2 on the Puzzle Task. Analyses were run separately for teacher rated academic performance at T2, parent rated academic competence at T1, and child rated academic competence at T2.

The overall MANOVA with temperament composites and teacher rated academic performance interactions for the Patel et al. (2007) 2nd choice scoring method was marginally significant (Pillai's $F(9, 129) = 1.44$ $p < .07$). The univariate analyses showed that the effortful control x teacher rated academic performance interaction was significant ($F(3, 43) = 2.81$, $p < .05$), and that the negative affectivity x teacher rated academic performance interaction was also significant ($F(3, 43) = 3.25$, $p < .05$).

Simple effects analyses were conducted to evaluate achievement motivation group differences on teacher rated academic performance separately for children with high and low effortful control separately. There were no significant differences for the

low effortful control group ($F(3, 18) = .14, p > .05$), but there were significant differences for the high effortful control group ($F(3, 21) = 3.25, p < .05$).

Follow-up post-hoc comparisons were conducted for the effortful control x teacher rated academic performance interaction using Tukey's HSD test. For high effortful control children, significant group differences on teacher rated academic performance were found between those who remained mastery and all other groups ($p < .05$). Figure 3 shows that teacher ratings of academic performance were affected by achievement motivation only for children who were high on effortful control. In general, children who remained mastery oriented over time and were high on effortful control had teacher ratings of academic performance that were higher than children with high effortful control in the other three achievement motivation groups.

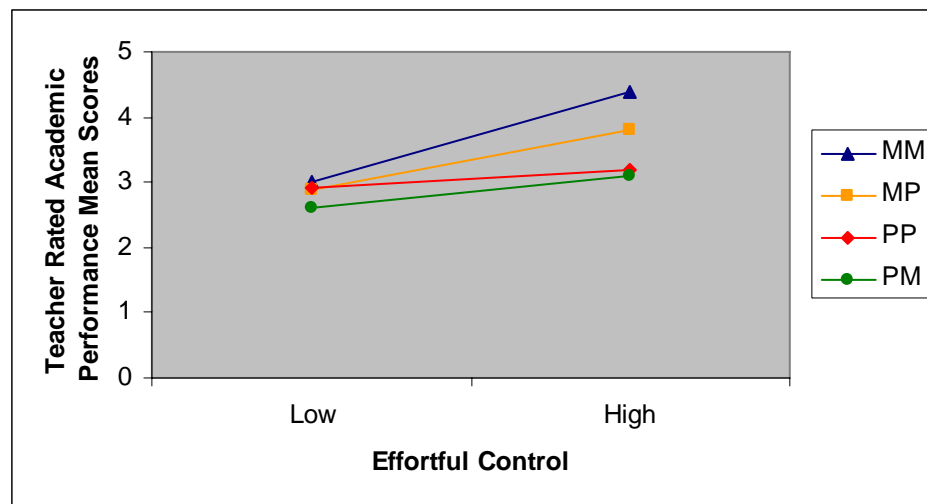


Figure 3. Interaction effect for high vs. low effortful control x teacher rated academic performance across changes in achievement motivation (Patel et al. (2007) 2nd choice)

Additionally, simple effects analyses were conducted to evaluate achievement motivation group differences on teacher rated academic performance separately for children with high and low negative affectivity. There were no significant differences for the high negative affectivity group ($F(3, 18) = .72, p > .05$), but there were significant differences for the low negative affectivity group ($F(3, 21) = 3.79, p < .05$).

Follow-up post-hoc comparisons were conducted for the negative affectivity x teacher rated academic performance interaction using Tukey's HSD test. For the low negative affectivity children, significant group differences on teacher rated academic performance were found between those who remained mastery and all other groups ($p < .05$). Figure 4 shows that teacher ratings of academic performance were affected by changes in achievement motivation only for children who were low on negative affectivity. Overall, children who remained mastery oriented over time and were low on negative affectivity had teacher ratings of academic performance that were higher than children with low negative affectivity in the other achievement motivation groups.

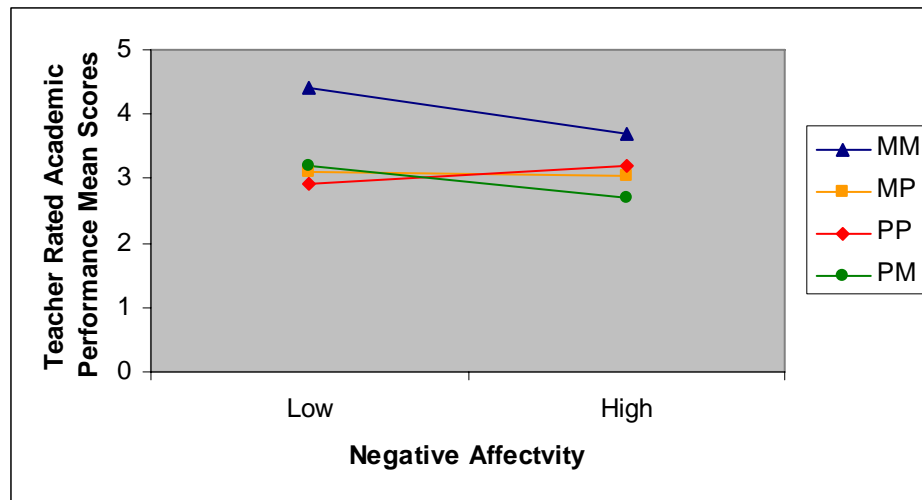


Figure 4. Interaction effect for high vs. low negative affectivity x teacher rated academic performance across changes in achievement motivation (Patel et al. (2007) 2nd choice)

The overall MANOVA with the temperament composites and child rated academic competence interactions for the Patel et al. (2007) 2nd choice scoring method was not significant (Pillai's $F(9, 129) = 1.16, p > .05$); however, univariate analyses showed that the effortful control x child rated academic competence interaction was significant ($F(3, 43) = 2.81, p < .05$).

Simple effects analyses were conducted to evaluate achievement motivation group differences on child rated academic competence separately for children with high and low negative affectivity. There were no significant differences for the low effortful control group ($F(3, 18) = .44, p > .05$), or for the high effortful control group ($F(3, 21) = .37, p > .05$). Figure 5 suggests that there may be group differences on achievement motivation for the low effortful control group; however, due to a lack of variance, group differences in achievement motivation for effortful control were not detected.

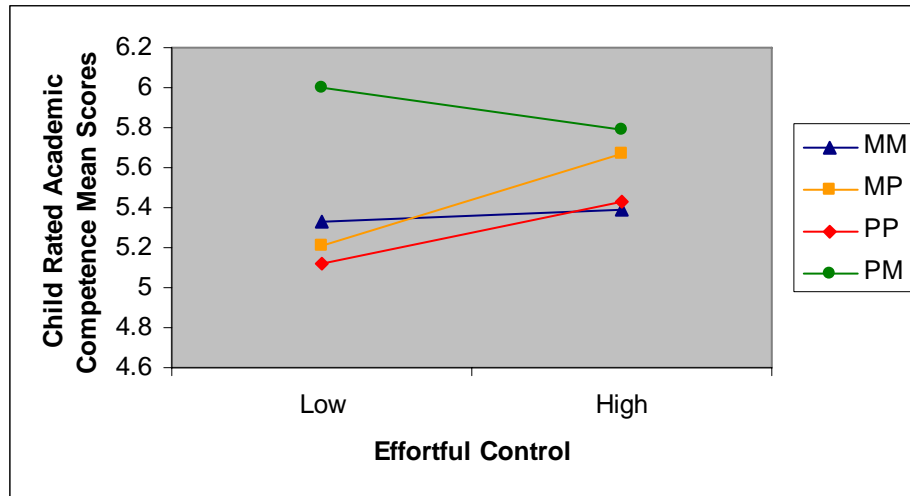


Figure 5. Interaction effect for high vs. low effortful control x mean scores of child rated academic competence across changes in achievement motivation (Patel et al. (2007) 2nd choice)

Change over Time Overall Summary

Changes in achievement motivation

Change over time results were intended to provide an understanding of whether achievement goals changed over the course of first grade. When assessed by the Puzzle Task, more children changed from mastery to performance goals using the Patel et al. (2007) scoring method and the Smiley and Dweck (1994) 2nd choice scoring method. Based on these results, the evidence suggests that more children changed from an initial mastery goal orientation at the beginning of first grade to more performance goals by the end of first grade. On the contrary, children's perceptions of their own achievement motivation did not change over time, with children perceiving themselves as more mastery oriented both at the beginning and at the end of first grade.

Achievement motivation, temperament, and schooling

The interaction between temperament and academic performance played a role in children's achievement goals over time. When classification of achievement goals was based on the Patel et al. (2007) 2nd choice, children who remained mastery oriented over time and were high on effortful control had teacher ratings of academic performance that were higher than children with high effortful control in the other three achievement motivation groups. Additionally, children who remained mastery oriented over time and were low on negative affectivity had teacher ratings of academic performance that were higher than children with low negative affectivity in the other achievement motivation groups. These interactions reveal that those children who remained mastery oriented over time and had either lower negative affectivity or higher effortful control had higher teacher rated academic performance.

Overall, from the beginning to the end of first grade, (1) changes in achievement motivation were evident, with more children changing from mastery to performance goals, and (2) some interactions between temperament and teacher rated academic performance were evident for individuals who remained mastery oriented over time.

5. DISCUSSION

As early as first grade, children begin to present differentiated achievement goal patterns. Some children remain stable in their achievement goals over time, while others will change their goal patterns. An understanding of how temperament and the school context impacts children's achievement motivation can support the identification of different achievement trajectories for children early in their academic career. This study shows that children's achievement goals over the course of first grade are related to temperament and schooling. The current study incorporated a longitudinal and multi-method approach to assess changes in achievement motivation over the course of first grade, with four major research goals; (1) examine children's achievement motivation over the course of first grade using two different scoring methods (Patel et al. (2007) and Smiley and Dweck (1994)), (2) investigate the role of temperament on group differences in children's achievement goals, (3) investigate the impact of school on group differences in children's achievement goals, and (4) evaluate methodological issues and constraints surrounding the assessment of achievement motivation and temperament in particular.

Children have different achievement goal patterns

The present study found that children's achievement goals changed over the course of first grade. In general, more children changed from mastery to performance goals when goals were scored by the Patel et al. (2007) method and the Smiley and

Dweck (1994) 1st choice method; however, with Smiley and Dweck's 2nd choice scoring method, the change from mastery to performance and performance to mastery was fairly equal. Interestingly, quite a few children (40%) changed from performance to mastery goals over time when scored by the Smiley and Dweck 1st choice method as well, indicating that indeed there are changes in achievement goals taking place over the first year of school. Overall, these results support our hypothesis that more performance oriented individuals would emerge over time.

Our findings regarding changes in achievement goals are consistent with prior achievement motivation literature, suggesting that the frequency of performance goals increases during middle childhood (Butler, 2005). Studies using the Puzzle task have shown that very young kindergarteners tend to be more mastery oriented (Chang & Burns, 2005; Patel et al., 2007; Smiley & Dweck, 1994; Ziegert et al., 2001); however, once children enter 1st grade, larger proportions of performance orientated children begin to emerge (Patel et al., 2007). Furthermore, Ziegert and colleagues (2001) examined longitudinal changes in achievement goals with the Puzzle Task from kindergarten and found that one year after the initial measurement, 30% of children had changed from mastery to performance goals.

In general, more performance goals may emerge over time as a response to environmental change. Wigfield and Eccles (1994) noted that children's motivation can change as children begin to modify their achievement goals in order to ensure positive feedback. As children become immersed in a school setting, where they receive feedback regarding their academic performance, they may begin to modify their motivation. This

may include changing their overall goals from learning for the purpose of understanding, to learning for the purpose of grades or positive feedback. Consequently, changes in achievement goals captured by the present study may be a reflection of children's changing context.

Puzzle Task scoring methods produce different proportions of achievement goals

As hypothesized, the two methods used to score the Puzzle Task produced different proportions of achievement goals at T1 and T2. The Patel et al. (2007) scoring method produced more performance oriented individuals, while the Smiley and Dweck (1994) scoring method produced either a mastery/performance split or more mastery individuals overall. When assessing change over time in achievement goals, all scoring methods except the Smiley and Dweck 2nd choice found that more children changed to performance goals over time. Prior work by Patel et al. (2007) found that the Patel et al. scoring method revealed larger numbers of performance oriented children, while prior work using Smiley and Dweck's system found a mastery/performance split (Smiley & Dweck, 1994; Ziegert et al., 2001).

The scoring systems inherently produced different proportions of mastery and performance oriented individuals due to varying scoring criteria. The Smiley and Dweck (1994) scoring system classified children as mastery if they provided the following reasons for choosing an insoluble puzzle; "challenging", "want/like", and "no reason". In contrast, the Patel et al. (2007) scoring system only classified children as being mastery if their reason for choosing an insoluble puzzle was "challenging." Based on these criteria, the Patel et al. method is more conservative in the classification of mastery goals, while

the Smiley and Dweck method is more liberal. Given these differences, the Patel et al. system may be more accurate in assessing children's achievement goals, as it reduces the likelihood of falsely classifying a child as mastery oriented (Type I error). In the case of classifying children's achievement goals, falsely classifying a child as mastery oriented may be more problematic than failing to classify a child as mastery oriented, because of the specific benefits noted in the literature for being mastery oriented. Therefore, it is important for scoring methods to be more conservative in the classification of mastery goals.

Additionally, each scoring method consisted of two "choices" to account for the two opportunities that children had to attempt a puzzle of their choice. Results indicated that both scoring methods yielded slightly more mastery individuals for the 2nd choice than for the 1st choice. This finding is inconsistent with previous work by Patel et al. (2007) who found more performance oriented individuals for the 2nd choice ($I^{st} = 68\%$, $2^{nd} = 86\%$). On the other hand, the Smiley and Dweck scoring for the Patel et al. (2007) sample, produced comparable proportions of performance oriented children for both 1st and 2nd choices ($I^{st} = 25\%$, $2^{nd} = 21\%$). More mastery behaviors for the 2nd choice may be due to children's sense of accomplishment after completion of the 1st puzzle choice. Because children were allowed to work until completion on a puzzle, they may have become more confident in their abilities, with the belief that they can solve any of the other puzzles.

Temperament and the school context impact children's achievement goals

Findings linking individual temperament to group differences in children's achievement goals supported the hypothesis that positive temperament characteristics would play a role in children's mastery goals, with stronger relationships at T2 than at T1. Across all scoring systems (except the Patel et al. (2007) 2nd choice), mastery oriented children displayed higher levels of approach behaviors at the beginning of first grade. By the end of first grade, temperament began playing a larger role in group differences in achievement goals. The Smiley and Dweck scoring method revealed that mastery oriented individuals had higher levels of approach and activity level, indicating that these children were more likely to approach novel situations than performance oriented individuals. For the Patel et al. scoring method, the 2nd choice seemed to capture achievement motivation group differences better than the 1st choice, with mastery oriented individuals displaying higher levels of effortful control, attentional focusing, inhibitory control, and low intensity pleasure. According to these findings, mastery oriented individuals were able to maintain focus, plan and/or suppress inappropriate approach behaviors, and enjoy activities with low stimulus intensity more than their performance oriented counterparts. It is interesting that these findings were captured by the more conservative scoring method, and were not observed with the liberal scoring method. This suggests that classifying children conservatively may lead to the detection of more nuanced differences, especially for temperament.

When achievement motivation was rated by children themselves, at T1 those who indicated more mastery behaviors had higher ratings on effortful control, approach, and

attentional focusing, while at T2 only attentional focusing emerged as a factor.

Accordingly, children's perceptions of their own achievement motivation became less related to temperament over time, which may be indicative of a larger role played by contextual changes.

These findings extend prior work conducted by Patel et al. (2007) who found that mastery oriented children had lower levels of negative affectivity and higher levels of attention regulation and effortful control in kindergarten and 1st grade. The relationship between temperament and achievement motivation may provide support for aspects of motivation having some biological basis, and not only being context dependent. In particular, the significant differences in effortful control and attention found between mastery and performance oriented children need to be further explored. It is possible that both effortful control and attention are associated with how children develop their motivation patterns, with the possibility that children's abilities to inhibit or initiative behaviors and to maintain their attention on a task is related to their reaction to challenging situations.

Additionally, various temperament by temperament interactions were evident at T2, and indicated that there were multiple mechanisms linking temperament to a mastery goal orientation. When achievement goals were scored by the Smiley and Dweck (1994) 1st choice scoring method, those individuals classified as mastery who were high on surgency had higher levels of negative affectivity than performance oriented children who were high on surgency. Our hypothesis suggested that an interaction between low negative affectivity and high surgency would have an effect on mastery oriented children;

however, our findings did not support this hypothesis. If children are fearful (have high levels of negative affectivity), their perceptions about whether to approach (urgency) novel people or objects may be affected (Rothbart & Ahadi, 1994). Fearful children who rely primarily on avoiding novel situations will lack the ability to learn about new situations. They may not learn that they can effectively cope in these situations and may persist in being vulnerable and ineffective (Cortez & Bugental, 1995). Previous literature suggests that because mastery oriented children are typically interested in the learning process, and know when to approach novel situations, they have higher levels of urgency and lower levels of negative affectivity. On the contrary, a high negative affectivity X high urgency interaction may be the product of children who launch into novel or challenging situations and then experience failure. Prior work seems to suggest that fear dictates whether children launch themselves into new situations (Rothbart & Ahadi, 1994); however, it may be that mastery children approach new situations and then react negatively when they experience roadblocks.

Additionally, when achievement goals were scored by the Patel et al. (2007) 2nd choice scoring method, those individuals classified as mastery who were low on effortful control had higher levels of negative affectivity compared to performance oriented children who were low on effortful control. Previous literature suggests that with development children's capacity for effortful control also increases, which has direct links to children's attentional abilities (Rothbart & Jones, 1998). For example, research has found that children high in effortful control are better able to use attention to generate possible solutions, inhibit task-irrelevant thoughts, and to persist in response to failure

feedback, contrary to those with lower levels of effortful control (Rothbart & Ahadi, 1994). Consequently, mastery children who are interested in the learning process, but have low effortful control may not be able to focus on a task or inhibit task-irrelevant thoughts and behaviors, becoming frustrated and displaying higher levels of negative affectivity.

Changes in achievement motivation also raise the issue of the impact of the school context. Children who perceived themselves as being more mastery oriented at the beginning of first grade also perceived themselves and had parents who perceived them as more academically competent. Even though research on the effects of children's self-perceptions of competence on achievement motivation has been limited, it has been noted that prior to entering a school environment, children have limited exposure to academic evaluations (Butler, 2005), and a higher sense of perceived competence (Harter, 1999). Due to this limited exposure to evaluation and a higher sense of competence, children who perceived themselves as more mastery oriented may also rate themselves higher on academic competence.

At the end of first grade, teachers rated children who perceived themselves as more mastery oriented higher on overall academic performance. In addition, those who remained mastery oriented over the course of first grade (i.e. mastery at T1 and T2) had higher teacher ratings of academic performance. Prior work by Eshel and Klein (1981) found positive correlations between children's perceived competence and actual competence, as reflected by an increase in teacher ratings. Consequently, children who are mastery oriented might do better academically because of an inherent quality that

exists from being mastery oriented, or children might become or remain mastery oriented because of the positive experience of doing well academically.

Temperament and the school context interact to affect changes in achievement goals

Findings from the study suggested that temperament and schooling played an interactive role on changes in achievement goals when they were classified with the Patel et al. (2007) 2nd choice scoring method. Those who remained mastery oriented over time and were high on effortful control had higher teacher ratings of academic performance than all other achievement motivation types with high effortful control. Additionally, children who remained mastery oriented over time who were low on negative affectivity had higher teacher ratings of academic performance than all other achievement motivation types with low negative affectivity.

Even though prior work regarding these interactions is limited, previous literature suggests that taken individually, high effortful control and low negative affectivity are more typical of mastery oriented individuals (Rothbart and Hwang, 2005). The present study extends previous work by showing that teacher rated academic performance was especially high for children who remained mastery over time if the children were high on effortful control or low on negative affectivity. Children with high effortful control and low negative affectivity may be better able to adjust to their classroom environment than those who have lower levels of both. This positive adjustment may aid in academic performance by allowing these children to focus on their work, persist on tasks, and display more positive attitudes toward learning, which may lead to higher levels of academic performance.

Methodological issues

As a means of exploring various methodological issues and constraints for studying young children, the present study incorporated a multi-method approach to assessing achievement motivation, temperament, and academic performance. Typically, young children's achievement motivation has been assessed via the Puzzle Task (Smiley & Dweck, 1994), while temperament has been assessed via parent-report questionnaires (e.g. CBQ: Rothbart et al., 2001). Generally, these measures tend to disregard children's own perceptions. This is due to difficulties in eliciting reliable self-reports from children, children's short attention spans, and limited language ability (Irwin, 1985). However, researchers have also found that children engaged in age-appropriate activities are more likely to talk openly about their experiences (Ceci and Bruck, 1993). This methodological issue is significant for researchers in this field, as it can help contribute to the development and use of new methods for assessing young children.

Findings from this study indicated that differences in achievement motivation were better captured by the Puzzle Task, as both parent and child reports seemed to be inflated on the mastery end across all analyses. Parent and child temperament ratings revealed no relationship, contrary to previous work by Hwang (2003) who found significant correlations for five temperament dimensions; Inhibitory Control, Fear, Low Intensity Pleasure, Discomfort, and Activity Level. In her study, Hwang (2003) used a 62-item modified version of the original CBQ (Rothbart et al., 2001), while the present study included the 32-item CBQ-VSF (Putnam & Rothbart, 2006); all 32 items were included in Hwang's questionnaire. Using fewer items on our child temperament

measure may have distorted the temperament ratings that we obtained from them. Based on our findings, parent reports seem to capture children's temperamental qualities better than children's own reports. Further investigations of achievement motivation should utilize observational measures of children's temperament such as the Lab-TAB (Goldsmith et al., 1999); such measures may be able to capture more candid and covert temperamental characteristics not measured by questionnaires.

Additionally, children's perceptions of achievement motivation, temperament, and academic competence were evaluated using a puppet measure based on the original Berkley Puppet Interview (Measelle et al., 1998). Although this measure is claimed to be an age-appropriate method for interviewing young children (Measelle et al., 1998), our results indicate that children were not able to provide reliable responses, providing inflated self-perceptions of themselves. This is consistent with previous research by Stipek and her colleagues (Stipek, 1981; Stipek, Roberts, & Sanborn, 1984), suggesting that young children's cognitive immaturity leads them to overestimate their skills, and to have overly optimistic expectations for future performance relative to that of older children. Prior research has suggested that cognitive immaturity or immature forms of development may serve some functional purpose, helping children adapt to their particular environment (Oppenheim, 1981). Young children's tendencies to overestimate their cognitive skills might bolster their self-esteem, and provide adaptive properties for them at a particular moment in development (Bjorklund, Gaultney, & Green, 1993). This suggests that young children may be more likely to approach challenging and novel situations, as found in the present study with mastery oriented individuals.

Additionally, even though it was impressed upon children that they could answer questions in an open-ended manner, they seemed to generally answer based on one of the bipolar statements (i.e. I like school, or I don't like school). This lack of understanding may have been due to the presentation of only bipolar statements or to concerns with presenting socially desirable responses. When assessing young children, it may be useful to provide more opportunities for a range of open-ended responses. This might be a better alternative to bipolar statements, allowing children to provide a range of responses, while also balancing against the possibility of tangential or tedious responses that might be produced in an entirely open-ended response scenario.

Limitations and future directions

Changes in achievement goals are more effectively captured when a large sample is included to account for varying directions of change. One limitation of our study was the uneven cell sizes emerging from different scoring methods. While a limitation of coding methodologies is always the potential for unequal number of subjects between cells, a larger sample size may have helped ameliorate the vast differences in frequency of children coded for each achievement motivation group. In our study, cell sizes for children changing from performance to mastery goals were particularly small, leading to a lack of variance and some issues with power for some analyses. Specifically, due to limited cell sizes at T2 and for change over time, analyses using the Patel et al. (2007) 1st choice scoring method were exploratory in nature. Overall, more children in the study would have potentially increased the cell sizes for each of the change groups (i.e. mastery to performance and performance to mastery).

Another limitation of the study was the use of the Puzzle Task to assess children's achievement goals. Even though the Puzzle Task is one of the few established measures for assessing young children's achievement goals, there are some concerns that this task may not be the optimal assessment tool. A problem associated with the Puzzle Task is that of validity. Does the Puzzle Task truly capture differences in children's achievement goals? First, the Puzzle Task is somewhat limited because of its emphasis as a visual-spatial task, rather than a more global achievement motivation task. Further research is needed to address this limitation, with a task that can examine achievement goals over a variety of domains. Second, the Puzzle Task may be capturing children's persistence behaviors rather than their achievement motivation. While achievement motivation pertains to achieving a task, persistence involves continuing to work on a task. Accordingly, persistence and mastery motivation may represent two distinct dimensions, with persistence tapping behavioral control and attention and mastery motivation tapping positive emotionality (Shiner, 1998). For researchers to examine achievement goals among young children, alternate assessment tools are needed to address the current limitations posed by the Puzzle Task.

For a broader understanding of how children's achievement motivation changes over time, and whether it continues to change or stabilizes after a certain time point, a longitudinal study spanning the range of elementary schools years would also be beneficial. A longitudinal study of this nature would provide important information regarding the relationship between achievement motivation and children's changing cognitive abilities. In addition, findings from a large-scale longitudinal study would

provide valuable information regarding the impacts of the current standards-based school curricula on children's motivational styles.

Implications of the study

A major implication of this study is that mastery orientation alone does not ensure positive outcomes; multiple temperament patterns and academic contexts interact to shape children's achievement goal orientation over time. In the present study, mastery children had higher negative affectivity scores than performance children if they were low on effortful control or high on surgency, implying that there were multiple mechanisms linking temperament to achievement motivation. Furthermore, negative affectivity scores were highest for mastery oriented children who were low on effortful control, suggesting that being mastery oriented alone may not serve as a protective factor for children's development. Additionally, teacher rated academic performance was especially high for children who remained mastery oriented over time if they were high on effortful control, once again showing that being mastery oriented is not the only factor involved in positive or negative outcomes for children.

Additionally, another important implication of this study is that as early as first grade, children begin to present differentiated achievement goal patterns, with some remaining stable in their goals, while others change their goal patterns. Importantly, these differentiated patterns of achievement goals are related to differences in individual temperament and children's adjustment to an academic context. With an understanding of how temperament and the school context impacts children's achievement motivation, we may not only be able to understand how to teach children with varying learning styles,

but we may also be able to identify different achievement trajectories for children starting at a very young age.

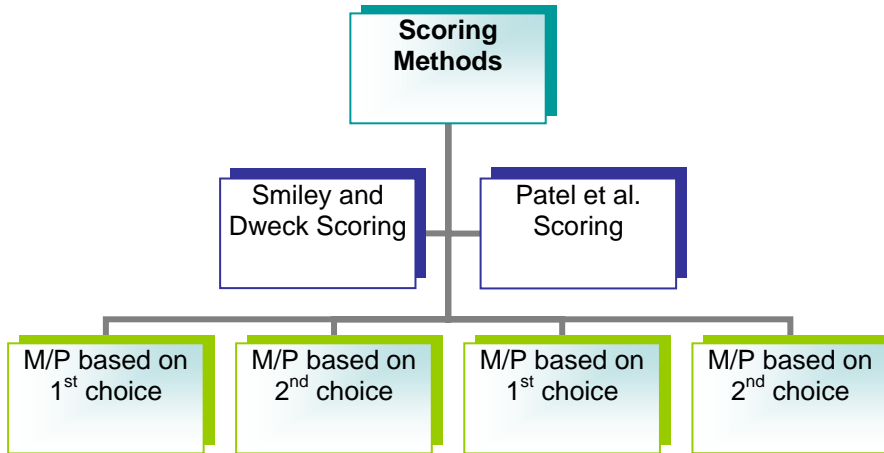
APPENDIX A: Summary of Construct Definitions

Construct	Definition
Achievement Motivation	
Mastery	Engagement in an activity or task for the purpose of improvement or learning
Performance	Engagement for the purpose of demonstrating competence, gaining favorable judgments, and avoiding the demonstration of a lack of ability
Temperament	
Activity Level	Level of gross motor activity including rate and extent of locomotion.
Anger/Frustration	Amount of negative affect related to interruption of ongoing tasks or goal blocking.
Approach	Amount of excitement and positive anticipation for expected pleasurable activities.
Attentional Focusing	Tendency to maintain attentional focus upon task-related channels.
Discomfort	Amount of negative affect related to sensory qualities of stimulation, including intensity, rate or complexity of light, movement, sound, and texture.
Falling Reactivity/Soothability	Rate of recovery from peak distress, excitement, or general arousal.
Fear	Amount of negative affect, including unease, worry or nervousness related to anticipated pain or distress and/or potentially threatening situations.
High Intensity Pleasure	Amount of pleasure or enjoyment related to situations involving high stimulus intensity, rate, complexity, novelty, and incongruity.
Impulsivity	Speed of response initiation.
Inhibitory Control	The capacity to plan and to suppress inappropriate approach responses under instructions or in novel or uncertain situations.
Low Intensity Pleasure	Amount of pleasure or enjoyment related to situations involving low stimulus intensity, rate, complexity, novelty, and incongruity.
Perceptual Sensitivity	Amount of detection of slight, low intensity stimuli from the external environment.
Sadness	Amount of negative affect and lowered mood and energy related to exposure to suffering, disappointment, and object loss.
Shyness	Slow or inhibited approach in situations involving novelty or uncertainty.
Smiling/Laughter	Amount of positive affect in response to changes in stimulus intensity, rate, complexity, and incongruity.

Temperament Composites	
Negative Affectivity	Mean scores of: Anger, Discomfort, Fear, Sadness, and Soothability (R)
Effortful Control	Means scores of: Attentional Focusing, Inhibitory Control, Low Intensity pleasure, and Perceptual Sensitivity
Surgency	Mean scores of: Activity Level, High Intensity Pleasure, Impulsivity, and Shyness (R)
Schooling	
Academic Competence	Perceptions of child's academic abilities
Academic Performance	Ratings of children's academic subjects (Reading, Writing, Math, Social Studies, & Science) and classroom behaviors (Speaking, Listening, Work Habits, & Conduct)

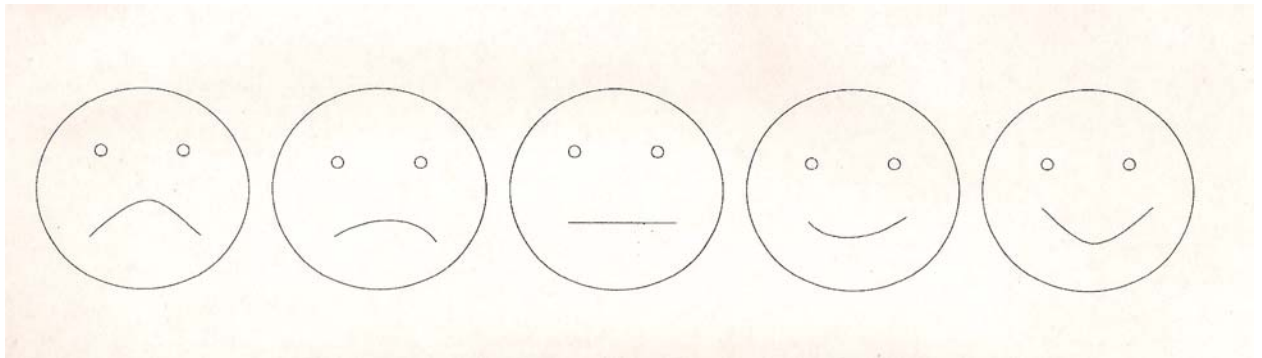
Note: (R) – reverse coded items

APPENDIX B: Puzzle Task Scoring Methods



Note: The bottom tier represents the four possible scores for measuring mastery and performance goal orientations using the Puzzle Task.

APPENDIX C: The Face Scale



1

2

3

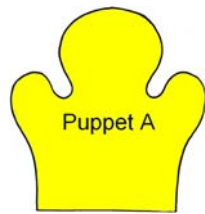
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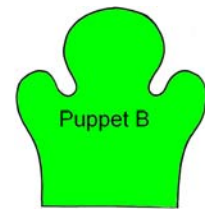
APPENDIX D: Achievement Motivation Items for Puppet Measure and Parent Report

<i>Positive</i>	<i>Negative</i>
1a. I like school work that's hard	1b. I don't like school work that's hard
2a. When things are hard, I keep trying	2b. When things are hard, I stop trying
3a. I don't give up when work is hard	3b. I give up when work is hard
4a. School is important	4b. School is not important
5a. I like school	5b. I don't like school
6a. I try my best at school	6b. I don't try my best at school
7a. When school is hard, I try my best	7b. When school is hard, I don't try my best

APPENDIX E: Demonstration of Puppet Measure



Positively framed questions
- "I like school"



Negatively framed questions
- "I don't like school"

Then ask child: "How about you?"

APPENDIX F: CBQ-VSF Temperament Items for Puppet Measure

<i>Puppet A</i>	<i>Puppet B</i>
1a. I'm always in a big hurry to get from one place to another.	1b. I'm never in a big hurry to get from one place to another.
2a. I get frustrated when someone stops me from doing something I want to do.	2b. I don't get frustrated when someone stops me from doing something I want to do.
3a. I concentrate when I'm drawing or coloring in a book.	3b. I don't concentrate when I'm drawing or coloring in a book.
4a. I like going on really high slides.	4b. I don't like going on really high slides.
5a. I get upset when I have a little cut or bruise.	5b. I don't get upset when I have a little cut or bruise.
6a. When I get ready for trips, I plan the things I will need.	6b. When I get ready for trips, I don't plan the things I will need.
7a. I often rush to do something new.	7b. I don't rush to do something new.
8a. I become sad if my family's plans don't work out.	8b. I don't become sad if my family's plans don't work out.
9a. I like it when someone sings to me.	9b. I don't like it when someone sings to me.
10a. I feel comfortable with almost any person.	10b. I don't feel comfortable with every person.
11a. I am afraid of burglars or the "boogie man."	11b. I am not afraid of burglars or the "boogie man."
12a. I notice when my parents are wearing new clothes.	12b. I don't notice when my parents are wearing new clothes.
13a. I like quiet activities more than rowdy games.	13b. I don't like quiet activities more than rowdy games.
14a. When I'm angry, I stay angry for a long time (+10 mins).	14b. When I'm angry, I don't stay angry for a long time.
15a. When I'm building or putting something together, I work for a long time.	15b. When I'm building or putting something together, I don't work for a long time.
16a. I like to go high and fast on swings.	16b. I don't like to go high and fast on swings.
17a. I feel sad when I can't finish something.	17b. I don't feel sad when I can't finish something.
18a. I don't have a hard time following instructions.	18b. I have a hard time following instructions.
19a. I take a long time to get used to something new.	19b. I don't take a long time to get used to a something new.
20a. I don't complain when I'm sick.	20b. I complain when I'm sick.
21a. I like nursery rhymes.	21b. I don't like nursery rhymes.
22a. When I'm around people I don't know, I	22b. When I'm around people I don't

feel shy.	know, I don't feel shy.
23a. It's hard for me to calm down when I'm upset.	23b. It's not hard for me to calm down when I'm upset.
24a. I notice if there is something new in the living room.	24b. I don't notice if there is something is new in the living room.
25a. I have lots of energy in even in the evening.	25b. I don't have lots of energy in the evening.
26a. I am not afraid of the dark.	26b. I am afraid of the dark.
27a. I like looking at picture books.	27b. I don't like looking at picture books.
28a. I like rough and rowdy games.	28b. I don't like rough and rowdy games.
29a. I am not very upset when I have a small cut or bruise.	29b. I get very upset when I have a small cut or bruise.
30a. I don't like to go to places that I am told are dangerous.	30b. I like to go to places that I am told are dangerous.
31a. I am slow when I have to decide what to do next.	31b. I am not slow when I have to decide what to do next.
32a. I get angry when I can't find something that I want to play with.	32b. I don't get angry when I can't find something that I want to play with.
33a. I like to be gently rocked or swayed.	33b. I don't like to be gently rocked or swayed.
34a. When I meet new people, I'm shy.	34b. When I meet new people, I'm not shy.
35a. I get upset when my friends are getting ready to leave after a visit.	35b. I don't get upset when my friends are getting ready to leave after a visit.
36a. I tell my mom when she look different.	36b. I don't tell my mom when she looks different.

APPENDIX G: Children's Perceptions of Academic Competence

<i>Positive</i>	<i>Negative</i>
1a. I'm a smart girl/boy	1b. I'm not a smart girl/boy
2a. I do a good job in school	2b. I don't do a good job in school
3a. I'm not dumb	3b. I feel dumb
4a. I learn things well	4b. I don't learn things well
5a. I'm smarter than other kids	5b. I'm not smarter than other kids
6a. I don't make mistakes a lot	6b. I make mistakes a lot

APPENDIX H: Academic Performance Section of Teacher Report Form

Academic Subject	1. Far below grade level	2. Somewhat below grade level	3. At grade level	4. Somewhat above grade level	5. Far above grade level
Reading	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Writing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Speaking	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Listening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Math	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Social Studies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Science	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Handwriting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Work Habits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conduct	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

APPENDIX I: Time 1 Results

Achievement motivation Measures	TIME 1 RESULTS							
	Independent Variables							
	% Mastery	% Performance	Parent Rated Temperament	Child Rated Temperament	Parent Rated Academic Competence	Child Rated Academic Competence	Teacher Rated Academic Performance	Teacher Rated Class. Behavior
Patel 1	14.3%	85.7%	- Mastery have higher levels of high intensity pleasure and approach	X	X	X	X	X
Patel 2	26.5%	73.5%	X	- Mastery have: 1. higher levels of negative affectivity 2. lower levels of inhibitory control	X	X	X	X
Smiley and Dweck 1	55.1%	44.9%	- Mastery have higher levels of approach	X	X	X	X	X
Smiley and Dweck 2	69.4%	30.6%	- Mastery have higher levels of approach	X	X	X	X	X
Parent rated achievement motivation	X	X	X	- Mastery have higher activity level	X	- Children rated as mastery perceive themselves as more academically competent	X	X
Child rated achievement motivation	X	X	- Mastery have higher levels of: 1. effortful control 2. approach 3. attentional focusing	X	X	- Children who self-rated as mastery rate themselves as more academically competent	X	X

APPENDIX J: Time 2 Results

Achievement motivation Measures	TIME 2 RESULTS							
	Independent Variables							
	% Mastery	% Performance	Parent Rated Temperament	Child Rated Temperament	Parent Rated Academic Competence	Child Rated Academic Competence	Teacher Rated Academic Performance	Teacher Class. Behavior
Patel 1	8.5%	91.5%	- Mastery have higher levels of high intensity pleasure	- Mastery have higher levels of shyness	- Mastery have higher parent rated acad. competence	X	X	X
Patel 2	19.1%	80.9%	- Mastery have higher levels of: 1. effortful control 2. attentional focusing 3. inhibitory control 4. low intensity pleasure - Interactions 1. Mastery who are low on effortful control have higher levels of negative affectivity compared to performance oriented children who are low on effortful control	X	- Mastery have higher parent rated acad. competence	X	X	X
Smiley and Dweck 1	44.7%	55.3%	- Mastery have higher levels of: 1. approach 2. activity level. - Interactions 1. Mastery who are high on surgency have higher levels of negative affectivity than performance oriented children who are high on surgency.	X	X	X	X	X
Smiley and Dweck 2	70.2%	29.8%	- Mastery have higher levels of: 1. approach 2. activity level 3. discomfort	X	X	X	X	X
Parent rated achievement motivation	X	X	X	X	X	- Children rated as mastery rate themselves as more academically competent	- Children rated as mastery had higher teacher ratings of academic performance	X
Child rated achievement motivation	X	X	- Children who self-rated as mastery had higher levels of attentional focusing	X	X	X	- Children who self-rated as mastery had higher acad. performance ratings	X

APPENDIX K: Change of Time Results

Achievement motivation Measures	CHANGE OVER TIME RESULTS								
	Independent Variables								
	% Mastery	% Performance	Parent Rated Temperament	Child Rated Temperament	Parent Rated Academic Competence	Child Rated Academic Competence	Teacher Rated Academic Performance	Teacher Rated Class. Behavior	Parent Temperament × Teacher Academic Performance
Patel 1 over time	2.5% of performance changed to mastery	57.1% of mastery became performance	X	X	X	X	X	X	
Patel 2 over time	14.7% of performance changed to mastery	69.2% of mastery became performance		X	X	X	- MM have higher teacher ratings of academic performance than MP, PP, and PM	X	- MM who are high on effortful control have higher teacher ratings of acad. performance than children with high effortful control in the MP, PP, and PM - MM who are low on negative affectivity have higher teacher ratings of acad. performance than children with low negative affectivity in the MP, PP, and PM groups.
Smiley and Dweck 1 over time	40% of performance changed to mastery	51.9% of mastery became performance	X	X	X	X	X	X	
Smiley and Dweck 2 over time	21.4% of performance changed to mastery	23.4% of mastery became performance		X		X	X	X	
Parent rated	X	X	X	X	X	X	X	X	
Child rated	X	X	X	X	X	X	X	X	

REFERENCES

REFERENCES

- Achenbach, T. M., & Edelbrock, C. (1986). *Manual for the teacher's report form and each version of the child behavior profile*. Burlington, VT: University of Vermont.
- Ames, C. (1984). Competitive, cooperative, and individualistic goal structures: a motivational analysis. In R. Ames & C. Ames (Eds.), *Research on motivation in education: Student motivation* (pp. 177-207). New York: Academic Press.
- Ames, C. (1990). Motivation: What teachers need to know. *Teacher's College Record*, *91*, 409-421.
- Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*, 261-271.
- Ames, C., & Archer, J. (1988). Achievement goals in the classroom: Students' learning strategies and motivation processes. *Journal of Educational Psychology*, *80*, 260-267.
- Arseneault, L., Kim-Cohen, J., & Taylor, A. (2005). Psychometric evaluation of 5- and 7-year-old children's self-reports of conduct problems. *Journal of Abnormal Child Psychology* *33*, 537-550.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, *52*, 1-26.
- Barkley, R. A. (1997). *ADHD and the nature of self-control*. New York: Guilford.
- Barrett, K. C., & Morgan, G. A. (1995). Continuities and discontinuities in mastery motivation during infancy and toddlerhood: A conceptualization and review. In R. MacTurk & G. Morgan (Eds.), *Mastery motivation: conceptual origins and applications* (pp. 57-94). Norwood, NJ: Ablex.
- Baumer, S. (1998). *Self-regulation processes in preschool and school children*. Unpublished doctoral dissertation, University of Jerusalem.

- Beizer Seidner, L., Stipek, D. J., & Deitch-Feshbach, N. (1985). A developmental analysis of elementary school-aged children's concepts of pride and embarrassment. *Child Development, 59*, 367-377.
- Bernhart, B. R., & Prager, S. B. (1985). Preventing child suicide: The elementary school death education puppet show. *Journal of Counseling and Development, 63*, 311-312.
- Bjorklund, D. F. (2005). *Children's Thinking: Cognitive Development and Individual Differences* (4th ed.). Belmont, CA: Wadsworth/Thomson Learning.
- Burhans, K. K., & Dweck, C. S. (1995). Helplessness in early childhood: The role of contingent worth. *Child Development, 66*, 1719-1738.
- Buss, A. H., & Plomin, R. (1975). *A temperament theory of personality development*. New York: Wiley.
- Buss, A. H., & Plomin, R. (1984). *Temperament: Early developing personality traits*. Hillsdale, N.J: Erlbaum.
- Butler, R. (2005). Competence assessment, competence, and motivation between early and middle childhood. In A. J. Elliot & C. S. Dweck (Eds.), *Handbook of competence and motivation* (pp. 202-220). New York: The Guilford Press.
- Cain, K., & Dweck, C.S. (1995). The development of children's achievement motivation patterns and conceptions of intelligence. *Merrill-Palmer Quarterly, 41*, 25-52.
- Carey, W.B., Fox, M., & McDevitt, S.C. (1977). Temperament as a factor in early school adjustment. *Pediatrics, 60*, 621-624.
- Ceci, S. J., & Bruck, M. (1993). Suggestibility of the child witness: a historical review and synthesis. *Psychological Bulletin, 113*, 403-439.
- Chang, F., & Burns, B. (2005). Attention in preschoolers: Associations with effortful control and motivation. *Child Development, 76*, 247-263.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159.
- Cortez, V. L., & Bugental, D. B. (1994). Children's visual avoidance of threat: A strategy associated with low social control. *Merrill-Palmer Quarterly, 40*, 82-97.
- Covington, M. V. (1992). *Making the grade: A self-worth perspective on motivation and school reform*. New York: Cambridge University Press.

- Covington, M. V., & Dray, E. (2002). The developmental course of achievement motivation: A need-based approach. In A. Wigfield & J. S. Eccles (Eds.), *Development of achievement motivation* (pp. 33-56). San Diego: Academic Press.
- Derryberry, D., & Rothbart, M. K. (1997). Reactive and effortful processes in the organization of temperament. *Development and Psychopathology, 9*, 633-652.
- Diener, C. I., & Dweck, C. S. (1978). An analysis of learned helplessness: Continuous changes in performance, strategies, and achievement cognitions following failure. *Journal of Personality and Social Psychology, 36*(451-462).
- Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 10*, 1040-1048.
- Dweck, C. S. (1999). *Self-theories: Their role in motivation, personality, and development*. Philadelphia: Psychology Press/Taylor & Francis.
- Dweck, C. S., & Leggett, E. L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*, 256-273.
- Dweck, C. S., & Lennon, C. (2001, April). *Person vs. process focused parenting: Impact on achievement motivation*. Paper presented at the biennial meeting of the Society for Research in Child Development, Minneapolis.
- Dweck, C. S., & Reppucci, N. D. (1973). Learned helplessness and reinforcement responsibility in children. *Journal of Personality and Social Psychology, 25*, 109-116.
- Eccles, J., Wigfield, A., Harold, R. D., & Blumfeld, P. (1993). Age and gender differences in children's self- and task perceptions during elementary school. *Child Development, 64*, 830-847.
- Eccles, J. S., Wigfield, A., & Schiefele, U. (1998). Motivation to succeed. In W. Damon & N. Eisenberg (Eds.), *Handbook of Child Psychology* (Vol. 3, pp. 1017-1095).
- Eder, R. A. (1990). Uncovering young children's psychological selves: Individual and developmental differences. *Child Development, 61*, 849-863.
- Elliot, A. J., & Harackiewicz, J. M. (1996). Approach and avoidance achievement goals and intrinsic motivation: A mediational analysis. *Journal of Personality and Social Psychology, 70*, 461-475.
- Elliot, A. J. (1999). Approach and avoidance motivation and achievement goals. *Educational Psychologist, 34*, 169-189.

- Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology, 82*, 804-818.
- Elliott, E. S., & Dweck, C.S. (1985). Goals: An approach to motivation and achievement. *Journal of Personality and Social Psychology, 54*, 5-12.
- Elliot, E. S., McGregor, H. A., & Gable, S. L. (1999). Achievement goals, study strategies, and exam performance: A mediational analysis. *Journal of Educational Psychology, 91*, 549-563.
- Eshel, Y., & Klein, Z., & . (1981). Development of academic self-concept of lower class and middle class primary school children. *Journal of Educational Psychology, 73*, 287-293.
- Fiske, D. W. (1966). On the coordination of personality concepts and their measurement. *Human Development, 9*, 74-83.
- Fox, N.A., & Field T.M. (1988). Individual differences in preschool entry behavior. *Journal of Applied Developmental Psychology, 10*, 527-540.
- Friedman, W. J. (1991). The development of children's memory for past events. *Child Development, 62*, 139-155.
- Goldsmith, H. H., Buss, K. A., & Lemery, K. S. (1997). Toddler and childhood temperament: Expanded content, stronger genetic evidence, new evidence for the importance of environment. *Developmental Psychology, 33*, 891-905.
- Goldsmith, H. H., Buss, A., Plomin, R., Rothbart, M. K., Thomas, A., Chess, S., Hinde, R. A., & McCall, R. B. (1987). Roundtable: What is temperament? *Child Development, 58*, 505-529.
- Goldsmith, H. H., Rieser-Danner, L.A., & Briggs, S. (1991). Evaluating convergent and discriminant validity of temperament questionnaires for preschoolers, toddlers, and infants. *Developmental Psychology, 27*, 566-579.
- Gottfried, A. E. (1990). Academic intrinsic motivation in young elementary school children. *Journal of Education Psychology, 82*, 525-538.
- Grant, H., & Dweck, C.S. (2003). Clarifying achievement goals and their impact. *Journal of Personality and Social Psychology, 85*, 541-553.

- Gray, J. (1971). The psychophysiological basis of introversion-extroversion. *Behavioral Research and Therapy* 8, 249-266.
- Hagekull, B., Bohlin, G., & Lindhagen, K. (1984). Validity of parental reports. *Infant Behavior and Development*, 7, 77-92.
- Harter, S. (1981). A new self-report scale of intrinsic versus extrinsic orientation in the classroom: Motivational and informational components. *Developmental Psychology* 17, 300-312.
- Harter, S. (1986). Processes underlying the construction, maintenance, and enhancement of the self-concept in children. In J. Suls & A. G. Greenwald (Eds.), *Psychology perspectives on the self* (Vol. 3, pp. 136-182). Hillsdale, NJ: Erlbaum.
- Harter, S. (1990). Self and Identity Development. In S. S. Feldman and G. R. Elliott (Eds.), *At the Threshold: The Developing Adolescent* (pp. 352-388). Cambridge, Massachusetts: Harvard University Press.
- Harter, S. (1999). *The construction of the self: A developmental perspective*. New York: Guilford.
- Harter, S., & Pike, R. (1984). The pictorial scale of perceived competence and social acceptance for you children. *Child Development*, 55, 1969-1982.
- Hartup, W., & van Lieshout, C. F. (1995). Personality development in social context. *Annual Review of Psychology*, 46, 655-687.
- Hebert, C., & Dweck, C.S. (1985). Mediators of persistence in preschoolers: Implications for development. *Unpublished manuscript*.
- Heckhausen, H. (1987). Emotional components of action: Their ontogeny as reflected in achievement behavior. In D. Gîrlitz & J. F. Wohlwill (Eds.), *Curiosity, imagination, and play*. Hillsdale, NJ: Erlbaum.
- Heyman, G. D., Dweck, C. S., & Cain, K. M. (1993). Young children's vulnerability to self-blame and helplessness: Relationships to beliefs about goodness. *Child Development*, 63, 401-415.
- Hokoda, A., & Fincham, F. D. (1995). Origins of children's helpless and mastery achievement patterns in the family. *Journal of Educational Psychology*, 87, 375-385.

- Hwang, J. (2003). Development of a temperament self-report measure for young children. *Dissertation Abstracts International*, 63(11-B), 5550. (UMI No. AAI3072589).
- Irwin, E. C. (1985). Puppets in therapy: An assessment procedure. *American Journal of Psychotherapy*, 39, 389-399.
- Kagan, J. (1994). *Galen's Prophecy*. New York: Basic Books.
- Kamins, M. L., & Dweck, C. S. (1999). Person vs. process praise and criticism: Implications for contingent self-worth and coping. *Developmental Psychology*, 35, 835-847.
- Kaplan, A., Middleton, M.J., Urdan, T., & Midgley, C. (2002). Achievement goal theory: Defining goals and goal structures. In C. Midgley (Ed.), *Goals, goal structures, and patterns of adaptive learning* (pp. 22-52). NJ: Erlbaum.
- Keogh, B. K. (2003). *Temperament in the classroom: Understanding individual differences*. Baltimore, MD: Paul H. Brookes.
- Kochanska, G., DeVet, K., Goldman, M., Murray, K., & Putnam, S. P. (1994). Maternal reports of conscience development and temperament in young children. *Child Development*, 65, 852-868.
- Lewis, M., Alessandri, S. M., Sullivan, M. W. (1990). Violation of expectancy, loss of control, and anger expressions in young infants. *Developmental Psychology*, 26, 745-751.
- Martin, R. P., Wisenbaker, J., & Huttunen, M.O. (1994). Review of factor analytic studies of temperament measures based on the Thomas-Chess structural model: Implications for the Big 5. In G. Kohnstamm & C. Halverson (Eds.). *The developing structure of temperament and personality from infancy to adulthood*. Hillsdale, N.J: Erlbaum, 157-172.
- Matheny, A., Wilson, R., & Thoben, A. (1987). Activity, motor coordination and attention: Individual differences in twins. *Perceptual Motor Skills*, 32, 151-158.
- Measelle, J. R., Ablow, J.C., Cowan, A., & Cowan, C.P. (1998). Assessing young children's view of their academic, social, and emotional lives: an evaluation of the self-perception scales of the Berkley puppet interview. *Child development*, 69, 1556-1576.

- Middleton, M., & Midgley, C. (1997). Avoiding the demonstration of lack of ability: An under-explored aspect of goal theory. *Journal of Educational Psychology, 89*, 710-718.
- Midgley, C. M., Kaplan, A., & Middleton, M. (2001). Performance-approach goals: Good for what, for whom, under what circumstances, and at what cost? *Journal of Educational Psychology, 93*, 77-86.
- Miller, R. B., Behrens, J. T., Greene, B. A., & Newman, D., & (1993). Goals and perceived ability: Impact on student valuing, self-regulation and persistence. *Contemporary Educational Psychology, 18*, 2-14.
- Mize, J., & Ladd, G. W. (1988). Predicting preschoolers' peer behavior and status from their interpersonal strategies: A comparison of verbal and enactive responses to hypothetical social dilemmas. *Developmental Psychology, 24*, 782-788.
- Mosatche, H. S., & Bragonier, P. (1981). An observational study of social comparison in preschoolers. *Child Development, 52*, 376-378.
- Nicholls, J. G. (1978). The development of the concepts of effort and ability, perception of academic attainment, and the understanding that difficult tasks require more ability. *Child Development, 49*, 800-814.
- Nicholls, J. G. (1984). Conceptions of ability and achievement motivation. In R. E. Ames, & C. Ames (Eds.), *Research on motivation in education: Student motivation* (Vol. 1, pp. 39-73). New York: Academic Press.
- Nicholls, J. G. (1989). *The competitive ethos and democratic education*. Cambridge, MA: Harvard University Press.
- Nicholls, J. G. (1990). What is ability and why are we mindful of it? A developmental perspective. In R. J. Sternberg & J. Kolligian (Eds.), *Competence considered* (pp. 11-40). New Haven, CT: Yale University Press.
- Nicholls, J. G., & Miller, A. T. (1984). Reasoning about the ability of self and others: A developmental study. *Child Development, 55*, 1990-1999.
- Patel, D. M., Olson, V.A., & Lehman, E.B. (2007). *Correlates of achievement goal orientation in young and older elementary school children*. Paper presented at the Society of research in child development, Boston, MA.
- Pearlman, C. (1984). The effects of level of effectance motivation, IQ, and penalty/reward contingency on the choice of problem difficulty. *Child Development, 55*, 537-542.

- Piaget, J. (1930). *The child's conception of physical causality*. New York: Harcourt, Brace.
- Pintrich, P., & Schunk, D. (1996). *Motivation in education: Theory, research & applications*. Englewood Cliffs, NJ: Prentice-Hall.
- Posner, M., & Rothbart, M. K. (2007). *Educating the human brain*. Washington, DC: APA Books.
- Putnam, S. P., & Rothbart, M. K. (2006). Development of short and very short forms of the children's behavior questionnaire. *Journal of Personality and Social Psychology*, *87*, 103-113.
- Rholes, W. S., Blackwell, J., Jordan, C., & Walters, C. (1980). A developmental study of learned helplessness. *Developmental Psychology*, *16*, 616-624.
- Rothbart, M. K., & Ahadi, S. A. (1994). Temperament and the development of personality. *Journal of Abnormal Psychology*, *103*, 55-66.
- Rothbart, M. K., & Bates, J. (1998). Temperament. In N. Eisenberg (Ed.), *Handbook of child psychology* (5th ed., pp. 105-176). New York: John Wiley & Sons, Inc.
- Rothbart, M. K., & Bates, J. E. (2006). Temperament. In D. William, & R. M. Lerner (Eds.), *Handbook of Child Psychology* (6th ed., pp. 99-166). Hoboken, N.J: John Wiley & Sons, Inc.
- Rothbart, M. K., & Derryberry, D. (1981). Development of individual differences in temperament. In M. E. Lamb & A. L. Brown (Eds.), *Advances in developmental psychology* (pp. 37-86). Hillsdale, N.J: Erlbaum.
- Rothbart, M. K., & Hwang, J. (2005). Temperament and the development of competence and motivation. In A.J. Elliot & C.S. Dweck (Eds.), *Handbook of Competence and Motivation* (pp. 167-201). New York: The Guilford Press.
- Rothbart, M. K., & Jones, L. B. (1998). Temperament, self-regulation, and education. *School Psychology Review*, *27*, 479-491.
- Rothbart, M. K., & Mauro, J.A. (1990). Questionnaire approaches to the study of infant temperament. In J.W. Fagen & J. Colombo (Eds.), *Individual differences in infancy: Reliability, stability, and prediction* (pp. 441-429). Hillsdale, N.J: Erlbaum.

- Rothbart, M. K., Ahadi, S.A., Hershey, K. L., & Fisher, P. (2001). Investigations of temperament at three to seven years: The children's behavior questionnaire. *Child Development, 72*, 1394-1408.
- Rowe, D. C., & Plomin, R. (1977). Temperament in early childhood. *Journal of Personality Assessment, 41*, 150-156.
- Ruble, D. N., & Dweck, C. S. (1995). Self-conceptions, person conceptions and their development. In N. Eisenberg (Ed.), *Review of personality and social psychology: Social development* (Vol. 15, pp. 109-139). Thousand Oaks, CA: Sage.
- Russell, J. A. (1990). The preschooler understands of the causes and consequences of emotions. *Child Development, 61*, 1987-1881.
- Ryan, A. M., Gheen, M., & Midgley, C. (1998). Why do some students avoid asking for help? An examination of the interplay among students' academic efficacy, teachers' socio-emotional role, and the classroom goal structure. *Journal of Educational Psychology, 90*, 528-535.
- Shiner, R. L. (1998). How shall we speak of children's personality traits in middle childhood? A preliminary taxonomy. *Psychological Bulletin, 124*, 308-332.
- Smiley, P. A., & Dweck, C.S. (1994). Individual differences in achievement goals among young children. *Child Development, 65*, 1723-1743.
- Sorensen, R. L., & Maehr, M.L. (1977). A comparison of achieving orientations of preschool and school age children. *Child Study Journal, 7*, 7-16.
- Stipek, D. J. (1981). Children's perceptions of their own and their classmates' abilities. *Journal of Educational Psychology, 73*, 404-410.
- Stipek, D. J. (1984). Young children's performance expectations. In J. G. Nicholls & M. L. Maehr (Eds.), *Advances in motivation and achievement: The development of achievement motivation* (Vol. 3). Greenwich, CN: Academic Press.
- Stipek, D. J., & Daniels, D. (1988). Declining perceptions of competence: A consequence of changes in the child or the educational environment? *Journal of Educational Psychology, 80*, 352-356.
- Stipek, D. J., & MacIver, D. (1989). Developmental change in children's assessment of intellectual competence. *Child Development, 60*, 521-538.

- Stipek, D. J., Recchia, S., & McClintic, S. M. (1992). Self-evaluation in young children. *Monographs of the Society for Research in Child Development*, 57 (2, Serial No. 226).
- Stipek, D. J., Roberts, T. A., & Sanborn, M. E. (1984). Preschool-age children's performance expectations for themselves and another child as a function of the incentive value of success and the salience of past performance. *Child Development*, 55, 1983-1989.
- Tellegen, A. (in press). *Manual for the Multidimensional Personality Questionnaire*. Minneapolis: University of Minnesota Press.
- Thomas, A., & Chess, S. (1977). *Temperament and development*. New York: Brunner Mazel.
- Tuckman, B. W. (August 1999). *Symposium: Motivational Factors Affecting Student Achievement - Current Perspectives*. Paper presented at the Annual Meeting of the American Psychological Association, Boston.
- Watson, D., & Clark, L. A. (1992). Affects separable and inseparable: On the hierarchical arrangement of the negative affects. *Journal of Personality and Social Psychology*, 62, 489-505.
- Wigfield, A., & Eccles, J. S. (1994). Children's competence beliefs, achievement values and general self-esteem: Change across elementary and middle school. *Journal of Early Adolescence* 14, 107-138.
- Wigfield, A., Eccles, J. S., Schiefele, U., Roeser, R., & Davis-Kean, P. (2006). Development of achievement motivation. In W. Damon and N. Eisenberg (Eds.), *Handbook of child psychology* (6th ed.). New York: Wiley.
- Windle, M., & Lerner, R. (1986). Reassessing the dimension of temperamental individuality across the life span: The Revised Dimensions of Temperament Survey (DOTS-R). *Journal of Adolescent Research*, 1, 213-230.
- Ziegert, D. I., Kistner, J.A., Castro, R., & Robertson, B. (2001). Longitudinal study of young children's responses to challenging achievement situations. *Child Development*, 72, 1723-1743.

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