2008-01-01

The Differential Role of Initiative and Persistence in Early Childhood

Michelle Filomena Maier
University of Miami, mmaier@psy.miami.edu

UNIVERSITY OF MIAMI

THE DIFFERENTIAL ROLE OF INITIATIVE AND PERSISTENCE IN EARLY CHILDHOOD

By

Michelle Filomena Maier

A THESIS

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements
for the degree of Master of Science

Coral Gables, Florida

December 2008

UNIVERSITY OF MIAMI

A thesis submitted in partial fulfillment of
the requirements for the degree of
Master of Science

THE DIFFERENTIAL ROLE OF INITIATIVE AND PERSISTENCE IN EARLY CHILDHOOD

Michelle Filomena Maier

Approved:

_____	_____
Daryl B. Greenfield, Ph.D. Professor of Psychology	Terri A. Scandura, Ph.D. Dean of the Graduate School
_____	_____
Heather A. Henderson, Ph.D. Assistant Professor of Psychology	Batya E. Elbaum, Ph.D. Associate Professor of Teaching and Learning

MAIER, MICHELLE F. (M.S., Psychology)
The Differential Role of Initiative and Persistence in Early Childhood (December 2008)

Abstract of thesis at the University of Miami.

Thesis supervised by Professor Daryl B. Greenfield.
No. of pages in text. (40)

This study examined the relationship of two important learning behaviors, persistence and initiative, and three- to five-year-old low-income preschool children's school readiness outcomes. The sample consisted of 196 children from two urban Head Start Centers in a large Head Start Program in the Southeast. Initiative was measured by the Devereux Early Childhood Assessment and persistence by the Preschool Learning Behavior Scale. Academic outcomes were collected through the Language and Literacy subscale and the Early Math subscale of the Galileo System for Electronic Management of Learning. Results indicated that learning behaviors may be differentially important across age and academic domain. Persistence, and not initiative, significantly predicted younger and older preschoolers' yearly gains in early math outcomes. In contrast, while persistence was a significant predictor of language and literacy yearly gains for younger preschoolers, initiative was the significant predictor for older preschoolers. These differential results add to the understanding of learning behaviors and their effect on academic outcomes in early childhood. Such findings can help teachers, parents, and those developing early childhood interventions in promoting the learning behaviors that are the most appropriate for a certain age and academic area.

TABLE OF CONTENTS

List of Tables

List of Figures

CHAPTER 1: INTRODUCTION

The Differential Role of Initiative and Persistence in Early Childhood

Children think about and act upon learning opportunities in different ways, and these differences contribute to how well they perform in school. For this reason, Approaches to Learning (ATL), an all-inclusive domain of learning-related behaviors that includes a range of attitudes, habits, cognitive skills, and learning styles, has been designated as one of the five national school readiness domains (Kagan, Moore, & Bredekamp, 1995). ATL, also referred to as learning behaviors, is the newest, least studied, and consequently least understood domain of school readiness (Kagen et al., 1995). An exact definition has not been established, but some specific learning behaviors that are typically listed within this domain are openness to and curiosity about new tasks and challenges, initiative, persistence, attentiveness, tendency for reflection and interpretation, imagination and invention, and problem solving flexibility (Kagen et al., 1995; McDermott, Leigh, & Perry, 2002).

Learning behaviors are considered teachable, domain-general skills that impact all other school readiness domains (Kagen et al., 1995). They are also regarded as malleable and may change with time or vary depending on context (Barnett, Bauer, Ehrhardt, Lentz & Stollar, 1996; Engelmann, Granzin, & Severson, 1979; Kagan et al., 1995). Learning behaviors have been shown to be significantly related to academic outcomes (Peth-Pierce, 2000). As teachable and positive influences on school achievement, learning behaviors are an ideal focus for teachers and interventions aiming to improve academic outcomes. However, in order to determine how these behaviors can best be taught and which are most important for young children, researchers should unpack the proposed

components of ATL. A critical examination of how different learning behaviors develop and relate to school performance is necessary.

The current study is a preliminary effort to explore the proposed components of ATL. It examines the relationship of two learning behaviors, persistence and initiative, on low-income preschoolers' school readiness. In particular, the study examines how age moderates the relationship between learning behaviors and academic outcomes and hypothesizes that these learning behaviors are differentially important depending on age.

Low-income preschoolers

Low-income children are at particular risk for poor academic achievement (Jencks & Philips, 1998; Reardon, 2003). Stipek and Ryan (1997) found that low-income children begin school at an academic disadvantage even if they have attended at least one year of preschool. Additionally, evidence has shown that the preschool years comprise a critical period for helping children not only to develop the necessary skills for later school success but also to establish positive learning patterns (Alexander, Entwisle, & Dauber 1993; National Research Council and Institute of Medicine, 2000). Research has also found that ATL is one of the major child-level influences on this early academic success (McWayne, Fantuzzo, & McDermott, 2004). Therefore, concern for the development of learning behaviors and positive achievement patterns in at-risk children is particularly imperative for intervention research regarding school readiness and future academic success.

Learning behaviors

Learning behaviors are important influences on early academic success (McWayne et al., 2004), and they have been shown to predict achievement into the early

elementary school years. Specifically, they predict success in language, math, and social skills (McDermott, 1999; McDermott, Leigh, & Perry, 2002) and in overall academic achievement above and beyond intelligence or cognitive ability (McDermott et al., 2002). Learning behaviors also explain a significant amount of variance in teacher-assigned grades (Schaefer & McDermott, 1999).

The literature on children's classroom behavior and early learning- and work-related skills also illustrates that how children approach a learning situation is critical for school performance. Although learning- and work-related skills are not the same constructs as learning behaviors, their definitions do overlap somewhat; learning- and work-related skills include behaviors such as staying on task (persistence), and responsibility and independence (initiative). Work-related skills (e.g., listening, following directions, staying on task) contribute to reading, math, vocabulary, general information, and alphabet skills and continue to predict achievement in reading, math, and alphabet skills at the end of 2nd grade (McClelland, Morrison, & Holmes, 2000). Learning-related skills, which include self-regulation (such as planning and self-control) and aspects of social competence (such as responsibility, independence, and cooperation) in kindergarten uniquely predict reading and math skills between Kindergarten and 6th grade (McClelland, Acock, & Morrison, 2006). These learning-related skills also predict growth in reading and math achievement between Kindergarten and 2nd grade (McClelland at al., 2006).

Thus, learning- and work-related skills seem to lay the groundwork for academic performance because they provide a foundation for classroom behavior that positively influences achievement later on (McClelland et al., 2000). Alexander and colleagues

(1993) found that such classroom behaviors influence a child's academic development in the primary grades by increasing their learning and influencing the teacher's perception of the child; children who were interested in and actively participating in school-related activities were not only rated more positively by their teachers at the end of the year, but also obtained larger test score gains over the year. In addition, even after controlling for demographic factors, these skills predicted academic outcomes in the 1st grade and into elementary school.

Since learning behaviors are significant child-level predictors of academic achievement into the elementary school years, it is critical not only to identify children with both poor work- and learning-related skills but also to ascertain how educators can help support and improve such skills. Poor work-related behaviors have been shown to be a risk factor for low academic achievement as early as kindergarten and continuing into later school years (McClelland et al., 2000). However, the early school years offer an ideal opportunity for intervention because achievement trajectories are not completely established. Possessing good learning behaviors earlier in development helps establish adaptive learning patterns and places children on paths toward future academic success (Alexander et al., 1993). Therefore, identification of young children with poor learning behaviors and subsequent intervention may be critical for improving outcomes. However, to better inform interventions, researchers first need to consider the developmental course of learning behaviors in young children. This will allow researchers to determine which particular learning behaviors are most salient for children at specific times in their development.

Age-related differences in learning-related behaviors

Although little is known about how learning behaviors develop, research has found age-related differences in other skills and behaviors that are related to learning, such as strategy use and problem solving. In theory, a young child who understands the concepts of goal-directed behavior and cause and effect should be able to solve a problem by utilizing strategies, or goal-directed cognitive operations (Bjorklund, 2005; Bjorklund & Miller, 1997). However, many young children have difficulty successfully using strategies. When solving a problem, children develop and utilize more complex strategies over time, but this development is not stage-like. According to Siegler's Adaptive Strategy Choice Model (Bjorklund, 2005), children have many strategies available to them when solving a problem, and these different strategies compete for use. Even though numerous strategies may exist in a child's repertoire, a young child may still show difficulties in producing or correctly utilizing a strategy. Sometimes, young children exhibit a production deficiency; they have the mental capacity to use a strategy, but they do not produce it without prompting (Bjorklund, 2005). In addition, many times a child may be able to solve only part of a problem. For example, children improve their ability to follow rules as they become older. Zelazo and Reznick (1991) found that while three-year-old children can correctly verbalize a rule in a sorting task (e.g., If this picture is of something found inside the house, then it goes in this box. If this picture is of something found outside the house, then it goes in that box.), they show difficulties in executing the rule. In contrast, four-year-olds can both verbalize and execute the rule during the task.

The maturity and efficiency of other learning-related skills, such as planning and selected attention, also increase with age. Planning is an important element in problem

solving because often there are several steps a child must tackle before she reaches a goal. Planning is, therefore, difficult; it takes time, and it requires inhibition of current behavior. Thus, young children rarely plan, and when they do, they rarely plan ahead effectively (Bjorklund, 2005). Children also may need more time to become acquainted with the task or instructions before they can even begin to plan what they will do. However, children become more efficient planners as they mature and their cognitive skills improve. In addition, selective attention abilities increase with age. Young children spend more time attending to information that is irrelevant to the task at hand (Bjorklund, 2005). As they fill their minds with incidental learning unimportant to the current activity, it is difficult for them to plan appropriately, be strategic, and problem solve correctly.

Younger children may be showing these difficulties in strategy use and problem solving for several reasons. Perhaps, these problems are attributable to their use of less effective strategies, their poor inhibitory control, or their developing cognitive processing capacities. Young children may be using simpler and less effective strategies that may not help task performance (i.e., a utilization deficiency). Or, when performing a task, it may be too challenging to follow arbitrary rules even if they know the rule. Similarly, it is also often difficult for young children to switch to a new rule in a sorting task. Even if a young child can correctly say what that new rule is, she may be unable to inhibit herself from continuing to implement the previous rule (Zelazo & Reznick, 1991). According to the Cognitive Complexity and Control Theory (Zelazo & Frye, 1998), there are changes in the complexity of the rule systems that children use, and these changes depend on the child's age. While two-year-olds can only consider one rule at any given time, five-year-

olds can represent higher order rules and correctly select between two incompatible rules in a sorting task. Coordinating more than one rule requires conscious reflective thought and awareness, and these cognitive processes are just beginning to develop in the preschool years (Bjorklund, 2005). Therefore, it is not surprising that research detects age-related differences in young children's ability to solve problems and complete tasks.

Development of learning behaviors

Since age-related developmental differences have been found in preschoolers' learning-related skills like strategy use and problem solving, similar developmental trajectories may exist for learning behaviors. It is important not to assume that all learning behaviors develop in the same way and that there is only one set of ATL skills that produces the best outcomes for all children at all ages. Examination of the development of learning behaviors in the classroom context and, in particular, age-related differences within them is critical.

Most likely, early learning behaviors are shaped by both child characteristics and the environment. Since developmental growth occurs through interactions between persons and contexts over time, these competencies do not automatically mature once school begins (Bronfrenbrenner & Morris, 1998 as cited in Bornstein & Lamb (Eds.), 2005). They emerge in infancy and then develop, and hopefully improve, over time due to factors that influence the child such as genetics, family, peers, and teachers. Therefore, children of different ages may differ in their ability to produce and utilize learning behaviors. Although learning behaviors are considered to be malleable and teachable, younger preschoolers may not be developmentally ready to successfully utilize all the different learning behaviors under the domain of ATL.

The previously discussed research on strategy use and rule-following suggests children are able to utilize more complex skills as they get older (Bjorklund, 2005; Zelazo & Frye, 1998). Since research has found these age-related differences based on the complexity of learning-related skills, preschool children may also show similar age-related differences in learning behaviors. Two important learning behaviors that may change over time are persistence and initiative. Both are hypothesized by the current study to differ in their complexity and have been shown to be important for academic success. In particular, almost all state standards of early learning include both or one of these constructs. While some standards place initiative and persistence in the same group (i.e., a child needs to initiate a task and then persist; e.g., New Hampshire Early Learning Guidelines, 2005; Rhode Island Early Learning Standards, 2004), others designate them as separate indicators of school readiness (e.g., Arizona Early Learning Standards, 2005; Missouri Pre-K Social and Emotional Development Standards and Approaches to Learning, 2003).

Persistence

Persistence refers to a child's ability to persevere with difficult tasks. The capability of persisting at a task, even if it is complicated or boring, most likely enhances the child's opportunities to learn in general and, particularly, within the school environment (Karnes, Johnson, Cohen, & Shwedel, 1985; Martin, 1989; Sigman, Cohen, Beckwith, & Topinka, 1987). In addition, if implemented consistently across different situations, persistence then could also facilitate the development of cognitive competencies (Sigman et al., 1987) and effective problem solving (Karnes, Johnson, & Beauchamp, 1989).

Persistence has been shown to be related to academic outcomes. In fact, it has been a significant predictor not only of the growth in reading ability from kindergarten to 3rd grade but also of reading achievement in children with lower intelligence (Newman et al., 1996). In addition, research has demonstrated that adults can increase a child's persistence through proximity, verbal reinforcement, and the promotion of task procedures (Krantz & Scarth, 1979). Therefore, persistence seems to be an important modifiable learning behavior that may be influential in the promotion and continuation of learning opportunities.

Initiative

Initiative refers to a child's ability to use independent thought and actions to meet her needs (Le Buffe & Naglieri, 1999). This includes how a child begins an activity or play, makes decisions, tries new things, and attempts different ways to solve problems. In the literature on resilience, initiative is considered a protective factor for at-risk children (Le Buffe & Naglieri, 1999). By the time they are in preschool, at-risk children who develop a coping pattern that combines autonomy with an ability to ask for help when needed show resilience later in life (Werner, 1995). Therefore, a child's competencies, including her initiative and ability to develop and follow through on plans, most likely will affect how she performs in the school environment.

In contrast to the learning behavior of persistence, which examines what a child does once she is in the midst of an activity, initiative focuses more on how a child begins an activity or play. Although both learning behaviors overlap and require a certain amount of attention control (i.e., a child needs to be paying attention in order to persist at a task or initiate activities), they have been considered distinct. Little research has

explored how initiative relates to academic outcomes, but the item content of the Preschool Learning Behaviors Scale (PLBS), a teacher behavior rating scale assessing preschool children's approaches to learning, includes initiative as a specific learning behavior (McDermott et al., 2002). The dearth of literature on initiative as a learning behavior indicates the importance of examining child initiative as an aspect of ATL and exploring its relation to academic outcomes.

Current study

Although both persistence and initiative are considered important aspects of ATL during the preschool years, as indicated by their inclusion in many state standards of early learning, this study hypothesizes that learning behaviors have different complexities and are differentially important across age. Since cognitive processes are still developing in the preschool years, previous research has shown that it is difficult for younger children to perform more complex behaviors and skills completely. This is evidenced by their ability to solve only part of a problem or to verbalize a rule but not be able to utilize it in a task (e.g., Zelazo & Reznick, 1991). When comparing the two learning behaviors, persistence and initiative, it appears that persistence is a simpler skill that may develop earlier. To be considered persistent, a child needs only to continue with a current task. In addition, as evidenced by temperament research which has examined and measured persistence in infants and young children (e.g., at 6 months (Yarrow, Morgan, Jennings, Harmon, & Gaiter, 1982), at 15 and 18 months (Lemelin, Tarabulsy, & Provost, 2006), and in kindergarten (Newman, Noel, Chen & Matsopoulos, 1996), persistence seems to be an early characteristic of children. On the other hand, to show initiative, a child must first begin an activity, alone or with peers. Then, in order for an activity to be truly

helpful in terms of promoting and maximizing learning opportunities, the child must continue the activity. Thus, staying focused and being persistent is also an inherent part of the potentially more complex learning behavior, initiative. Younger preschoolers might be more likely to employ successfully the simpler learning behavior, persistence. Then, persistence would be more strongly associated with younger preschoolers' academic outcomes than more complex behaviors. In contrast, older preschoolers may have had more opportunities to develop the more difficult learning behaviors, and the development and utilization of these complex skills would have positively influenced their academic outcomes.

Using a sample of three- to five-year-old Head Start children, this study explored the relationship of persistence and initiative to low-income children's school readiness outcomes. The study examined how age moderates the relationship between these learning behaviors and academic outcomes and hypothesized that learning behaviors are differentially important across age. The two hypotheses that were tested are: 1) Persistence would be a better predictor of academic outcomes for younger preschoolers and 2) Initiative would be a significant predictor of academic outcomes for older preschoolers.

CHAPTER 2: METHOD

Participants

Children were selected from 23 classrooms in two urban Head Start Centers in a large Head Start Program in the Southeast, $N = 196$, with 48% females. Children's ages, as computed at the beginning of the school year, range from 36 to 60 months ($M = 48$, $SD = 7$). The majority of the sample was African American (92%), with some Hispanic (7%) and white/multiracial children (1%).

Procedure

Study personnel notified Head Start center directors and classroom teachers about the project, explained the procedures in a meeting, and asked them to sign consent for collaboration. Once the center directors and teachers agreed to participate, the Head Start central office provided the information needed to request parental consent and to compile child demographic data. Classroom teachers sent parental consents home to the children's parents. Once all consents were collected, teachers gave them back to study personnel. Teachers were also provided with the questionnaire they needed to complete for each student, a letter explaining the questionnaire, and a thank you letter.

In accordance with normal Head Start procedures, teachers are trained to complete the Language and Literacy and Early Math subscales of the Galileo System for Electronic Management of Learning (Galileo). Because teachers completed Galileo over the course of the 2003-2004 school year, the first score entered by the teacher was considered the child's Fall outcome while the last score entered was used as the Spring outcome. In addition, all Head Start teachers completed the Devereux Early Childhood Assessment (DECA) within the first 45 days that the children were in school. The DECA

is used by Head Start as a screening instrument for preschoolers' behavioral and social development. Teachers filled out the learning behaviors questionnaire, the Preschool Learning Behaviors Scale (PLBS), in the spring.

Measures

Initiative. The Devereux Early Childhood Assessment (DECA; Le Buffe & Naglieri, 1999) is a nationally standardized, norm-referenced preschool behavior rating scale of within-child protective factors. This scale includes the following subscales: Initiative, Self Control, Attachment, and Behavioral Concerns. The current study used the Initiative subscale as a measure of preschool children's ability to use independent thought and actions to meet their needs. The reliability across raters for the initiative subscale is .90.

The Initiative subscale consists of 11 Likert-type items. The teacher is asked to rate whether a child exhibits a particular behavior very frequently, frequently, occasionally, rarely, or never. Items in this subscale include:

During the past 4 weeks how often did the child…

Do things for himself/herself?

Choose to do a task that was challenging for her/him?

Try or ask new things or activities?

Start or organize play with other children?

Make decisions for himself/herself?

Persistence. The Preschool Learning Behavior Scale (PLBS; McDermott, Green, Francis & Stott, 1996) is a teacher behavior rating scale that assesses preschoolers' approaches to learning. Developed in collaboration with classroom teachers, the PLBS

has been validated for use with Head Start populations. The scale consists of 29 Likert-type items that present a specific learning-related behavior. The scale yields three dimensions: Competence Motivation, Attention/Persistence, and Attitude towards Learning. The Cronbach's alpha coefficients for the three dimensions demonstrate high internal consistency: .87, .88 and .78, respectively.

The current study used the Attention/Persistence subscale as a measure of children's persistence, or their ability to attend to relevant stimuli and persevere with difficult tasks. When completing this measure, the teacher must indicate whether a particular behavior most often applies, sometimes applies, or doesn't apply to a child. Refer to Table 1 for all items in the Attention/Persistence subscale.

Educational Outcomes. School readiness outcomes were collected through the Galileo System for Electronic Management of Learning (Galileo; Bergan et al., 2003). Because both language and literacy and early math are important academic domains for school readiness (Duncan et al., 2007), only those subscales are used in this study. The Galileo is an IRT (Item Response Theory)-based measure that allows teachers to assess child growth in the readiness domains established by Federal Head Start standards: Language and Literacy, Early Math, Approaches to Learning, Social and Emotional Development, Nature and Science, Creative Arts, Motor Development, and Physical Health (U.S. Department of Health and Human Services, 2000). Assessment Technology Incorporated (ATI) reports high levels of internal consistency, ranging from .92-.97.

Data analytic strategy

In order to examine how age moderates the relationship between learning behaviors and school readiness outcomes, multiple linear regression analyses were

conducted using SPSS REGRESSION. This study hypothesized that learning-related behaviors are differentially important depending on age. Two hypotheses were tested: 1) Persistence would be a better predictor than initiative of academic outcomes for younger preschoolers and 2) Initiative would be a significant predictor of academic outcomes for older preschoolers.

Regression analyses used initiative, persistence, and their interactions with age as predictor variables and the Galileo subscale scores (language and literacy and early math) as outcome variables. Fall Galileo scores were controlled for in all analyses. In addition, the continuous variables of age, initiative, persistence, and Fall Galileo scores were centered to reduce multicollinearity between predictors and interaction terms (Holmbeck, 2002). In order to test that the relationship between learning behaviors and academic outcomes depends on a child's age, the interactions between age and initiative and between age and persistence were calculated by multiplying initiative and then persistence by age. Finally, two hierarchical linear regression models were run to determine the unique effects of the variables on the two academic outcomes. First, Fall Galileo scores were entered in the model, followed by initiative, persistence, and age, and finally the interaction terms. Although it was assumed that the constructs of initiative and persistence would be correlated, there is no strong theoretical reason that suggests which behavior may be more important, and, therefore, both learning behaviors were entered into the second block together. The regressions were run separately on language and literacy and on early math.

CHAPTER 3: RESULTS

The independent variables were examined for outliers, normality, skewness, and kurtosis, and no assumptions were violated. In addition, the children did not differ by gender on any of the variables. The means and standard deviations for each variable, as well as their zero-order correlations are presented in Tables 2, 3, and 4. Age in months, initiative, persistence, and both academic outcomes were all significantly correlated with one another. As expected, initiative and persistence were correlated but only moderately at .46 ($p < .001$). Unexpectedly, however, when examining correlations among three-year-olds only, age was not significantly correlated with persistence, spring language and literacy, fall math, or spring math. Similarly, age was not correlated with any of the academic outcomes for four-year-olds. This unanticipated lack of correlation once the sample was split by age might be explained by the more restricted range of ages in each group. Another possible explanation is that small age differences among three-year-olds or among four-year-olds may be less predictive of outcomes than the amount of time spent in school (Cahan & Cohen, 1989).

The prediction of early language and literacy outcomes can be modeled with the equation:

$$Y = \alpha + \beta_1(Fall\_LL) + \beta_2(Init) + \beta_3(Persist) + \beta_4(Age) + \beta_5(Age\_Persist) + \beta_6(Age\_Init) + \varepsilon \quad (1)$$

Although neither persistence ($B = .435$, $t(167) = 1.682$, $p = .094$) nor initiative ($B = .321$, $t(167) = 1.023$, $p = .308$) predicted language and literacy outcomes, age was a significant predictor (B = .873, $t(167) = 2.053$, $p = .042$), controlling for Fall Galileo scores. Therefore, there was a significant positive relationship between child age and language and literacy outcomes over the academic year. There was a significant interaction effect

between initiative and age (B = .135, t(167) = 3.134, p = .002) but not between persistence and age, B = -.052, t(167) = -1.387, p = .167. The R^2 change associated with the inclusion of the initiative-by-age interaction term in the model was .019 (p = .008). Therefore, this interaction explained an additional 1.9% of the variance in language and literacy scores above and beyond the 65.4% explained by the main effects of Fall Galileo scores, persistence, initiative, and child age as well as the persistence-by-age interaction term (See Figure 1).

The prediction of early math outcomes can be modeled with the equation:

$$Y = \alpha + \beta_1(Fall\_Math) + \beta_2(Init) + \beta_3(Persist) + \beta_4(Age) + \beta_5(Age\_Persist) + \beta_6(Age\_Init) + \varepsilon \quad (2)$$

Controlling for Fall math scores, only persistence significantly predicted outcomes in early math, B = .591, t(168) = 2.168, p = .032. The main effects of persistence, initiative, and child age accounted for 3.1% (p = .008) of the variance in math outcomes over and above the 53.2% (p < .001) explained by Fall Galileo scores. However, in the final model, the R^2 change associated with the inclusion of both interaction terms was not significant, R^2 change = .006, p = .302 (See Figure 2).

Since the interaction between initiative and age was significant for language and literacy, there is evidence for moderation. In order to further understand the nature of this interaction, the sample was first divided into two groups: children younger than 48 months (N = 97) and children older than 48 months (N = 99) at the start of the school year. Splitting the sample into three- and four-year-olds is justified since both age groups are represented in typical preschool classrooms, and the sample sizes are approximately equal. As expected, four-year-olds, in comparison to three-year-olds, had significantly higher scores on all measures, but the variance within each group was equal. Two

additional regression analyses were then run to determine the unique effects of initiative and persistence on language and literacy outcomes for three-year-olds and for four-year-olds separately. Since persistence was hypothesized to be more important for younger preschoolers, Fall Galileo scores were entered first into all analyses, followed by persistence, and then initiative.

For the three-year-olds, controlling for Fall Galileo scores, persistence significantly predicted outcomes (B = .718, $t(82)$ = 2.390, p = .019) while initiative did not, B = -.672, $t(82)$ = -1.1698, p = .093 (see Figure 3). Younger preschoolers' scores in language and literacy increase by .718 per unit change in persistence.

The results were reversed for four-year-olds. Controlling for Fall Galileo scores, initiative significantly predicted outcomes (B = 1.294, $t(84)$ = 3.007, p = .003) while persistence did not, B = .273, $t(84)$ = .664, p = .508 (see Figure 4). Older preschoolers' scores in language and literacy increase by 1.294 per unit change in initiative. Initiative explained an additional 5.2% of the variance in language and literacy over and above the 46.9% explained by persistence and Fall Galileo scores alone. See Figure 5 for the graph of significant age-by-initiative interaction for both three- and four-year-olds. This figure provides the average end-of-the-year language and literacy score for children, with an average Fall language and literacy score and average persistence, that have low initiative (½ standard deviation below the mean), mean initiative, and high initiative (½ standard deviation above the mean). Other plots of this interaction were also explored. Regardless of whether children one full standard deviation above and below the mean initiative were examined or the sample was divided into thirds, the results were similar.

As expected from the previous regression analysis, univariate ANOVA analyses confirmed there are no significant differences in language and literacy scores between three-year-olds who have low, mean, or high initiative, controlling for Fall Galileo scores and persistence. However, pairwise comparisons using Bonferroni's adjustment showed that four-year-olds who have low initiative had significantly lower language and literacy scores (M = 572.31, SE = 6.66) than those who had high initiative, (M = 600.86, SE = 6.58), $t(87) = -2.93$, p =.013. In addition, four-year-olds with high initiative performed significantly better than those who had initiative scores at the mean (M = 571.54, SE = 5.39), $t(87) = -3.46$, p =.003.

CHAPTER 4: DISCUSSION

This study is a preliminary step in examining the development of learning behaviors in the preschool classroom context and, in particular, age-related differences within them. Although initiative and persistence are two components of ATL that overlap, they are distinct learning behaviors that may not follow the same developmental trajectory. Persistence, and not initiative, significantly predicted both younger and older preschoolers' yearly gains in early math outcomes. In contrast, while only persistence was shown to be strongly related to language and literacy yearly gains for younger preschoolers, initiative was the only significant predictor for older preschoolers. These differential results suggest that specific learning behaviors affect children's achievement differently by academic domain as well as child age.

Younger preschoolers, in comparison to older preschoolers, had lower scores overall on academic outcomes as well as initiative and persistence. Although this difference is not surprising, it suggests that younger preschoolers may be less able to produce and utilize learning behaviors in comparison to older children in the same classroom. Such age differences are consistent with literature on schooling effects. Research has shown that the growth of some basic cognitive skills, such as spatial operations and language, depends on environmental input; these cognitive skills developed less over the summer months than over the school year (Huttenlocher, Levine, & Vevea, 1998). Similarly, another study found a schooling effect for reading recognition, mathematics, and letter recognition, among other things, in kindergarten and 1st grade (Christian, Morrison, Frazier, Massetti, 2000). These findings show that instructional experiences, and not just chronological age, impact development and

learning. Despite a potential schooling effect, the current study suggests that which learning behaviors are salient for academic achievement may be different for three-year-olds in comparison to four-year-olds.

As children mature and become more competent, the way the individual components of ATL work to influence outcomes appears to change. In the domain of language and literacy, persistence may be a simpler skill that younger preschoolers are more likely to utilize successfully, as evidenced by the more persistent younger preschoolers having better outcomes. Older preschoolers, on the other hand, may be more likely to use more complex learning behaviors such as initiative when learning. The current findings in the domain of language and literacy support these hypotheses; when controlling for their persistence, older children who show more initiative had more gains in the domain of language and literacy. These results are consistent with previous research on other learning-related behaviors and skills, such as problem solving and strategy use, that show age-related differences.

Even though this study found a differential relationship of initiative and persistence within the domain of language and literacy, it was not obtained in the area of early math. Only persistence predicted growth in math for all preschoolers. If replicated, this is a potentially important finding to consider when designing interventions that focus on how ATL can positively impact learning in different academic domains. There may be several explanations for the distinct relationship found between learning behaviors and the two academic areas. Different teacher pedagogical beliefs have been related to the amount of time spent teaching different academic domains. Lee and Ginsburg (2007) found subtle differences in teachers' beliefs regarding math and literacy learning. When

teaching literacy, preschool teachers tended to follow their students' interests by promoting social competence and positive dispositions toward literacy. For math, however, these teachers were inclined to promote basic math knowledge and skills by imbedding them into daily routines. In addition, observations of preschool classrooms show that teachers spend only 15% of their time teaching math and science, in comparison to teaching reading and language 29% of the time (Layzer, Goodson, & Moss, 1993).

If teacher beliefs influence the amount of time they spend teaching different academic domains, then they may also affect the kind of opportunities that are provided in the preschool classroom for children to develop learning behaviors. By spending more class time on language and literacy learning and, while doing so, focusing more on student interests, teachers may provide more opportunities for preschoolers to show persistence and initiative during language and literacy activities than math activities. Preschoolers frequently interact with peers and adults throughout the day by talking, playing, and reading books. Active learning and, in particular, showing initiative seem to be an inherent part of getting the most out of the preschool day in terms of language and literacy development, especially for older preschoolers. However, if teachers are not only spending less time teaching math but also focusing exclusively on basic skills, this subject may be less familiar to preschoolers, especially low-income children who tend to develop early numeracy skills at a slower rate than middle-class preschoolers (Ginsburg, Klein, & Starkey, 1998). This may result in educators teaching math in more structured ways and providing fewer opportunities for children to initiate and engage in math-related learning opportunities on their own.

Less math-related instruction, and subsequently fewer learning opportunities, may produce a different set of learning behaviors necessary for preschool math achievement. Persistence may be the more salient skill for learning and honing basic math skills. If math is taught less, math learning may lag behind language and literacy development so that the more complex skill of initiative is not yet applicable to outcomes, even for the older preschoolers. Initiative may become a more important skill in math achievement later on as children develop and are taught more math skills. On the other hand, initiative, after controlling for persistence, simply could be a less critical skill for preschoolers' performance in math.

In contrast to the current study, Head Start preschoolers' initiative has been shown to be positively related to their math skills, as assessed by the Test of Early Mathematics Ability (TEMA-2) (Dobbs, Doctoroff, Fisher & Arnold, 2006). Dobbs and colleagues, who also used the DECA to measure initiative, conceptualized initiative as a socio-emotional strength that includes a number of behaviors such as persistence. The current study extends these findings by not only parsing initiative and persistence apart but also examining how age might affect the relationship between these learning behaviors and outcomes. Although initiative was related to math outcomes in the current study, this relationship was no longer significant once controlling for child persistence. A limitation to the Dobbs et al. study (2006) is that they did not measure persistence in addition to initiative. The current study's findings lend support to the idea that persistence is an inherent part of initiative; however, persistence and initiative seem to be separate constructs that have different roles in relation to academic outcomes. Future research should further examine these learning behaviors as well as the reasons for the differential

roles that were found. The non-significance of initiative in relation to math outcomes may be a result of preschool instruction and learning opportunities, or perhaps, learning behaviors are not as domain-general as previously thought, and there are separate sets of learning behaviors necessary for different academic domains.

It is important to note that this study has some limitations. Although these relationships were examined in an urban, ethnically diverse population, cultural influences on learning behaviors and academic outcomes were not taken into consideration. Future studies should explore such contextual variables that may influence learning behaviors. Also, all measures utilized were completed by the child's teacher. Further examination of these relationships using a multi-method approach with teacher questionnaires as well as direct assessments and observations of both academic outcomes and learning behaviors is critical. Since learning behaviors were found to relate differentially to early math and language and literacy, future research that examines how these ATL skills relate to other academic areas like science would be beneficial.

The age-related differences found in persistence and initiative suggest that learning behaviors change over time. However, this cross-sectional study cannot directly show that learning behaviors change with age, and longitudinal data would be necessary to explore these relationships more explicitly. Development of a measure that can capture change in the specific ATL behaviors would also be essential for examination of the trajectory of learning behaviors over time. Additionally, these data are nested (children within classrooms, within centers). Multilevel modeling would allow for measurement of growth and further exploration of child as well as teacher and classroom characteristics. It

was not possible, however, to use such analyses in the current study because the sample size and number of classrooms were insufficient.

Finally, the effect sizes found in this study are not conventionally considered large; for example, four-year-olds' initiative explained only an additional 5.2% of the variance in their language and literacy gains over and above the 46.9% explained by persistence and Fall Galileo scores. However, small increases in early competencies may result in better academic outcomes later on (Hamre & Pianta, 2005). Additionally, this effect is similar to previous research findings where the PLBS explained 11% of the variance in Head Start preschoolers' academic success (McWayne et al., 2004). Although the current study's effects were smaller, learning behaviors were examined individually. In addition, if learning behaviors set the foundation for later academic success (McClelland et al., 2000), it is not surprising that they may show a small effect early on, especially when they are examined only over the course of one school year.

In addition to investigating trajectories of development, future studies should explore possible mechanisms to explain this differential relationship between learning behaviors and outcomes. As suggested by Dobbs et al. (2006), the amount of initiative a child exhibits may influence how often she engages in learning situations, but it could also be the case that stronger academic skills lead to more initiative. Additionally, other characteristics such as behavior problems could influence whether a child misses out on potential learning opportunities and therefore may not readily acquire learning behaviors. Teachers may also treat and teach children with behavior problems differently.

Finally, learning behaviors should be examined in relation to early childhood interventions. Some research has shown that initiative, as measured by the DECA, was

not as strongly related to math outcomes for Head Start preschoolers that received a math intervention than for a control group (Dobbs et al., 2006). Because research considers learning behaviors as modifiable and domain-general, creating and implementing interventions that use ATL as a framework may be a way to enhance school readiness. Such interventions would also help clarify how learning behaviors affect children's outcomes.

CHAPTER 5: CONCLUSIONS

Despite its limitations, this study contributes to a growing body of literature on ATL and preschool academic achievement and highlights important implications for future research and intervention development. Learning behaviors were found to be differentially important across age. In addition, early math and language and literacy were not related to initiative and persistence in the same way. Overall, these findings underscore the idea that we cannot assume a "one size fits all" set of ATL skills for preschool children. Different learning behaviors may be important for child outcomes, depending on child age and academic domain. Such findings, if replicated, will add to the currently limited understanding of how learning behaviors develop, which behaviors should be promoted, and under what circumstances. Specifically, these implications are applicable to low-income children who are particularly at-risk for poor school readiness. Since past research has shown that learning behaviors are modifiable, research that reveals which ATL skills are salient at particular ages would help teachers, parents, and those developing early childhood interventions to promote the learning behaviors that are the most appropriate for a particular age and subject area.

TABLES

Table 1

Items from the Preschool Learning Behaviors Scale (PLBS; McDermott, Green, Francis & Stott 1996)

Attention/Persistence
Pays attention to what you say
Sticks to an activity for as long as can be expected for a child of this age
*Adopts a don't-care attitude to success or failure.
*Acts without taking sufficient time to look at the problem or work out a solution.
Cooperates in group activities.
*Is distracted too easily by what is going on in the room, or seeks distraction.
*Cannot settle into an activity.
*Shows little determination to complete an activity, gives up easily.
*Tries hard but concentration soon fades and performance deteriorates

Note. *Items denoting lack of persistence are reverse coded.

Table 2

Variable Descriptives for Entire Sample and by Age

	3-year-olds		4-year-olds		Entire Sample	
	Mean	SD	Mean	SD	Mean	SD
Age	42.27***	3.48	54.28	3.54	48.34	6.96
Initiative	48.36***	8.65	54.68	8.83	51.56	9.28
Persistence	44.97**	10.57	49.38	9.91	47.18	10.45
Literacy 1	483.78***	44.28	528.33	43.52	506.31	49.14
Literacy 2	522.35***	46.25	578.50	45.56	551.16	53.74
Math 1	477.04***	37.63	523.99	36.85	500.13	43.98
Math 2	531.87***	42.03	581.82	43.34	557.51	49.41

Note. Significance refers to comparisons between 3- and 4-year olds.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3

Bivariate Correlations Among Age, Initiative, Persistence, and Academic Scores for All Preschoolers

	Age	Initiative	Persistence	Literacy 1	Literacy 2	Math 1	Math 2
Age	--	.46***	.31***	.44***	.50***	.54***	.49***
Initiative		--	.45***	.23**	.28***	.32***	.31***
Persistence			--	.20**	.28***	.19**	.25***
Literacy 1				--	.78***	.76***	.69***
Literacy 2					--	.67***	.82***
Math 1						--	.73***
Math 2							--

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 4

Bivariate Correlations Among Age, Initiative, Persistence, and Academic Scores for 3-year-olds

	Age	Initiative	Persistence	Literacy 1	Literacy 2	Math 1	Math 2
Age	--	.34***	.18	.25*	.08	.20	.06
Initiative		--	.39***	.05	-.03	.12	.04
Persistence			--	.12	.22*	.09	.12
Literacy 1				--	.78***	.72***	.70***
Literacy 2					--	.55***	.72***
Math 1						--	.65***
Math 2							--

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5

Bivariate Correlations Among Age, Initiative, Persistence, and Academic Scores for 4-year-olds

	Age	Initiative	Persistence	Literacy 1	Literacy 2	Math 1	Math 2
Age	--	.35***	.33***	-.04	.15	.16	.19
Initiative		--	.39***	.11	.30**	.20	.33***
Persistence			--	.11	.20	.06	.25*
Literacy 1				--	.66***	.65***	.51***
Literacy 2					--	.54***	.77***
Math 1						--	.63***
Math 2							--

Note. * $p < .05$. ** $p < .01$. *** $p < .001$.

FIGURES

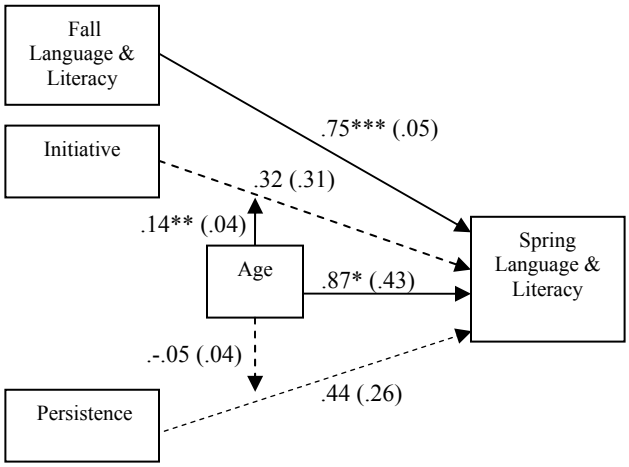

Figure 1. Initiative and persistence predicting to language and literacy outcomes with age as a moderator, controlling for Fall language and literacy scores.
* $p < .05$. ** $p < .01$. *** $p < .001$.

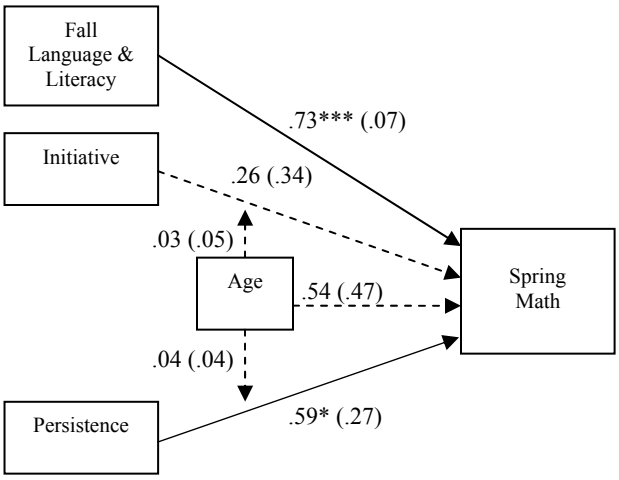

Figure 2. Initiative and persistence predicting to early math outcomes with age as a moderator, controlling for Fall early math scores.
* $p < .05$. ** $p < .01$. *** $p < .001$.

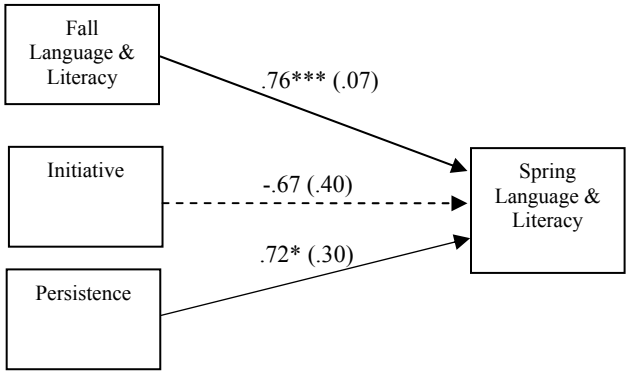

Figure 3. Initiative and persistence predicting to language and literacy outcomes for 3-year-olds, controlling for Fall language and literacy scores.
* $p < .05$. ** $p < .01$. *** $p < .001$.

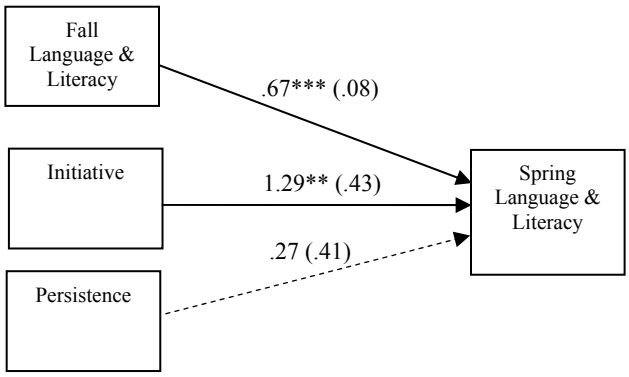

Figure 4. Initiative and persistence predicting to language and literacy outcomes for 4-year-olds controlling for Fall language and literacy scores.
* $p < .05$. ** $p < .01$. *** $p < .001$.

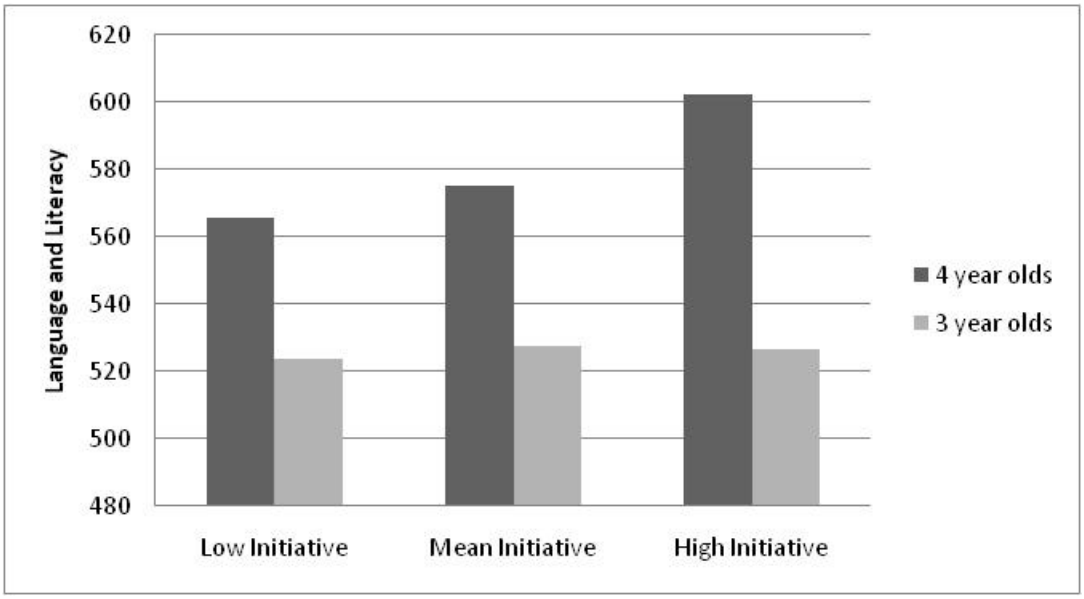

Figure 5. Significant age-x-initiative interaction (½ SD) for language and literacy.

References

Alexander, K. L., Entwisle, D. R., & Dauber, S. L. (1993). First-grade classroom behavior: Its short- and long-term consequences for school performance. *Child Development, 64,* 801-814.

Arizona Early Learning Standards (2005). Arizona Department of Education.

Barnett, D. W., Bauer, A. M., Ehrhardt, K. E., Lentz, F. E., & Stollar, S. A. (1996). Keystones targets for changes: Planning for widespread positive consequences. *School Psychology Quarterly, 11,* 95-117.

Bergan, J. R., Bergan, J. R., Rattee, M., Feld, J. K., Smith, K., Cunningham, K., & Linne, K. (2003). The Galileo system for electronic management of learning (10th ed.). Assessment Technology, Incorporated.

Bjorklund, D. F. (2005). *Children's thinking: Cognitive development and individual differences*. Belmont, CA: Wadsworth/Thomson Learning.

Bjorklund, D. F., & Miller, P. H. (1997). New Themes in Strategy Development. *Developmental Review, 17,* 407-410.

Bornstein, M. H., & Lamb, M. E. (Eds.). (2005). *Developmental Science: An advanced textbook* (5th ed.). New Jersey: Lawrence Erlbaum Associates, Inc.

Cahan, S., & Cohen, N. (1989). Age versus schooling effects on intelligence development. *Child Development, 60,* 1239-1249.

Christian, K., Morrison, F. J., Frazier, J. A., & Massetti, G. (2000). Specificity in the nature and timing of cognitive growth in kindergarten and first grade. *Journal of Cognition and Development, 1*(4), 429-448.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Mahwah, NJ: Erlbaum.

Dobbs, J., Doctoroff, G. L., Fisher, P. H., & Arnold, D. H. (2006). The association between preschool children's socio-emotional functioning and their mathematical skills. *Applied Developmental Psychology, 27,* 97-108.

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., et al. (2007). School readiness and later achievement. *Developmental Psychology, 43*(6), 1428-1446.

Engelmann, S., Granzin, A., & Severson, H. (1979). Diagnosing Instruction. *Journal of Special Education, 13*(4), 355-363.

Ginsburg, H.P., Klein, A., & Starkey, P. (1998). The development of children's mathematical thinking: From research to practice. InW. Damon (Series Ed.), I. E. Siegel & K. A.Renninger (Vol. Eds.), *Handbook of Child Psychology: Vol. 4. Child Psychology in Practice* (5th ed., pp. 401–476). New York: Wiley.

Hamre, B.K., & Pianta, R.C. (2005). Can instructional and emotional support in the first-grade classroom make a difference for children at risk of school failure? *Child Development, 76*(5), 949-967.

Holmbeck, G. N. (2002). Post-hoc probing of significant moderational and meditational effects in studies of pediatric populations. *Journal of Pediatric Psychology, 27*(1), 87-96.

Huttenlocher, J., Levine, S., & Vevea, J. (1998). Environmental input and cognitive growth: A study using time-period comparisons. *Child Development, 69*(4), 1012-1029.

Jencks, C., & Phillips, M. (Eds.). (1998). The black-white test score gap. Washington, DC: Brookings Institution Press.

Kagan, S. L., Moore, E., & Bredekamp, S. (Eds.) (1995). Reconsidering children's early learning and development: Toward shared beliefs and vocabulary. Washington, DC: National Education Goals Panel.

Karnes, M. B., Johnson, L. J., & Beauchamp, K. D. (1989). Developing problem-solving skills to enhance task persistence of handicapped preschool children. *Journal of Early Intervention, 13*(1), 61-72.

Karnes, M., Johnson, L., Cohen, T., & Shwedel, A. (1985). Facilitating school success among mildly and moderately handicapped children by enhancing task persistence. *Journal of the Division for Early Childhood, 9,* 151-161.

Krantz, M., & Scarth, L. (1979). Task persistence and adult assistance in the preschool. *Child Development, 50,* 578-581.

Layzer, J. L., Goodson, B. D., & Moss, M. (1993). Life in preschool: Observational study of early childhood programs for disadvantaged four-year-olds (Vol. I). Cambridge, MA: Abt Associates.

Le Buffe, P. A., & Naglieri, J. A. (1999). Devereux Early Childhood Assessment. Kaplan Press.

Lee, J. S., & Ginsburg, H. P. (2007) Preschool teachers' beliefs about appropriate early literacy and mathematics education for low- and middle-socioeconomic status children. *Early Education & Development, 18*(1), 111-143.

Lemelin, J. P., Tarabulsy, G. M., & Provost, M. A. (2006). Predicting preschool cognitive development from infant temperament, maternal sensitivity, and psychosocial risk. *Merrill-Palmer Quarterly, 52*(4), 779-806.

Martin, R. P. (1989). Activity level, distractibility, and persistence: Critical characteristics in early schooling. In M. K. Rothbart, G. A. Kohnstamm, & J. E. Bates (Eds.), Temperament in childhood (pp. 451-461). Oxford, England: John Wiley & Sons.

McClelland, M. M., Acock, A. C., & Morrison, F. J. (2006). The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school. *Early Childhood Research Quarterly, 21*(4), 471-490.

McClelland, M. M., Morrisson, F. J., & Holmes, D. L. (2000). Children at risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly, 15,* 307-329.

McDermott, P.A. (1999). National scales of differential learning behaviors among American children and adolescents. *School Psychology Review, 28*(2), 280-291.

McDermott, P. A., Green, L. F., Francis, J. M., & Stott, D. H. (1996). Preschool Learning Behavior Scale, Philadelphia: Edumetric and Clinical Science.

McDermott, P.A., Leigh, N. M., & Perry, M. A. (2002). Development and validation of the Preschool Learning Behaviors Scale. *Psychology in the Schools, 39*(4), 353-365.

McWayne, C. M., Fantuzzo, J. W., & McDermott, P. A. (2004). Preschool competency in context: An investigation of the unique contribution of child competencies to early academic success. *Developmental Psychology, 40*(4), 633-645.

Missouri Pre-K Social and Emotional Development Standards and Approaches to Learning (2003). Missouri Department of Elementary and Secondary Education, Early Childhood section.

National Research Council and Institute of Medicine, Committee on Integrating the Science of Early Childhood Development, Board on Children, Youth, and Families. (2000). *From neurons to neighborhoods: The science of early child development* (J.P. Shonkoff & D.A. Phillips, Eds.). Washington, DC: National Academy Press.

New Hampshire Early Learning Guidelines (2005). Division for Children, Youth, & Families, Child Development Bureau.

Newman, J., Noel, A., Chen, R., & Matsopoulos, A. S. (1996). Temperament, selected moderating variables and early reading achievement. *Journal of School Psychology, 36*(2), 215-232.

Peth-Pierce, R. (2000). A good beginning: Sending America's children to school with the social and emotional competence they need to succeed. The Child Mental Health Foundations and Agencies Network [FAN].

Reardon, Sean F. 2003. "Sources of Educational Inequality: The Growth of Racial/Ethnic and Socioeconomic Test Score Gaps in Kindergarten and First Grade." Population Research Institute Working Paper #2003-05R. Pennsylvania State University, University Park, PA.

Rhode Island Early Learning Standards (2004). Rhode Island Department of Education, Rhode Island Department of Human Services, and Rhode Island KIDS COUNT.

Schaefer, B. A., & McDermott, P. A. (1999). Learning behavior and intelligence as explanations for children's scholastic achievement. *Journal of School Psychology, 37,* 299-313.

Sigman, M., Cohen, S. E., Beckwith, L., & Topinka, C. (1987). Task persistence in 2-year-old preterm infants in relation to subsequent attentiveness and intelligence. *Infant Behavior and Development, 10*, 295-305.

Stipek, D. J, & Ryan, R. H. (1997). Economically disadvantaged preschoolers: Ready to learn but further to go. *Developmental Psychology, 33*(4), 711-723.

U.S. Department of Health and Human Services. (2000). *The Head Start path to positive child outcomes.* Washington, D.C.: Head Start, ACF, Department of Health and Human Services.

Werner, E.E. (1995). Resilience in development. *Current Directions in Psychological Science, 4*(3), 81-85.

Yarrow, L. J., Morgan, G. A., Jennings, K. D., Harmon, R. J., & Gaiter, J. L. (1982). Infant's persistence at tasks: Relationships to cognitive functioning and early experience. *Infant Behavior and Development, 5*,131-142.

Zelazo, P. D., & Frye, D. (1998). Cognitive complexity and control: II. The development of executive function in childhood. Current Directions in Psychology Science, 7(2), 121-126.

Zelazo, P. D., & Reznick, J. S. (1991). Age-related asynchrony of knowledge and action. *Child Development, 62,* 719-735.