UNDERSTANDING EARLY VULNERABILITIES FOR ANXIETY:

PREDICTORS OF SELF-EFFICACY IN TODDLERS

by

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Self-efficacy, a proposed vulnerability for anxiety, is thought to be rooted in repeated experiences during children's early years. Few studies have directly examined how these beliefs and behavior patterns are manifested in early childhood despite the importance of infancy and toddlerhood as times of major cognitive, behavioral, and regulatory developments that may play a role in the etiology of psychopathology. Thus a primary goal of this dissertation was describing early self-efficacy, measured as a child's behavioral responses and coping capacity during an impossible task. Factor analyses identified a latent self-efficacy construct based on children's observed task persistence, strategies used during the task, and flexible use of strategies. Through a growth model analytic framework this construct was used to examine individual differences in toddler self-efficacy. A linear growth model demonstrated excellent fit

and decreasing self-efficacy over time, as well as significant variability in toddlers' initial responses and behavioral trajectories across an impossible task.

An additional aim of this dissertation was to identify important predictors and concomitants of toddler self-efficacy at 17 months. Using a structural equation model, paths between self-efficacy and maternal psychopathology, maternal behavior, infant temperament, and social-emotional correlates were examined. Analysis of theorized predictors revealed greater maternal anxiety at 17 months was predictive of lower self-efficacy and increased social-emotional problems. Greater maternal acceptance, responsiveness, and non-intrusiveness during infancy were associated with greater self-efficacy and lower symptoms at 17 months, demonstrating a longitudinal impact of maternal behavior a year later. However, early self-efficacy demonstrated limited associations with toddlers' social-emotional problems. As such, maternal psychopathology and maternal sensitivity appeared to be important predictors of children's elevated symptoms and self-efficacy even at this early age, despite nominal direct associations between children's self-efficacy and symptomatology.

Results demonstrated a multi-faceted construct of self-efficacy in toddlers, encompassing both persistence and coping abilities. This early self-efficacy measurement expanded definitions of efficacy and measured self-efficacy in a younger population than has previously been studied. Early variations in self-efficacy linked to maternal sensitivity during infancy and maternal anxiety indicate the importance of longitudinal associations between risk factors and toddler outcomes for understanding self-efficacy. Clinical implications for assessment and prevention are considered.

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To my parents, whose sensitivity and support taught me to persist in the face of any challenge.

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CHAPTER I

INTRODUCTION

Overview

Cognitive conceptualizations of anxiety disorders have singled out self-efficacy and related constructs as core vulnerabilities for development and maintenance of symptoms. Anxiety disorders are the most prevalent psychiatric disorders in childhood populations (e.g. McClure & Pine, 2006); they are often chronic, interfere significantly in children's daily functioning, and tend to persist into adulthood (Vasey & Ollendick, 2000). Researchers have investigated risk factors and vulnerabilities associated with increased likelihood of anxiety disorders, particularly during middle childhood and adolescence. These studies implicated several factors associated with increased risk of anxiety development, including some internal to children and others originating in parenting and the family environment. For example, past research has explored the varied roles of temperament traits, cognitive characteristics, parental diagnoses, and parenting behaviors in the onset of anxiety pathology.

Studies of early development have looked prospectively at how child temperament, maternal sensitivity, and maternal diagnoses predict later childhood anxiety (Biringen, 1990; Kagan & Snidman, 1999; Feldman, 2007; Nicol-Harper, Harvey, & Stein, 2007) and to some extent self-efficacy constructs (Frodi, Bridges, & Grolnick, 1985; Moorman & Pomerantz, 2008). Other studies of children in preschool

and elementary school have also examined how parenting behaviors, maternal anxiety, and particular cognitive styles (e.g., self-efficacy constructs) are associated prospectively and concurrently with symptoms in children with anxiety (Chorpita, 1998; Messer & Beidel, 1993; Whaley et al., 1999; Wood et al., 2003). However, research on early-occurring vulnerabilities in infancy and studies of symptomatology and self-efficacy in middle childhood rarely takes a longitudinal approach, and often measure constructs that are developmentally non-continuous or difficult to link across a wider developmental age-span. For example, while researchers measure maternal sensitivity in studies with infants, maternal warmth and control are instead measured in studies of older children. While these constructs are theoretically similar and related in measurement, researchers measure them in different contexts and metrics and the two constructs are rarely linked across time in their association with child psychopathology.

As a means of theoretically linking risk in infancy through middle-childhood, as well as gaining an understanding of developmental processes associated with anxiety etiology, my goal in this dissertation was to explore self-efficacy. Self-efficacy has been operationalized and observed as young as 18-months, and is often studied in children, adolescents, and adults. Self-efficacy refers to an individual's beliefs about personal control and agency; self-efficacy beliefs are concerned with what that individual believes she can do under particular circumstances, especially under challenging circumstances (Maddux & Gosselin, 2003). Low self-efficacy has been theoretically and empirically associated with anxiety in older children and adults and with lower levels of mastery in infants (e.g., Bandura, 1977; 1993; Maddux & Gosselin, 2003).

Measured cognitively in middle-childhood and behaviorally in early childhood, individual differences in self-efficacy as measured by toddler response to mastery and challenge may indicate early anxiety risk (Bandura, 1993; Chorpita & Barlow, 1998). Measured in conjunction with early risk factors such as temperament-based negative affectivity in infancy, maternal anxiety, and maternal parenting behavior, my examination of self-efficacy may begin to explicate the developmental processes linking these known vulnerabilities for anxiety in infants and later manifestations of anxiety in toddlerhood and childhood.

I measured self-efficacy in a population of 17-month-old toddlers. Prior studies of self-efficacy and related constructs measured these behaviors primarily in children 18-months and older, however this dissertation is the first to examine self-efficacy this early in childhood. Data for predictive analyses were collected longitudinally, beginning prenatally when mothers were in their third trimester, and again when children were 5-months- and 17-months-old. Thus, prediction from infant behavior and mother-infant interactions in this dissertation came from this 5-month period, and toddler behavior was measured when children were 17-months-old.

While this was not a clinical sample in terms of anxiety symptomatology in mothers or children, all families demonstrated low socio-economic status (i.e., household income at or below federal poverty guidelines for Oregon, 2004-2005). Several studies have demonstrated that poverty impacts children's social-emotional functioning and that exposure to poverty interferes with an individual's development of beliefs that she is an effective agent in coping with her surroundings (i.e., self-efficacy

beliefs) (See Evans, Gonella, Marcynyszyn, Gentile, & Salpekar, 2005 for a review). Additionally, according to a recent meta-analysis examining links between lower household income and increased psychological distress, 46 studies found elevated internalizing symptoms for children living in poverty (Grant, Compas, Stuhlmacher, Thurm, McMahon, et al., 2003). Several studies have also demonstrated associations between lower socio-economic status and diminished mastery or self-efficacy beliefs in children (Bandura, Barnaranelli, Caprara, & Pastorelli, 1996; Evans et al., 2005). Thus, examination of self-efficacy and early anxiety symptoms in this low SES community sample constitutes a high-risk group for low self-efficacy and increased social-emotional problems.

My aims in this dissertation were threefold, with an overarching goal of measuring self-efficacy as an early vulnerability for anxiety disorders. First, I conceptualized early self-efficacy as a combination of persistence, affect, and coping rather than solely persistence and affect as prior research has done (Abrew & Jennings, 2004). Toddler behavior during an impossible task was measured and individual differences in children's persistence, strategies used, and flexibility of strategies were examined. Finally, self-efficacy's role in the etiology of anxiety was measured through examination of various predictive associations between known risk factors for anxiety, self-efficacy, and toddler psychopathology symptoms. Results from this dissertation will contribute to the identification of early behavior patterns indicating variations in early self-efficacy. In addition, by examining predictive links between pre-existing risk factors, self-efficacy, and toddler symptomatology, these results will help to identify

processes and early factors that exacerbate or lessen the likelihood of anxiety disorders. I will also discuss the clinical implications of these results for prevention and early intervention efforts.

CHAPTER II

BACKGROUND AND LITERATURE REVIEW

Toddlerhood is a time of great cognitive growth and developmental progress. Crucial social and cognitive milestones are achieved during this transition from infancy to childhood, many of which are in service to children's developing senses of autonomy, individuation, and agency (Jennings & Abrew, 2004; Stipek, Gralinski, & Kopp 1990). These developmental milestones are vital to the development of self-efficacy, and while developmental researchers universally describe similar developmental processes there is some disagreement regarding the specific prerequisites for self-efficacy beliefs. Toddlers begin to develop a sense of self-agency that can be observed in their behavior and affect; early pleasure taken in producing effects on their surroundings and motivation to master the environment have been observed in late infancy and early toddlerhood; these early mastery behaviors and associated pleasure have been measured in children under 12-months (Jennings & Abrew, 2004; MacTurk & Morgan, 1995). Self-regulatory capacities increase during toddlerhood, and attentional networks associated with increased executive function abilities are quickly developing (Stipek et al., 1990; Rothbart, Posner, & Kieras, 2006). Self-concept begins to emerge through increased awareness of self-as-object, growing capacities for self-evaluation, and associated self-conscious emotions (e.g. pride, shame; Stipek et al., 1990).

Self-concept and related self-evaluation are considered key components of control, helplessness, and self-efficacy. Regardless of actual task difficulty, low self-evaluations can result in helpless behavior, while self-evaluated competence leads to task engagement and efficacy behaviors. However, to evaluate oneself a child must develop a "categorical" self-concept, such that she understands herself as a distinct entity. Research has shown that toddlers begin to recognize themselves in pictures and mirrors between 15- and 18-months. At about this time, toddlers also begin to use pronouns and demonstrate self-conscious behaviors (Stipek, Recchia, McClintic, 1992). While the impact of these self-evaluative abilities, and the associated emotions of pride and shame, on topics such as school achievement and cognitive development have been widely researched, there is less literature regarding the implications of this kind of self-evaluation for mental health outcomes, and in this dissertation I focused on these types of associations (Burhans & Dweck, 1995; Stipek et al., 1992).

Over the course of toddlerhood, children develop an increasing understanding of goals and outcomes, which contributes to development of positive affect and pride accompanying successful outcomes, shame resulting from failure to reach goals, and a growing capacity for self-efficacy beliefs (Jennings & Abrew, 2004). Around 17- to 18-months of age, children begin to develop a sense of autonomy and protest adult interventions, while younger children readily agree to assistance. Starting around this time, children also begin to show "mastery smiles," which are directly contingent on completion of a goal-directed activity (Kagan, 1981). These cognitive and

developmental shifts normatively experienced during toddlerhood are considered necessary for the development of self-efficacy.

Early self-efficacy, along with related constructs such as helplessness and control, has been primarily explored in preschool and school-aged children. However the developmental abilities occurring in toddlers as described above encourage extension of self-efficacy measurement developmentally downward, in order to study the initial manifestations of self-efficacy as toddlers are just first developing efficacy-based beliefs and associated behaviors. This dissertation aims to understand the beginnings of self-efficacy in early childhood, and to additionally examine how variation in self-efficacy behaviors in toddlers relates to development of anxiety.

Development of Early Self-Efficacy

Self-efficacy refers to individuals' beliefs about their abilities to "exercise influence over events that affect their lives" (Bandura, 1993). Efficacy beliefs serve as a "mechanism of agency," and are posited to influence how people of all ages feel, think, and behave. Weems and Silverman (2006) similarly define self-efficacy as individuals' impressions of their ability to impact events, reflecting a cognitive sense of *competence* and *control* (Weems & Silverman, 2006). Of particular note, efficacy beliefs are thought to determine how much effort a person exerts and how long she persists in situations of challenge or threat; one's sense of self-efficacy affects whether and to what extent coping efforts are initiated (Bandura, 1977).

Thus in challenging circumstances, individuals' beliefs in their capabilities to cope and exact change on a situation directly impact their affective and behavioral

reactions. While past conceptualization of the self-efficacy construct is largely cognitive, research on children has explored behavioral and affective components as well (Bandura, 1977; Jennings & Abrew, 2004). Studies of older children and adolescents have used questionnaires and interviews to measure self-efficacy, however for developmental reasons research on self-efficacy in early childhood has instead needed to focus on describing the behavioral, and to some extent the affective, properties of toddlers' engagement with environmental challenges. Researchers have posited a link between these early self-efficacy behaviors and later-occurring cognitive styles that have been observed in childhood and adulthood (Jennings & Abrew, 2004).

Self-efficacy as measured in adults is theorized to develop in a number of ways (e.g., vicarious experience, imaginal experience), however the primary pathway is through personal experience (Bandura, 1977; Bandura, 1997). From a developmental perspective, self-efficacy develops over time from repeated experiences; the process begins in infancy and continues through adulthood. Young infants in their first few months have some understanding of cause and effect, learned through early grabbing and reaching abilities such as holding and shaking a rattle, as well as through contingency-based social interactions such as a consistent parental response to an infant's cry or smile (Mandler, 1992). This growing understanding of cause and effect increases as infants develop symbolic thought and a concept of themselves as distinct individuals over the first two years of life. For example, an infant may note the different sensations produced when putting her own hand versus her mother's hand in her mouth, and these cognitive processes serve as the beginning of self-concept.

With these types of repeated experiences a child begins to learn from her environment, developing agency and coping skills as the beginnings of self-efficacy. Early experiences with control over her environment will encourage an infant to attempt novel behaviors and to expect contingent responses, thus building confidence and an efficacious belief system. However, a child who primarily experiences a delay in or lack of behavior-outcome contingencies in his environment, for example observing a mechanical mobile that moves on its own or experience with an inconsistently responsive or unresponsive caregiver, will struggle to develop confidence regarding control over his environment (Bandura, 1997; Watson, 1977). In sum, social cognitive theory posits that development of agency begins in infancy and over time moves from perceptions of causal relationships to understanding that actions produce outcomes, and finally to a more developed understanding of how one's own actions produce a particular outcome, thus resulting in self-efficacy beliefs (Maddux & Gosselin, 2003).

Over time, different components of self-efficacy develop in line with challenges specific to that developmental stage. In middle childhood, social self-efficacy beliefs are a priority as relationships with peers become salient and prosocial coping and emotion regulation in social situations are required skills for adaptive development (Denham, 1998). In adolescence, social self-efficacy as well as academic and general efficacy skills are important in balancing the demands of academics, peers, and growing autonomy in decision-making and living skills. For example, adolescents with greater self-efficacy beliefs are less likely to abuse substances, practice unsafe sexual behavior, or engage with deviant peer groups (Bandura, 1997; Caprara et al., 1998).

While self-efficacy beliefs become more differentiated and situation-dependent as children and adolescents age, in infancy and toddlerhood self-efficacy is thought to be in its initial stage. As described above, a beginning sense of self-efficacy is thought to emerge as an infant develops a sense of herself as an agent acting on the environment. These early-infancy and toddlerhood self-efficacy behaviors admittedly overlap with what has been described in the literature as mastery motivation or competence, a construct related behaviorally to self-efficacy and defined as the ability to persist at a task in the face of challenge (e.g. McCall, 1995; Morgan & Yang, 1995). Mastery has been examined extensively in 17-21-month-olds as toddlers' persistence during challenging puzzle and shape sorter tasks (Barrett, Morgan, & Maslin-Cole, 1993; Busch-Rossnagel, Vargas, Knauf, & Planos, 1993; Caruso, 1990; Frodi, Bridges, & Grolnick, 1985; Gilmore, Cuskelly, Purdie, 2003; Hauser-Cram, 1993; Moorman & Pomerantz, 2008; Sigman, Cohen, Beckwith, & Topinka, 1987), and mastery orientation has been demonstrated as relatively stable over time (Gilmore, Cuskelly, & Purdie, 2003) and associated longitudinally with achievement motivation (see MacTurk & Morgan, 1995 for a review). For example, Moorman and Pomerantz measured 4-year-old children's behavior on a difficult shape search task (similar to a word search game). They measured time spent working on the task, task engagement, persistence, frustration, and giving up on the task, and aggregates of these five dimensions were calculated as a mastery dimension (Moorman & Pomerantz, 2008). Similarly, Gilmore and colleagues measured mastery as 15-36-month-old toddlers' persistence during challenging jigsaw puzzle and shape-sorter tasks (Gilmore, Cuskelly, & Purdie, 2003).

Though highly similar in description during infancy, mastery behaviors in older children indicate competence (i.e. causal beliefs about action-outcome contingencies) or achievement orientation but not necessarily an individual's *beliefs* about their competence or personal efficacy in a particular situation (Bandura, 1977). This differentiation is akin to splitting hairs when applied to infant-and toddler-level research, however since extrapolation and linkage of early-appearing vulnerabilities to later-occurring developmental processes is a key component of this dissertation, I aimed to define early self-efficacy above and beyond mastery motivation. Research validating the construct of mastery motivation in infancy and early childhood has explored the typical developmental course of mastery orientation as it relates to achievement, however this mastery literature has not connected mastery to socio-emotional development or psychopathology etiology (MacTurk & Morgan, 1995).

Self-efficacy has been primarily studied in older children and adolescents, however over the past 20 years researchers have concluded that self-efficacy and related constructs such as helplessness can be measured in preschool and younger populations (Dweck 1991; Burhans & Dweck, 1995). Table 1 provides a summary of research on self-efficacy and related constructs in children ranging in age from early childhood through adolescence. Similar to self-efficacy, helplessness in children is characterized as low persistence, avoidance of challenge, withdrawal from difficulty, and negative self-evaluations. In a series of studies, Dweck and colleagues developed a task using a series of unsolvable and solvable puzzles to measure helplessness. Four and five-year-old children were asked to complete three puzzles, all of which were unsolvable

because of mismatched puzzle pieces, and children were subsequently given a solvable puzzle. Next, children were asked to choose a puzzle to work on a second time, and were given a choice of unsolvable and solvable puzzles (Burhans & Dweck, 1995; Dweck, 1991; Smiley & Dweck, 1994). In a sample of 89 preschoolers, 36% were classified as nonpersisters because they chose the solvable puzzle. These nonpersisting children also demonstrated decreased affect and more helpless beliefs about their future success when interviewed after the solvable puzzle (Dweck 1991). In a similar sample of 78 preschoolers, 51% of children were classified as nonpersisters and 49% as persisters. In this study, persisters were asked to choose a second puzzle at the end of the above-described task, and 90% of these children again chose an unsolvable puzzle, re-confirming their task preference for challenge (Smiley & Dweck, 1994).

Another study by Kistner and colleagues used a task modeled on the same helplessness-inducing unsolvable followed by solvable puzzle task used by Dweck and colleagues in a kindergarten sample of children. Kistner created a composite score of helplessness based on six measures: Puzzle choice, reason given for choice, insufficient ability attribution, effort attribution, expectations for future success, and affect decrement from pre-post failure. Five years later, children's depression symptoms were measured in addition to feelings of self-worth. Children demonstrating greater helplessness at age 5 reported greater depression symptoms and lower feelings of self-worth at age 10 (Kistner, Ziegert, Castro, & Robertson, 2001).

Another study of helplessness in 5-7 year old children again used a modified unsolvable/solvable puzzle task, in this case completed as part of a mother-child

interaction task. Helplessness was measured from children's enthusiasm and motivation for the puzzle tasks, their persistence, and the level of frustration displayed. Children who exhibited more helplessness behaviors during this task with their mothers were independently rated as less competent and more prone to helplessness by their teachers, indicating cross-context reliability for this type of helplessness measure (Nolen-Hoeksema, Wolfson, Mumme, & Guskin, 1995).

A recent study by Cole and colleagues (Cole, Warren, Dallaire, Lagrange, Travis, & Ciesla, 2007) measured helplessness in kindergarteners using a similar task structure of several impossible puzzle trials followed by a solvable puzzle. However, this study is particularly interesting in its use of a novel analytic strategy for examining child behavior and its predictors. Helplessness was measured using six behaviors – positive affect, sadness/withdrawal, protests/refusals, self-evaluation, hopefulness, and motivation. The first three behaviors were observed throughout the tasks, while the last three behaviors were coded based on answers to specific questions after each task trial. Latent growth curves were modeled for each of these behaviors, with a focus on behavior trajectories over the five failure trials. Reliable individual differences were found in these trajectories across the tasks, and children showed significant decreases in positive affect, positive self-evaluation, hopefulness, and motivation across the failure trials. Children additionally increased in sadness and protests over time, suggesting an increasing impact of failure across the tasks (Cole et al., 2007).

While most of the above studies on helplessness have been conducted with preschool- or kindergarten-aged children, two recent studies have examined

helplessness and self-efficacy in toddlers (Jennings & Abrew, 2004; Kelley & Jennings, 2003). These studies used similar tasks to measure helplessness and self-efficacy as persistent, self-directed attempts to master a task, accompanied by positive affect when successful. Kelley and Jennings (2003) measured helplessness in 25- and 32-month-old toddlers using a "helplessness" box, which consisted of a wooden shape sorter with three geometrically shaped holes in the lid, three shapes that were sized to fit into the holes and three pieces that were too large for the holes. The experimenter demonstrated the task with the correctly sized shapes, then gave the toddler the over-sized shapes and instructed them to try the task. Afterwards, the experimenter presented a virtually identical box with correctly sized shapes and instructed the child to complete this task. Toddler behavior during the task was coded for persistence, task avoidance, negative affect, shame, and reluctance to engage in the second box. Factor analyses revealed two factors that were relatively consistent at 25- and 32-months – behavioral helplessness and affect-related helplessness (Kelley & Jennings, 2003).

A second study by Jennings (2004) measured self-efficacy in18-month-old toddlers using a series of six mastery toys, including exploratory, effectance, and goal-oriented tasks. During these tasks, toddler behavior was coded for persistence, mastery pleasure, number of prompts, and pride. A summary index of self-efficacy was calculated by summing standardized scores for all four measures. In addition, to reflect the multi-dimensional nature of self-efficacy, two subindices were formed for behavioral self-efficacy (sum of persistence and reversed prompts) and affective self-efficacy (sum of mastery pleasure and pride). The dimensions within each of these

subindices demonstrated strong intercorrelations and weaker correlations across indices, supporting the multi-dimensional nature of self-efficacy even in young children (Jennings & Abrew, 2004).

These studies provide evidence that self-efficacy is a measurable construct in preschoolers and toddlers and encourage further investigation of these constructs as multi-dimensional phenomena. This dissertation builds on these prior measurement studies to develop a modified conceptualization of self-efficacy which incorporates flexibility and coping behavior as well as persistence and affect. This expanded task and coding system used elements of self-efficacy, mastery, and helplessness tasks in order to thoroughly measure self-efficacy behavior in early childhood.

Self-Efficacy as Risk for Childhood Anxiety

Various researchers have established an association between a sense of agency and the development of anxiety disorders in older children and adults (e.g. Bandura, 1997; Chorpita & Barlow, 1998; Chorpita 2001). For example, Chorpita has proposed children's perceived control as a key cognitive vulnerability for anxiety (e.g. Rotter's locus of control). According to this developmental approach to cognitive theories of anxiety etiology, Chorpita suggests that children's pattern of experiences with uncertainty regarding their ability to control internal and external events can lead to a sense of uncertain helplessness. While Bandura argues that control-related cognitions and behaviors relate to causal beliefs rather than to efficacy beliefs, social cognitive theory suggests that robust or more resilient self-efficacy beliefs are rooted in an

individual's repeated experiences overcoming challenge, particularly where successful outcomes result from persistence and effective coping.

Thus, according to social cognitive theory, as well as Chorpita and Barlow (1998), early childhood experiences with diminished control and fewer competence experiences may result in a sense of decreased personal agency, or low self-efficacy, leading to a sense of uncertainty or anxiety (Bandura, 1977; Bandura, 1997; Muris, Meesters, Schouten, Hoge, 2004). Thus lower or less robust self-efficacy (i.e. low perceived control or helplessness) may represent a psychological vulnerability or mechanism for development of anxiety. In fact, Bandura states that according to social cognitive theory, "it is mainly perceived inefficacy in coping with potential threats that gives rise to both anticipatory anxiety and avoidant behaviors" (Bandura, 1997). A diverse body of literature has demonstrated links between perceived self-efficacy and anxiety symptoms in adults; in fact several cognitive and cognitive-behavioral treatment modalities address personal self-efficacy beliefs (e.g., through guided mastery or vicarious experience (i.e., modeling)) as therapeutic strategies to decrease anxiety (see Bandura, 1997 for a review of adult literature).

In recent years there has been some support of these theories in children and adolescents. Muris and colleagues demonstrated using the Self-Efficacy Questionnaire for Children (SEQ-C) that 11-14-year-old children reporting low levels of perceived control displayed higher levels of anxiety (Muris, Meesters, Schouten, & Hoge, 2004). A similar study using this self-efficacy questionnaire in 12-19-year-olds found associations between low self-efficacy and high trait anxiety, high neuroticism, and

greater anxiety and depression symptoms. In addition, when controlling for trait anxiety, self-efficacy still accounted for a small but significant portion of variance in anxiety symptoms (Muris, 2002). The SEQ-C was found to factor onto three subscales - academic, social, and emotional self-efficacy - and a study in which this questionnaire was administered to 14-17-year-olds found that academic and emotional self-efficacy were associated negatively with depression symptoms (anxiety was not measured), and these effects were greater in girls than in boys (Muris, 2001). Using a different self-efficacy questionnaire, Messer and Beidel (1993) measured self-efficacy or competence in 9-12 year-olds on the Perceived Competence Scale for Children (PCSC). They found that children with an anxiety disorder demonstrated lower competence than did a control group. In addition, they measured competence in children with test-anxiety, and found that these children showed intermediate levels of competence (between children with anxiety and controls).

Wheeler and Ladd (1982) studied self-efficacy and anxiety symptoms in 9-11-year-old children using another questionnaire, the Children's Self-Efficacy for Peer Interaction Scale (CSPI). They found that greater social self-efficacy was associated with lower anxiety. In a similar aged sample (10-12 years), Cowen and colleagues developed an interview measure for children's self-efficacy perceptions. They found that stress resilient children had higher perceived self-efficacy than did stress-affected (i.e., anxiety-prone) children (Cowen, Work, Hightower, Wyman, Parker, & Lotyczewski, 1991). Another study by Suveg and Zeman (2004) used children's responses during an emotion regulation interview to code general self-efficacy in terms

of confidence in regulatory abilities. In this group of 8-12-year-olds, children with anxiety disorders perceived themselves as lower in self-efficacy than did a non-anxious control group (Suveg & Zeman, 2004).

As described in these preceding paragraphs, a wide array of research using questionnaire and interview methodology and a range of participants from middle childhood to adolescence has demonstrated associations between anxiety symptoms or anxiety disorders, and self-efficacy. Additional research has shown associations with anxiety for constructs related to self-efficacy in definition and measurement. Perceived control measured through self-report questionnaires has been demonstrated as highly negatively correlated with anxiety in both clinical and school-based samples (Chorpita, 2001). A study of 117 children ranging in age from 9-17 measured perceived control using a 30-question control-beliefs questionnaire developed for this study. Weems and colleagues found that children with anxiety disorders reported lower perceived control than did non-anxious children. In addition, greater perceived control over anxiety-related events was associated with lower self-reported anxiety in this sample (Weems, Silverman, Rapee, & Pina, 2003). An older study, measuring locus of control using the Nowicki-Strickland Locus of Control Scale (NSLOC), found that children with an external locus of control tended to report greater anxiety (Nunn, 1988). In general, studies have found moderate to strong negative associations between perceived control and anxiety, even when controlling for depression (Chorpita, 2001; Weems & Silverman, 2006).

Self-efficacy, as well as children's perceptions of control, has been measured most often in older children, and in middle childhood and adolescence lower self-efficacy and decreased perceptions of control have both been associated with greater anxiety at a trait and symptom level. As described in the previous section, self-efficacy as well as similar constructs such as helplessness and mastery motivation/mastery orientation have been measured in preschool and younger populations. However, in early childhood and preschool populations, these constructs have not been explicitly linked with anxiety or other psychopathology through research, apart from one study linking helplessness at age 5 with greater depressive symptoms and negative feelings of worth at age 10 (Kistner et al., 2001).

In summary, etiological theories of anxiety suggest that symptoms result from cognitive styles based on long-term patterns of non-contingent behavior-response outcomes. One type of cognitive vulnerability for anxiety in older children is low self-efficacy, beliefs based in a perceived lack of competence or effective control learned from early environments. Bandura's social cognitive theory and Chorpita's cognitive theory of anxiety both root self-efficacy or control beliefs in early experiences, however longitudinal links between these early experiences, self-efficacy behaviors, and anxiety symptoms have not been empirically tested in a single study. In addition, the prospective time-course of self-efficacy or helplessness preceding anxiety as posited in these theories has little empirical evidence due to reliance on cross-sectional research in older children. Exploration of early self-efficacy behaviors in toddlerhood, the period when efficacy beliefs are initially developing and before anxiety disorders are full-

blown and recognizable, provides an opportunity to begin a prospective examination of self-efficacy as a precursor to anxiety. This dissertation explores early self-efficacy, linking these toddler behaviors to early symptoms of undifferentiated psychopathology, as well as examining associations with antecedents in infancy that have been demonstrated as risk factors for later anxiety and thus are hypothesized as risk for lower self-efficacy. This investigation of early toddler self-efficacy behaviors and associated risk factors may provide an important next step in understanding the developmental processes underlying efficacy beliefs and anxiety disorders in childhood.

Risk Factors for Anxiety: Links with Early Self-Efficacy

A large literature base exists on the etiology of anxiety disorders in children. Risk for anxiety has been explored in terms of child-based characteristics as well as parenting or family-based dimensions. However, less research has examined precursors to self-efficacy. Specifically, few researchers have investigated associations between self-efficacy behaviors and children's internal traits or maternal behavior and psychopathology from a longitudinal or even a cross-sectional perspective. The third aim of this dissertation focused on these longitudinal pathways between risk factors in infancy to self-efficacy and toddler psychopathology symptoms at 17-months. Thus, the following sections discuss how infant temperament, maternal psychopathology, and maternal behavior have been associated with anxiety in childhood, and to a limited extent with self-efficacy behaviors.

Temperament as a Risk Factor. Evidence suggests that temperamental factors serve as an important psychological vulnerability for anxiety (Hirshfeld-Becker et al.,

2004). In a sample of healthy infants followed by Kagan and colleagues, approximately 20% of children were born with a temperamental bias predisposing them to be highly reactive to novel situations and unfamiliar people. Kagan described children with this temperament profile as behaviorally inhibited (BI), and found this trait to show high levels of stability over time. Toddlers who were highly reactive to novelty (BI) as infants demonstrated significantly more fear reactions to novel situations and unfamiliar people at ages 14- and 21-months than did formerly low reactive toddlers (Kagan & Snidman, 1999). In fact, Kagan found that approximately one-third of adolescents formerly assessed as inhibited continued to show signs of inhibition and clinically significant social anxiety (Kagan & Snidman, 1999). There also was a significant association found between categorization as inhibited before age 2 and a diagnosis of social anxiety in adolescence (61%, compared to only 27% for individuals classified as uninhibited) (Kagan, Snidman, McManis, & Woodward, 2001). Though not all inhibited children later developed social phobia, these findings suggest that early behavioral inhibition may be a specific vulnerability for anxiety disorders.

An alternate framework conceptualizing temperament, developed by Rothbart and Derryberry (1981), observes biologically-based infant behavioral tendencies on a continuum rather than taking Kagan's categorical perspective. Rothbart and Derryberry define temperament as "constitutionally based individual differences in reactivity and self-regulation" (Rothbart & Sheese, 2007). According to Rothbart's temperamental constructs, infants show individual differences in their levels of reactivity or negative affectivity to distress, frustration, and positive stimuli, as well as differences in how

they inhibit or regulate this reactivity. Infants with higher levels of negative affectivity, particularly in the form of fear, have been shown over time to be more prone to internalizing problems, which include anxiety, depression, and general negative emotion (Rothbart, 2007).

Similar to Kagan's studies, Rothbart and colleagues found more highly reactive temperaments, manifested as increased reactivity and fear toward novel stimuli, to be associated with internalizing disorders. While researchers have not yet identified a specific link between temperament measured using Rothbart's model and anxiety disorders, the association between high reactivity and internalizing disorders, as well as overlap in constructs measured by Rothbart and Kagan, suggest that individual differences in vulnerability to states of uncertainty or fear as measured by Rothbart may serve as a diathesis for anxiety.

While associations between self-efficacy and temperament have not been empirically examined, high reactivity and fearfulness in response to novelty may serve to inhibit the development of agency in infancy and thus impact early manifestations of self-efficacy. Social cognitive theory posits that self-efficacy develops based on learned patterns from an individual's early environment, however an infant's temperament may influence how that environment is experienced (Mineka & Zinbarg, 2006). If an infant reaches for a toy and reacts with fear or distress to the novel response, that infant may be discouraged from future attempts at agency. Similarly, a highly reactive infant may experience distress often enough that a generally responsive caregiver may not be able to consistently respond effectively. Thus, an environment that might otherwise foster

agency and efficacy may fall short due to infant temperament-based characteristics. One study, examining associations in infancy (at 8- and 12-months) and in toddlerhood (24- and 36-months) between children's social competence and temperament, offers some support for this hypothesis. In this study, Houck (1999) found that infants and toddlers with difficult temperamental traits (i.e., high on negative affect and reactivity) showed lower levels of social competence across all four time-points. Houck additionally demonstrated that social competence, a construct similar in definition to self-efficacy, particularly increased during children's second year (12-24 months), and the negative association between social competence and difficult temperament was of a higher magnitude during this period than at any other time-point (Houck, 1999).

Constructs of temperament have the advantage of being measurable well before children reach age of onset or diagnosis for psychopathology (Hirshfeld-Becker et al., 2004), and even before development of measurable self-efficacy. Thus child temperament characteristics may serve as indicators for later development of anxiety and self-efficacy. Additionally, specific temperament traits have demonstrated strong continuity across short periods of time (infant through toddler, toddler through preschooler) and the underlying constructs have been shown to remain relatively stable from infancy through childhood (Komsi, Raikkonen, Pesonen, Heinonen, Keskivaara, et al., 2006; Putnam, Rothbart, & Gartstein, 2008). Thus temperament will be an important variable to measure across time as a predictor of toddler self-efficacy and symptomatology.

Maternal Anxiety as a Risk Factor. Researchers have begun to explore vulnerabilities to anxiety within families (Schreier, Wittchen, Hofler, & Lieb, 2008), and associations between maternal and child anxiety over time has been one major focus in this research. For example, a study by Garber (2002) found that maternal anxiety assessed shortly after the birth of a child showed some association with children's high anxiety symptoms at age 14. Although effects were small, these associations despite length of time between observations encourage further investigation. In fact, a recent longitudinal study by Schreier and colleagues (2008) found that in a large sample (N=933), children of mothers with anxiety disorders had a greater risk of developing an anxiety disorder compared to children of mothers without anxiety disorders. Additionally, children were at increased risk for developing anxiety disorders when their mothers demonstrated an earlier age of anxiety onset or more severe impairment. These findings support suggestions of a link between maternal anxiety and child anxiety.

Beidel and Turner (1997) compared 7-12-year-old children of parents with anxiety disorders, depressive disorders, mixed anxiety/depressive disorders, or no psychiatric disorder. They found that children of parents with anxiety, depression, or mixed disorders were significantly more likely to have a diagnosable disorder than offspring of control parents, but that children of anxious parents were more likely to have only anxiety disorders. Thus, while parental psychopathology may serve as a non-specific risk factor, generally increasing risk for disorders in children, parental anxiety serves as a specific risk factor for children's anxiety. Similarly, in a study by Biederman

and colleagues (2005) children were found to be at high risk for developing panic disorder with or without agoraphobia if their parents had panic disorder, however psychiatric comorbidity of bipolar disorder – a form of parental psychopathology often associated with increased likelihood of bipolar disorder and depression in children - conferred greater risk for anxiety in children, suggesting again that while anxiety in parents may contribute specific risk for child anxiety, other forms of parental psychopathology may serve as non-specific risk factors for anxiety (Biederman, Petty, Faraone, Hirshfeld-Becker, Henin, et al., 2005).

Few studies have looked prospectively at maternal anxiety as a predictor of children's self-efficacy. However, Jennings and Abrew examined toddler self-efficacy in children of depressed and non-depressed mothers. They found that toddlers of mothers diagnosed with past or current depression showed less self-efficacy on both behavioral and affective self-efficacy dimensions. In addition, mothers who were concurrently depressed had children with lower overall self-efficacy, indicating that more recent exposure to depression resulted in lower self-efficacy than past exposure (Jennings & Abrew, 2004). A similar study by Kelley and Jennings found that mothers who reported greater depression symptoms had children who displayed greater affect-related helplessness at 32-months. However, no direct associations between maternal depression and an overall helplessness measure were found at 25- or 32- months (Kelley & Jennings, 2003). Another research group similarly found few differences between helplessness behavior in 5-7 year old children as a result of maternal depression symptoms (Nolen-Hoeksema et al., 1995). However, both Kelley and Nolen-

Hoeksema found relations between maternal behavior during dyadic interaction tasks and children's helplessness that differed as a function of maternal depression, and these will be discussed in the following section.

Previous research has found a specific relation between maternal anxiety and child anxiety, above and beyond the relationship found between maternal depression and later anxiety in children (Beidel & Turner, 1997). However, associations between maternal depression and childhood anxiety indicate that mothers' depression may serve as a non-specific risk factor for anxiety in children. In addition, while research has not yet examined specific associations between maternal anxiety and self-efficacy, several studies have found links between maternal depression and children's self-efficacy and helpless behavior. Given this increased risk of anxiety disorders in children of mothers with anxiety, and some evidence of lower self-efficacy in children of mothers diagnosed with depression, this dissertation explored the associations between maternal anxiety and depression symptoms, self-efficacy, and toddler psychopathology symptoms. While fine-grained measurement of anxiety disorders in early childhood populations was largely unfeasible (Warren et al., 2006), I measured elevated problem symptoms in toddlers as an important outcome of maternal symptomatology and correlate of self-efficacy.

Maternal Behaviors as Risk Factors. Research on development of anxiety in preschoolers and older children has indicated specific parenting behaviors associated with anxiety disorders, among these maternal rejection, control, and intrusiveness. Several researchers have additionally examined the role of similar maternal behaviors in

infants and toddlers via maternal sensitivity (e.g. Feldman, 2003; Wood, McLeod, Sigman, Hwang, & Chu, 2003). Few studies however have examined the longitudinal course of rejection, intrusiveness, or maternal sensitivity in parenting across infancy and toddlerhood, and this dissertation is the first known study to incorporate these parenting dimensions as vulnerabilities for early psychopathology symptoms within the context of self-efficacy.

Maternal acceptance (in contrast to rejection) behaviors are characterized by interactional warmth, approval, and acceptance of a child's emotions. Experience with warmth and acceptance are thought to teach children successful coping and decrease proneness to anxiety. In contrast, parenting high in rejection undermines children's regulatory processes and increases sensitivity to uncertainty or anxiety (McLeod et al., 2007; Wood et al., 2003). Multiple studies of parenting behavior in mothers and their 7-14 year-old children found reduced maternal warmth and acceptance was related to development and maintenance of childhood anxiety (Moore, Whaley, & Sigman, 2004; Whaley et al., 1999; Wood et al., 2003).

Control or demandingness in parenting refers to excessive regulation or authoritarian behavior, where parents are overprotective and intrusive (Wood et al., 2003; McLeod et al., 2007). Excessive parental control has been associated with children's increased dependence on parents, theorized to decrease children's self-efficacy and perceptions of mastery and thus leading to anxiety (Wood et al,, 2003; McLeod et al., 2007). Alternately, parents' non-demanding and non-intrusive behavior has been associated with adaptive outcomes (Wood et al., 2007). One study by Whaley

and colleagues (1999) found that anxious mothers of clinically anxious children (ages ranging from 7-14) were rated as less granting of autonomy than anxious mothers of non-anxious children and non-anxious mothers of non-anxious children (Whaley et al., 1999). These findings were replicated in two recent studies, implicating child anxiety as even more strongly associated with maternal control or demandingness in parenting than with mother's anxiety status (Wood et al., 2003). Overall, research on parental demandingness has found that children who are clinically anxious or shy are likely to have relatively more controlling mothers, and mothers of anxious children are less likely to grant autonomy during unstructured tasks (Wood et al., 2003).

Similar associations have been demonstrated between maternal behavior and child self-efficacy related behaviors. Kelley and Jennings (2003) assessed maternal warmth, negativity, control, and intrusiveness during a mother-child teaching task when toddlers were 18- and 25-months old. Maternal negativity at 18-months was found to interact with maternal depression in predicting toddler helplessness at 25-months, such that mothers who were more depressed and demonstrated higher negativity in dyadic interactions had children who displayed more helpless behavior (Kelley & Jennings, 2003). Nolen-Hoeksema and colleagues similarly found that mothers who were more negative and hostile towards their 5-7 year old children during a challenging puzzle task had children who were more helpless during the puzzle task and were independently rated as less competent by teachers (Nolen-Hoeksema et al., 1995).

In a recent study, Cole measured helplessness in kindergarteners using a linear growth model to examine trajectories of helpless behavior during a series of unsolvable

puzzle trials. He found that harsh and negative parenting behaviors were associated with decreasing trajectories of helplessness across the failure trials, while warm and positive parenting predicted less helpless behavior during this series of impossible puzzles (Cole et al., 2007). Thus, positive parenting behavior minimized the effect of learned helplessness in these children.

Several studies have examined associations between maternal behavior and general task persistence, a component central to measurement of self-efficacy. For example, Matas, Arend, and Sroufe found that infants assessed as securely attached at 18-months, a categorization considered to indicate a long-term pattern of sensitive and responsive maternal behavior, demonstrated greater persistence and general competence at 2-years (Matas, Arend, & Sroufe, 1978). Frodi and colleagues (1985) found that children of more controlling mothers demonstrated less task persistence (Frodi, Bridges, & Grolnick, 1985). Additionally, Moorman and Pomerantz found greater maternal control was associated concurrently with lower mastery orientation, measured in part as persistence. These researchers additionally demonstrated that greater maternal control predicted lower mastery and persistence 6-months later (Moorman & Pomerantz, 2008). In a similar study, Kelley and colleagues found that greater maternal control behavior during a challenging teaching task at 24-months predicted children's decreased persistence at 36-months (Kelley, Brownell, & Campbell, 2000). Finally, according to Messer and Beidel, 9-12 year-old children with a diagnosed anxiety disorder demonstrated lower competence than a control group and also reported their families as

less autonomy granting, offering some support for a hypothesized association between maternal behavior, child self-efficacy, and anxiety symptoms (Messer & Beidel, 1993).

The majority of studies examining the role of maternal behavior in anxiety, and to some extent in self-efficacy related behaviors, have involved mothers of preschoolers and school-aged children. Research investigating maternal behaviors related to anxiety disorders in younger children and particularly in infants and toddler has been limited, though there is increasing research looking at parenting interactions and maternal sensitivity in mothers diagnosed with anxiety as a risk factor for child psychopathology (Feldman, 2003). Maternal sensitivity refers to caregiver responsivity to infant needs and sensitive caregiving behavior, a global dimension of which acceptance, rejection, intrusiveness, and demandingness are all substantive elements. Caregivers who are more sensitive and contingently responsive are thought to provide infants with more experience soliciting reinforcement. These contingent interactions may be among children's earliest opportunities to experience control and competence in manipulating their environment, thus cultivating an initial sense of agency and self-efficacy.

Anxious mothers were found to report fewer relationship-building behaviors with their infants (Feldman, Weller, Leckman, Quint, & Eidelman, 1999), and other researchers found higher prenatal maternal anxiety related to lower maternal sensitivity when infants were 3-months-old (Cox, Owen, Lewis, & Henderson, 1989). Anxious mothers were found to be more interfering in their infant's play (Biringen, 1990), and another set of researchers found maternal anxiety when infants were 3-months-old was associated with increased maternal intrusiveness at 9 months. Additionally, this latter

study found that when maternal anxiety decreased from 3 to 9 months, maternal sensitivity increased (Feldman, Greenbaum, Mayes, & Erlich, 1997). This dissertation will extend past research examining associations between maternal anxiety and maternal sensitivity to additionally measure how maternal sensitivity behaviors relate to self-efficacy and to problem symptoms in toddlers.

A recent meta-analysis by McLeod, Wood, and Weisz (2007) found that across 47 studies, parenting accounted for 4% of the variance in child anxiety. Analyses suggested that parental demandingness was more strongly associated with child anxiety than was parental rejection, surprising given the key role that parental rejection was thought to play in the development of anxiety (McLeod et al., 2007). However this study, as well as a similar meta-analysis by van der Bruggen and colleagues (2008), suggests that separating the elements of parenting dimensions for further research may help us to better understand what elements of parenting behaviors truly play a role in accounting for the development of anxiety, and in developing self-efficacy. Thus an examination of global and specific parenting behaviors in this dissertation will serve as an additional contribution to preceding research.

In summary, maternal parenting behavior has been examined extensively in association with childhood anxiety disorders, and a number of studies have investigated relations between particular parenting practices and self-efficacy related behaviors such as helplessness, competence, and mastery-based persistence. This dissertation aimed to specifically measure associations between maternal behavior in infancy and toddler self-efficacy, examining maternal behaviors as a general sensitivity construct and also

as specific dimensions of parenting such as intrusiveness and control in mother-infant interactions. While past studies have examined maternal behavior and anxiety symptoms *or* self-efficacy related behaviors, this dissertation is unique in its ability to measure all three constructs and their collective associations.

The Current Study

This dissertation examined vulnerabilities in early childhood for later symptomatology, with a goal of extending known risk factors for anxiety in older children downward to infancy and toddlerhood - the period in which development of these vulnerabilities is hypothesized to be rooted. Specifically, this dissertation focused on conceptualizing early self-efficacy and individual differences in self-efficacy behaviors in toddlers as a vulnerability for child anxiety. A second focus of this dissertation was determining a link between early self-efficacy and toddler symptomatology, an investigation conducted through identification of predictors of self-efficacy and of psychopathology symptoms in toddlers. The results from this dissertation can help researchers and practitioners better understand the elements and mechanisms of early risk for anxiety, perhaps contributing to intervention efforts through early screening, identification, and prevention with children before anxiety increases in severity and impacts individual and family functioning.

According to Bandura's social cognitive theory, self-efficacy is based in behavior patterns developed through repeated experiences during children's early years (e.g., Bandura, 1997). Few studies have directly examined how these early agency experiences and behavior patterns are manifested in early childhood, despite the

importance of infancy and toddlerhood as times of major cognitive, behavioral, and regulatory developments that may play a role in the etiology of psychopathology. Thus a primary goal of this dissertation was describing patterns of early self-efficacy, measured as a child's behavioral responses and coping capacity during an impossible task.

This dissertation additionally examined various hypothesized correlates and predictors of self-efficacy, a risk factor for anxiety disorders in older children and adults. While fine-grained measurement of anxiety disorders in an early childhood population was largely unfeasible in this sample (Warren et al., 2006), I measured elevated problem symptoms, as well as greater temperamental negative affectivity in toddlers as important anxiety-related correlates of self-efficacy. As a validity test, I also measured cognitive development, a construct thought to be linked to self-efficacy in the achievement literature (i.e. greater self-efficacy predicts later cognitive competence) (Gilmore, Cuskelly, & Purdie, 2003).

Predictive analyses examined the role of concurrent (17-months postnatal) and previous (prenatal and at 5-months postnatal) maternal anxiety and depression symptoms in predicting self-efficacy and elevated toddler symptoms. Research has established a strong association between maternal anxiety and depression and children's anxiety symptoms, and several studies have outlined associations between self-efficacy and maternal depression (Jennings & Abrew, 2004; Kelley & Jennings, 2003; Nolen-Hoeksema et al., 1995). This dissertation sought to replicate and extend these findings by examining associations between maternal symptoms, toddler self-efficacy, and child

problem symptoms. Other research has illustrated associations between maternal anxiety, childhood anxiety, and perceived control in older children (Chorpita & Barlow, 1998; Chorpita, 2001); this dissertation aimed to expand these findings by examining direct associations between maternal anxiety and self-efficacy. Analyses also investigated how maternal acceptance, contingent responsiveness, and non-intrusiveness in parenting during infancy were associated with self-efficacy during challenge one year later.

The following specific aims and hypotheses were explored:

Aim 1: Can self-efficacy be measured from observations of toddler behavioral response to an impossible task? This dissertation aimed to identify and describe patterns of self-efficacy behavior in toddlers based on measures of persistence, strategies used, and flexibility of strategies used in a sample of 17-month-old toddlers. In this first aim I evaluated factor structure of self-efficacy based on behavioral responses and coping strategies used during an impossible task. While past measures of self-efficacy in early childhood have primarily consisted of persistence and affect domains, I additionally measured coping strategies used and flexibility of strategies used during the impossible task. I hypothesized that this measure of self-efficacy would map onto previous research (e.g. Jennings & Abrew, 2004) that has found a two-factor structure for self-efficacy, with behavioral dimensions loading independently from affective measures. I anticipated that these expanded measurement domains would reveal a multi-dimensional construct of self-efficacy that better reflected self-efficacy as

defined and measured in older children and adults.

Aim 2: How do individual differences in toddlers' self-efficacy behavior vary over an impossible task? What kind of variation can be seen in initial reactions to an impossible task and patterns of response over the course of the task? Similar to Cole and colleagues' analysis of helplessness trajectories across an impossible task, do children demonstrate specific self-efficacy patterns through initial levels and trajectories of behavior? I hypothesized that there would be notable individual differences in toddler initial levels of self-efficacy as well as toddler self-efficacy trajectories across the task. While initial level was considered an immediate coping response to challenge, I was also interested in children's trajectory, or slope, during the impossible task. I expected that toddlers demonstrating increasing or stable self-efficacy trajectories across the task manifested a pattern of higher or more robust self-efficacy. On the other hand, toddlers who decreased in self-efficacy across the task demonstrated low self-efficacy indicating a sense of futility or giving up during challenge.

Aim 3: Taking a developmental psychopathology approach, the final aim of this dissertation was to identify predictors during infancy and concurrent correlates of self-efficacy initial levels and trajectories. Specifically, I was interested in whether previous or concurrent maternal psychopathology (anxiety and depression), maternal sensitive behaviors during infancy, and infant temperament served as developmental antecedents for variations in toddlers' self-efficacy. I was additionally interested in how self-efficacy related to a set of

developmentally relevant correlates, including toddlers' current social-emotional problems, competence, cognitive development, and temperamental negative affect. I anticipated higher levels of self-efficacy would be linked with lower social-emotional problems, greater competence, and higher cognitive development. Finally, this dissertation explored two experimental constructs measured after the impossible task measuring self-efficacy: challenge preference and latency to engage in the impossible shape-sorter when presented with this toy for a second time. Both of these helplessness measures have been used with preschool and kindergarten populations (Burhans & Dweck, 1995; Cole et al., 2007; Dweck, 1991; Jennings & Abrew, 2004), but not in early childhood samples. As in prior research, I expected toddlers preferring the challenging shape sorter and demonstrating a shorter latency to engage in the task would show greater self-efficacy.

In addition to main-effects models for each of these variables, this dissertation took a structural equation modeling approach to determine paths among hypothesized predictors, correlates, and outcomes of toddler self-efficacy at a multivariate level. These hypothesized associations were based on theoretical and empirical associations found in past research between maternal anxiety and depression, maternal parenting behavior, child temperament, self-efficacy behaviors, and child anxiety symptoms.

Thus this dissertation builds on past self-efficacy research through identification of self-efficacy in a younger population and with an expanded measurement domain. In addition, while a recent study used latent growth curve modeling to describe helplessness trajectories in kindergarteners (Cole et al., 2007), to my knowledge this type of approach has not yet been used in measuring self-efficacy. Finally, a comprehensive examination of hypothesized environmental and internal vulnerabilities for lower self-efficacy and for development of child anxiety symptoms in an early childhood sample provides an important addition to research on anxiety risk, prevention, and intervention.

Table 1
Studies on Self-Efficacy and Related Constructs in Childhood, Arranged by Child Age

Study	*Construct*	*Age Range*	*Measurement*	*Dimensions*	*Predictors/Correlates*
Frodi, Bridges, & Grolnick, 1985	Mastery motivation	12 months (N=41)	Six mastery tasks: Two effect production, two practicing emerging skills, and two problem-solving	Persistence and competence	Children of less controlling mothers showed greater task persistence and competence.
Jennings & Abrew, 2004	Self-Efficacy	18-months (N=132)	Variety of mastery (challenging) tasks	Behavioral and affective dimensions	Toddlers of depressed mothers showed less self-efficacy, more recent exposure to depression associated with lower efficacy.
Kelley & Jennings, 2003	Helplessness	25- and 32-months (N=134)	Behavior and affect during impossible shape sorter task	Behavioral and affective dimensions	Maternal behavior moderated the relation between maternal depression and helplessness.
Kelley, Brownell, & Campbell	Mastery Motivation	24- and 36-months (N=75)	Six achievement tasks varying in difficulty	Persistence, avoidance, pride, shame	Maternal autonomy-supporting behavior at 24-months predicted less shame, greater persistence, and less avoidance at 36-months.
Gilmore, Cuskelly, Purdie, 2003	Mastery Motivation	2 years and follow-up at 8 years (N=43)	At age 2, mastery task with puzzle and shape sorter of varying difficulty. At age 8, challenging puzzle and fishing game coded for task persistence	Persistence	Persistence stable across time for girls, not boys. Persistence at age 2 predicted cognitive functioning and academic achievement at 8 years. No associations found for boys.

Table 1 continued

Study	*Construct*	*Age Range*	*Measurement*	*Dimensions*	*Predictors/Correlates*
Moorman & Pomerantz, 2008	Mastery Orientation	4 years (N=110)	Observed mother-child interaction during challenging task	Five mastery dimensions: Time working on task, Task engagement, Persistence, Frustration, Give up	Maternal control associated with concurrent and predicted decrease in child mastery orientation.
Dweck, 1991	Helplessness	4-5 years (N=89)	Three impossible puzzles followed by solvable puzzle, then children were given choice between finishing solvable or unsolvable puzzle	Persisters and Nonpersisters	32 (36%) of children classified as Non-persisters, these children showed decreasing affect and helpless beliefs about future success.
Smiley & Dweck, 1994	Helplessness	4-5 years (N=78)	Impossible and solvable puzzles	Persisters and Nonpersisters	40 (51%) were classified as Non-persisters. When asked to choose a second puzzle, 90% of persisters again chose an unsolvable puzzle.
Cole , Warren, Dallaire, Lagrange, Travis, & Ciesla, 2007	Learned Helplessness	5 years (N=95)	Impossible puzzle trials followed by solvable puzzle trial	High and low helplessness	Negative life events and harsh/negative parenting associated with greater learned helplessness, warm/positive parenting associated with lower helplessness.

Table 1 continued

Study	*Construct*	*Age Range*	*Measurement*	*Dimensions*	*Predictors/Correlates*
Kistner, Ziegert, Castro, & Robertson, 2001	Helplessness	Helplessness assessed at 5 years, follow-up at 10 years (N=112)	Helplessness composite based on response to Dweck's impossible and solvable puzzles task	Helplessness spectrum	Helplessness at age 5 predicted more depressive symptoms at age 10 and more negative feelings of worth.
Nolen-Hoeksema, Wolfson, Mumme, & Guskin, 1995	Helplessness	5-7 years (N=40)	Challenging puzzle task	Mastery and helplessness	Depressed mothers used more negative affective tone, and mothers with negative affective tone were less able to encourage mastery and children exhibited more helplessness. These children rated as less competent by teachers.
Townsend, Dimigen, & Fung, 2000	Self-efficacy	7-14 years (N=60)	Asked how sure that "you will be well-behaved in the dentist's room"	General self-efficacy	Child efficacy not associated with dental anxiety.
Suveg & Zeman, 2004	Self-efficacy	8-12 years (N=52)	Emotion Regulation Interview	General self-efficacy score	Children with anxiety disorders perceived themselves as lower in self-efficacy than control group.
Wheeler & Ladd, 1982	Social self-efficacy	9-11 years (N=138)	Children's Self-Efficacy for Peer Interaction scale (CSPI)	Social self-efficacy scale	Social self-efficacy negatively related to anxiety.
Messer & Beidel, 1993	Self-efficacy	9-12 years	Perceived Competence Scale for Children (PCSC)	Competence	Children with an anxiety disorder had lower competence and temperamental flexibility than controls, test-anxious children showed intermediate levels of competence. Children with anxiety described families as less autonomy-granting.

Table 1 continued

Study	*Construct*	*Age Range*	*Measurement*	*Dimensions*	*Predictors/Correlates*
Cowen, Work, Hightower, Wyman, Parker, & Lotyczewski, 1991	Perceived self-efficacy	10-12 years, (N=74)	Self-efficacy interview	General self-efficacy score	Stress-resilient children had higher self-efficacy than stress-affected children.
Weems, Silverman, Rapee, & Pina, 2003	Control	9-17 years (N=117)	Control assessment questionnaire (30 questions)	Control over Internal Reactions and External Events	Perceived control over anxiety-related events negatively correlated with self-reported anxiety. Children with anxiety disorders reported lower perceived control than non-anxious participants.
Nunn, 1988	Locus of Control	11-14 years (N=267)	Nowicki-Strickland Locus of Control Scale (NSLOC)	External and internal locus of control	External control associated with greater anxiety.
Muris, 2002	Self-efficacy	12-19 years (N=596)	Self-Efficacy Questionnaire for Children	Academic, social, and emotional self-efficacy	Low self-efficacy associated with high trait anxiety/neuroticism, anxiety symptoms, and depression symptoms.
Muris, 2001	Self-efficacy	14-17 years (N=330)	Self-Efficacy Questionnaire for Children	Academic, social, and emotional self-efficacy	Academic and emotional self-efficacy associated negatively with depression, effects were greater in girls than boys.

CHAPTER III

METHODS

Participants

Participants ($N = 105$) were recruited during their third trimester of pregnancy through local childbirth education classes, hospitals, and public assistance organizations as part of a longitudinal research effort to identify psychobiological markers of risk for insensitive or unresponsive parenting. Out of 299 interested participants 130 were contacted for initial screening using the Screening Scale for Problems in Parenting (SSPP; Avison, Turner, & Noh, 1986) and 128 were screened using a 9-item version of the Center for Epidemiological Studies-Depression scale (CES-D; Radloff, 1977). During this prenatal stage, participants who scored in the clinical range on either measure (11 and above out of a possible 25 on the SSPP and 12 and above out of a possible 36 on the CES-D) were invited to participate in the prenatal laboratory visit. The final prenatal sample demonstrated elevated levels on at least one of these measures (CES-D, $M = 9.27$, $SD = 5.28$; SSPP, $M = 17.62$, $SD = 4.13$) during screening.

Ninety-five participants returned to the laboratory again (Time 2) when their infants were 5-months-old ($M = 20.99$ weeks, $SD = 2.55$). Of the 10 participants who did not complete the 5 month visit, one mother's baby died, two moved, four could not be reached, two had infants who were too fussy to participate, and one had volunteered for the prenatal assessment alone, so she was not contacted for the postnatal assessment.

Two dyads could not be coded for maternal sensitivity due to filming error, and two other dyads returned to the laboratory but did not complete the still face paradigm during which maternal sensitivity was coded. Thus, the final sample size for Time 2 was 91 mother-infant dyads. The differences in participant age, marital status, education, or household income between participants who completed the 5 month assessment and those with missing data were not statistically significant.

Eighty-six mother-child dyads returned to the laboratory for two sequential visits during a third wave of data collection (Time 3) when children were 17-months-old (M = 17.6 months, SD = 1.76). Of the 23 participants who did not complete the 17-month visit, one mother's baby died, 5 moved, 10 could not be reached, and one had volunteered for the prenatal assessment alone, so she was not contacted for the postnatal assessments. One child was in foster care and did not participate, and one mother was not interested in participating. One participant who did not participate at 5-months returned for this third data collection. Two participants completed questionnaires but did not return for a laboratory visit. One participant came to an initial lab session but did not return for the second visit, during which the primary task was conducted. One child was in the custody of a grandparent, and while the child participated in this third wave of data collection, information on the mother was not available. In addition, one child participated in the Time 3 session but refused to participate in the self-efficacy task, and one child's self-efficacy data was unusable due to experimenter error, thus the final sample size for Time 3 was 84 mother-child dyads.

Participant Demographics. See Table 2 for an overview of participant demographics. At the prenatal assessment (Time 1), women ranged in age from 18-38 (M=23.97, SD=4.66). Approximately 93% of the sample had a personal income of less than $20,000 and 56% reported household incomes below $20,000. Approximately 43% attended some college or received a 2-year degree, and 29% of mothers reported a high school diploma or GED as their highest level of education. Most of the mothers were either living with their partner (41%) or they were married (41%). Mothers were primarily European-American (80%), with 2.8% African American, 6.5% Hispanic, 3.7% American Indian, 1% Asian, and 5.6% identifying as "other."

Table 2
Demographic Data and Descriptive Statistics for Sample at 5-Months Postnatal

	Percentage	*M(SD)*	Range
Mother Age (years)		24.11 (4.77)	18-38
Education			
Some HS or HS degree	27		
Some college	46		
4-year college degree	7.8		
Graduate or professional degree	3.9		
European American*	85.0		
Married	46.0		
Family income [a,b]		21,000-40,000	1-90,000
Employed full-time	13.6		
Employed part-time	25.9		
Child Age (weeks)			
Postnatal visit 1		20.99 (2.55)	16-32
Postnatal visit 2		70.40 (7.04)	64-100
Child Gender Male			
Postnatal visit 1	44		
Postnatal visit 2	44		

[a] Median is reported; [b]Income reported in dollars
*3.7% African American, 2.4% Hispanic, 3.7% American Indian, 4.9% "other"

At the 5 month assessment, infants ranged in age from 16 to 32 weeks (M = 20.99 weeks, SD = 2.55). There were 42 males and 53 females. The mother's mean age was 24.11 years (SD = 4.77, range = 18-38) at the time of the 5 month assessment. Approximately 93% of the sample had a personal income of less than $20,000 and 47% had household incomes below $20,000. Approximately 27% of mothers reported a high school diploma or GED as their highest level of education, while 46% attended some college or received a 2-year degree. Most of the mothers were either married (46%) or living with their partner (35%). Mothers were primarily European-Americans (85%), with 3.7% African American, 2.4% Hispanic, 3.7% American Indian, and 4.9% identifying themselves as "another group."

At Time 3 children were approximately 17-months-old (M = 17.6 months, SD = 1.76; 38 male, 48 female). Mothers' mean age was 25.58 years (SD = 4.39, range = 19-39). Approximately 80% of the sample had a personal income of less than $20,000 and 33% had household incomes below $20,000. Nineteen percent of mothers reported a high school diploma or GED as their highest level of education, while 52% had attended some college or received a 2-year degree. Most of the mothers were either married (53%) or living with their partner (21%). Mothers were primarily European-Americans (84%), with 3.5% African American, 4.6% Hispanic, 2.3% American Indian, and 4.9% identifying themselves as "other."

Procedures

Time 1: Prenatal. During their third trimester of pregnancy, mothers came to the laboratory where they participated in several tasks and interviews. Participants

additionally completed a packet of questionnaires at this initial visit, including the Beck Anxiety Inventory (BAI-II) and the Center for Epidemiological Studies-Depression scale (CES-D) used in these analyses.

Time 2: 5-Months Postnatal. When infants were 5-months-old, they and their mothers came into the laboratory and participated in a series of tasks measuring infant development and parent-child interactions. The focal point of this laboratory session was the Still-Face Paradigm, during which measures of maternal sensitivity behaviors used in these analyses were coded. Mothers were asked to additionally complete a packet of questionnaires, including the Beck Anxiety Inventory (BAI-II), Center for Epidemiological Studies-Depression scale (CES-D) and the Infant Behavior Questionnaire (IBQ) used in these analyses.

The Still-Face Paradigm is a 6-minute laboratory procedure used to explore dynamic aspects of interactions between infants and caregivers (Tronick, Als, Adamson, Wise, & Brazelton, 1978). Experimenters introduced the mother to the SFP by explaining that they were interested in how babies behave when their parents are playing with them, and how they react when their parents are not responding to them. Infants were placed in a high chair across from the mother, after which the experimenter left the room and communicated the specific procedures of the SFP over an intercom from a separate filming room. Specifically, mothers were asked to play with their babies (with no toys) for two minutes, and play peek-a-boo for 30 seconds. Following standard procedures, mothers were then signaled to turn to their left for 15 seconds, and then signaled to turn around with a neutral face for two minutes. Following this still-

face episode, mothers were signaled to turn around to their left for 15 seconds, and then signaled to play with their baby again for one minute. This last episode constituted the reunion episode, and this period was coded for mothers' behaviors in soothing or engaging with their infant. This slightly modified version of the SFP was adapted from Lewinsohn (1996) as reported in Forbes, Cohn, Allen, and Lewinsohn, (2004). If the infants were fussy for more than 15 seconds at the start of the procedure, the interaction was stopped and the SFP was attempted again after the baby was soothed.

The SFP was video-recorded with one camera on the mother and one on the infant. A split-screen generator combined the images so that the mother and infant behaviors could be observed simultaneously. For the purpose of this dissertation, only the fourth episode (the reunion portion) of the SFP was coded and analyzed, since this phase reflected maternal behavior during distress, a period in which maternal sensitivity is more comprehensively demonstrated than in non-distressed or play episodes (Conradt & Ablow, 2010).

Time 3: 17-Months Postnatal. When children were 17-months-old, mothers and toddlers again came to the laboratory for a series of two visits scheduled within one week. At the first visit the Bayley Scales of Infant Development were conducted as a measure of cognitive development. During the second lab visit, a series of tasks measuring dyadic interactions and child characteristics were conducted, lasting approximately 2 hours. At the end of each session, mothers were given a packet of questionnaires to complete while children were engaged by the experimenter in a task measuring self-efficacy behaviors.

In *Part 1* of this three-phase self-efficacy task, the experimenter introduced a simple form board puzzle and encouraged the child to complete the puzzle, helping when necessary and verbally reinforcing success in order to provide a mastery experience for the child. Once completed, the puzzle was removed and a wooden shape-sorter box was produced for *Part 2*. The experimenter demonstrated how a set of balls fit through circular holes cut into the top of this box and rolled out through a hole in the side, then gave the child an opportunity to practice the task. During this second part of the task, once the child had successfully attempted the activity, the balls were switched for a matching set that were slightly too large for the holes. The child was given a minimum of 30 seconds and a maximum of 1 minute to attempt this impossible task, and this portion was the focal point of this self-efficacy measure. If children lost interest or a minute passed, the toy was removed and a set of alternate toys was produced for a 2-minute break. After the break, in *Part 3* of the task, the experimenter produced the puzzle and the wooden box again and asked the child to choose with which toy she preferred to play. If the child chose the puzzle they were given a chance to complete it, however all children received the wooden shape-sorter box a second time and were also presented with four balls sized to fit in the holes and encouraged to try the task again. After attempting the shape sorter successfully, children were praised for their efforts and debriefed in a developmentally appropriate fashion that "these balls fit in the box but the other balls were the wrong size." This self-efficacy task was videotaped and coded.

Coding Procedures: 5-Months Postnatal

Coding of Maternal Behaviors. Maternal sensitivity was assessed during the reunion episode of the Still-Face Paradigm (SFP) using the Global Ratings of Mother-Infant Interaction (Murray, Fiori-Cowley, Hooper, & Cooper, 1996). Coders examined seven dimensions of maternal behavior, coded on a scale from 1-5. Higher scores represented higher levels of the following dimensions: Warmth, acceptance, responsiveness, demandingness (reversed), sensitivity, intrusive behavior (reversed), and intrusive speech (reversed). *Warmth* was defined as the degree to which the mother expressed love and affection toward her baby; *acceptance* included the willingness and ability of the mother to follow the infant's lead; *responsiveness* was operationalized as both the mother's awareness of her infant's signals and response to them; *demandingness* was defined as the degree to which the mother required the infant to behave in a certain way; *sensitivity* included the ability of the mother to identify her infant's signals and vary behavior appropriately; *intrusive behavior* included the mother's attention-demanding behaviors and actions that interrupted infant communication; and *intrusive speech* considered the timing of the mother's speech in relation to infant vocalizations. Two composite scores were created: overall maternal sensitivity was calculated by averaging the participants' scores on five dimensions (warmth, acceptance, responsiveness, demandingness, and sensitivity); and a combined measure of maternal sensitivity and non-intrusiveness was additionally calculated based on means of all seven dimensions.

Inter-Rater Reliability. A subset of tapes (19; 17%) was coded by two coders to evaluate inter-rater reliability. Intraclass correlations between both coders for each of the seven dimensions coded were .88 (Warmth), .92 (Accepting), .87 (Responsive), .94 (Demandingness, reversed), .93 (Sensitivity), .96 (Intrusive behavior), .89 (Intrusive speech). The five maternal sensitivity scales were highly intercorrelated (*mean r* = .71, range = .46 to .91) and were accounted for by a single factor in a principal components analysis, thus I averaged each woman's score on all five dimensions to create a single measure of maternal sensitivity. Similarly, when all seven scales were examined they were generally highly correlated (*mean r* =.58, range = .10 to .91) and loaded onto a single factor. Thus, an aggregated measure of maternal behavior was created from averaging scores on all seven dimensions, and analyses were run with both this variable and the measure of maternal sensitivity.

Coding Procedures: 17-Months Postnatal

Coding of Child Behavior. Behaviors associated with self-efficacy were coded during the impossible shape-sorter task using a modified system based on coding previously developed by Jennings and Abrew (2004; Kelley & Jennings, 2003) to measure self-efficacy and helplessness in 18-and 25-month-old toddlers. I was primarily interested in toddler behavior during *Part 2* of the overall achievement task, when toddlers were presented with the wooden shape-sorter and over-sized balls. Three primary measures of self-efficacy were obtained during this task phase: *persistence* behaviors during each task element, *affect* during the task, and *strategies used* during the task. I was additionally interested in toddler's *latency to engage* during the final

phase of the task, and *challenge preference,* measured as choice of toy during the final task phase (see Appendix A for task protocol).

Part Two Coding Procedures. Persistence and *affect* were rated every 15 seconds during the second task phase. *Persistence* was rated from 1 to 6 for each time unit based on the behavior that characterized the majority of the 15-second block. This persistence scale ranged as follows: 1 = not engaged (looking away from the toy or trying to leave the area where the toy was presented); 2 = passive (looking at the toy but neither manipulating it nor moving their head or body to examine it); 3 = active-exploring (actively manipulating or examining the toy but without a clear task or goal; e.g., holding ball up to examine, or rubbing ball against carpet); 4 = active-effectance (repetitively manipulating the toy so that a visual or auditory display results. These active-effectance behaviors would indicate that the child perceived that he/she had some influence on the toy, and the behavior was not just curious examination but an intentional action; e.g., throwing balls or banging balls together); 5 = own task (attempting to accomplish a goal that was not the designated goal of the task, e.g. putting the balls in the side hole of the shape-sorter box); 6 = task-oriented (attempting to carry out the adult-defined task for which the toy was designed, e.g. putting the balls in the top hole of the shape sorter). Each child's persistence scores for all four 15-second blocks were used in factor analyses to identify a self-efficacy construct.

Affect was rated from 1 to 5 for each time unit coded, with codes ranging from negative to positive affect. On this scale, 1 = negative (clearly pouting or other negative facial expression *or* vocalized negative affect including crying, whining, or expressed

anger); 3 = neutral (no clear instance of positive or negative affect); and 5 = positive (clear smile or vocalization of positive affect, including laughing or squealing with delight). Affect scores for each 15-second block were used in initial factor analyses, however due to lack of variability in affect – toddlers tended to maintain neutral affect throughout the task – affect was removed from final confirmatory factor models.

Strategies used was coded in two forms: *all strategies used* measured every strategy attempted by toddlers and was coded in 15-second increments, and *main strategy used* was the strategy that characterized the majority of behaviors during each 15-second time block. Possible strategies used were as follows: 1 = Task/goal-oriented; 2 = Child problem-solved, found new method to use toy in proactive, goal-oriented way, stayed engaged in task and shape-sorter despite not focusing on task goals (e.g., using other parts of shape sorter, trying to get other balls from experimenter's storage area); 3 = Child used balls in non-proactive/goal-oriented way but still engaged with toy (e.g. banging in play, throwing or mouthing balls, examining balls); 4 = Child passively observed experimenter or held balls but did not use them; 5 = Child disengaged from task, behaviors did not involve balls or box; 6 = Child socially referenced experimenter (verbal or non-verbal, e.g. gaze orientation or handed balls to experimenter); 7 = Child socially referenced mother (verbal or non-verbal); 8 = Child exhibited undirected vocalization (e.g., grunts, "uh oh"); 9 = Other behavior.

Once coded, the various strategies used were categorized as positive, or indicative of self-efficacy, or negative and reflecting lower efficacy or control over one's environment. Task/goal-oriented (1), problem-solving (2), and social referencing

to experimenter (6) behaviors were categorized as positive, while passive observation (4), disengaging from task (5), and socially referencing their mother, who was uninvolved with the task (7) were considered negative self-efficacy behaviors. The remaining strategies were considered neutral behaviors or not solely indicative of self-efficacy. Based on these positive/negative designations, count variables were created reflecting frequency of positive and negative behaviors used as a *main strategy* during each 15-second block. Flexibility of strategy used was measured via count variables for all positive and negative strategies demonstrated during each 15-second block. Both *main strategy* and *flexibility of strategy* count variables were included in self-efficacy construct factor models.

Part Three Coding Procedures. Latency to engage was coded during Part 3 as the number of seconds between when the experimenter initially presented the correct balls to the child and when the toddler released their first ball into the shape sorter. This time span was intended to reflect individual differences in latency to engage in the formerly frustrating task (i.e., degree of learned helplessness induced). Children who were administered the third phase of the task but never put the ball in (n=4) were considered an extreme case of extended latency and were coded separately as 90 and entered into analyses. Due to significant positive skew, these data were transformed using a natural logarithm function before use in analyses.

Finally, *challenge preference* during this final phase was recorded based on choice of toy, and preference for the initial easy puzzle versus the frustrating shape-sorter was examined as a hypothesized correlate of self-efficacy. In an earlier study,

Smiley and Dweck (Dweck, 1991; Smiley & Dweck, 1994) gave preschoolers a choice between returning to difficult or easy puzzles they had worked on previously, and found associations between choice of the easy puzzle and greater helplessness (i.e., low self-efficacy). In the current study, toddlers were given experience with an easy puzzle during the first part of the task, a difficult puzzle (the impossible shape-sorter task) during the second part, then were given a choice about which toy they would prefer to play with again in the third part of the task. Given past findings that children demonstrating helplessness chose the easy puzzle rather than the more difficult one, and other research showing an inverse association between helplessness and self-efficacy, I expected toddler choice of toy to reflect self-efficacy orientation.

Inter-Rater Reliability. A subset of tapes (15; 19%) was coded by two coders to evaluate inter-rater reliability. Intraclass correlations between both coders for the five primary dimension of interest were .76 (Persistence), 1.0 (Affect), .75 (Primary Strategy), .68 (Flexibility of Positive Strategies), and .77 (Flexibility of Negative Strategies).

Self-Report Measures

Maternal Anxiety. The Beck Anxiety Inventory (BAI) was administered to assess maternal self-report of anxiety symptoms at prenatal, 5 month-, and 17 month visits. Mothers rated 21 items on a scale from 0 (not at all) to 3 (severely, I could barely stand it) indicating the frequency of anxiety symptoms over the previous week. Raw scores were computed by summing the 21 questionnaire items. Higher scores indicate higher levels of anxious symptomatology. The psychometric properties of the

BAI, including internal consistency and construct and discriminant validity, have been demonstrated in a variety of samples (e.g., Beck & Steer, 1990; Fydrick, Dowdall, & Chambless, 1992).

Maternal Depression. The Center for Epidemiologic Studies - Depression Scale (CES-D; Radloff, 1977) was used to assess maternal self-report of depression symptoms prenatally, at 5 month, and at 17 month visits. Mothers rated 20 items on a scale from 0 (rarely or none of the time) to 3 (most or all of the time) that assesses the frequency of depressive symptoms during the previous week. Raw scores were computed by summing the 20 questionnaire items. Higher scores indicate higher levels of depressive symptomatology. The reliability and validity of the CES-D have been demonstrated and the instrument has been used in previous work to measure depressive symptomatology in women during the prenatal and postpartum periods (e.g., Besser & Priel, 2003; Pancer, Pratt, Hunsberger, & Gallant, 2000).

Child Measures

Temperament. The Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2003) was used to assess infant temperament via maternal report. The IBQ-R is a 191-item questionnaire with items rated on a likert scale from 1 to 7, and comprised of 14 scales. The IBQ was collected when children were 5-months-old. The Early Childhood Behavior Questionnaire (ECBQ; Putnam, Jones, & Rothbart, 2002) was used to assess maternal report of toddler temperament. The ECBQ is a 201-item questionnaire with items rated on a likert scale from 1 to 7, and comprised of 18 scales. The ECBQ was collected when children were 17-months-old. Both the IBQ-R and

ECBQ contain items addressing children's behavior during commonly occurring situations. For each item, mothers rated their child on the frequency (never, very rarely, less than half the time, half the time, more than half the time, almost always, always) of a particular behavior in specific contexts (e.g., "When being carried in the past week, how often did the baby push against you until put down?"). Both the IBQ-R and ECBQ have demonstrated adequate internal consistency for all scales, moderate inter-rater reliability, and longitudinal stability over 6- and 12- month spans (Gartstein & Rothbart, 2003; Putnam, Gartstein, & Rothbart, 2006). Research developing these measures has demonstrated consistent factor structure of orthogonal Negative Affectivity, Surgency/Extraversion, and Effortful Control factors. These factor scores demonstrated similar associations to those in previous research (e.g., Putnam, Rothbart, & Gartstein, 2008), however I choose to examine specific temperament scale scores thought to be associated with anxiety and self-efficacy for purposes of specificity and precision (Putnam, Rothbart, & Gartstein, 2008). There is some evidence that infants demonstrating higher reactivity and distress in response to environmental stimuli as well as greater inhibition and shyness have an increased likelihood of developing anxiety problems (Sanson, Hemphill, Smart, 2004; Kagan & Snidman, 1999). Thus, at 5 months I examined the following IBQ-R scales: Fear (startle or distress to sudden changes in stimulation, novel stimuli or people, inhibited approach to novelty), Sadness (general low mood, also low mood related to distress, object loss, or inability to perform a desired action), Falling Reactivity (rate of recovery from peak distress, excitement, or general arousal; ease of falling asleep), and Distress to Limitations (fussing or crying

while in a confining place or position, when involved in caretaking activities, or when unable to perform a desired action). At 17 months, I examined the same temperament dimensions – Fear, Sadness, Falling Reactivity (Soothability), and Frustration. I additionally used Shyness (slow or inhibited approach and/or discomfort in social situations involving novelty or uncertainty) in analyses, a dimension measured on the ECBQ but not on the IBQ-R. Overlapping dimensions on the IBQ-R and ECBQ address similar behaviors though contexts for these behaviors vary in each measure according to age appropriate differences (Putnam et al., 2008).

Social and Emotional Symptoms. The Brief-Infant Toddler Social and Emotional Assessment (BITSEA, Briggs-Gowan & Carter, 2001) was completed by mothers when toddlers were 17-months-old. The BITSEA is a 42-item measure developed as a screening tool for identifying social-emotional and behavioral problems in 1-3 year-old children. Items appearing on the BITSEA are a subset of clinically relevant items on the Infant Toddler Social and Emotional Assessment (ITSEA), a 169-item parent-report questionnaire assessing children's problem and competence areas. The ITSEA contains an internalizing scale including Generalized Anxiety and Separation Distress subscales, both of which address anxiety-related symptoms. Five items from these anxiety subscales were included in the BITSEA (e.g. is afraid of certain places, like stores, elevators, parks, or cars; is very worried about getting dirty; seems nervous, tense, or fearful; worries a lot or is very serious; cries or hangs onto you when you try to leave). Scores on the BITSEA consist of problem symptom and competence scales, calculated by adding raw item scores (0 indicating not true/rarely, 1 indicating somewhat

true/sometimes, or 2 indicating very true/often). Problem scale scores range from 0 to 98 and competence scores range from 0 to 22, with higher scores indicating greater problems or competence respectively. This measure has demonstrated acceptable test-retest reliability, inter-rater reliability, and some predictive validity (Briggs-Gowan & Carter, 2008; Briggs-Gowan, Carter, Irwin, Wachtel, & Cicchetti, 2004). Children's total problem scores, including five anxiety items, and competence scores on the BITSEA were used in analyses as hypothesized correlates or outcomes of self-efficacy. While not a pure measure of anxiety symptoms, specific or fine-grained diagnosis of anxiety disorders in toddlers is difficult and often inaccurate (Warren, Umylny, Aron, & Simmens, 2006), thus problem symptoms were the best proximal construct for anxiety in this 17-month sample.

Cognitive Development. At 17 months toddler cognitive and motor development were assessed using the Bayley Scales of Infant Development, 2nd Edition (BSID-II, Bayley, 1993). The Bayley is a standardized developmental assessment, which yields standard scores describing a child's mental and motor development compared to same-aged peers. For the age range tested in this sample, the Bayley takes approximately 45 minutes to administer and combines a series of activities completed with the toddler on the floor and seated at a table on a caregiver's lap.

Data Analysis Plan

Data Verification and Screening. All questionnaire and coding forms were screened for missing data and inconsistent responses. Questionnaire data was optically scanned; coding and questionnaire data were entered twice and discrepancies were

identified and corrected. Prior to analysis, all variables were checked for out-of-range values and inter- and intrameasure consistency; frequency distributions and plots were examined for unusual data distributions or data points. Preliminary analyses were conducted to test the validity of the assumptions underlying the statistical procedures to be employed and appropriate data transformations were employed when necessary.

Analytic Plan. I analyzed these data in three main steps, corresponding to my three primary aims in this dissertation. A first aim was to measure self-efficacy in young children as an expanded construct including coping abilities and flexibility in addition to persistence; social cognitive theory posits self-efficacy as a multidimensional construct consisting of persistence as well as coping/competence beliefs. In addition, past research has demonstrated a two-factor model of self-efficacy, where one factor reflects behavioral components and the other encompasses affect (Jennings & Abrew, 2004; Kelley & Jennings, 2003). In order to fit factor models according to this theory and prior research, confirmatory factor analytic techniques were used. These analyses allowed for structured factor outcomes rather than merely exploring patterns in the data. Additionally, in contrast to exploratory factor analysis in which constraints are not imposed, the analyses described in this dissertation were theory-driven and as such certain constraints were set in model specification, such as fixing loadings of observed variables and freely estimating related error terms in particular models.

A series of confirmatory factor models were specified and estimated using both SPSS (Version 16.0) and MPlus 5.0 (Muthén & Muthén, 1998-2007). Analytic goals

were to determine the best factor structure over the task as a whole, and to evaluate model structure repeated across time. Beginning with a confirmatory principal components analysis in SPSS, a two-factor model including persistence, main strategies used (positive and negative), flexibility of strategies (positive and negative), and toddler affect was tested. All factors reported had eigen values greater than 1 and factor loadings of .5.

I used MPlus to further examine factor structure of these observational codes, since this program allowed for increased control over parameter settings in model specification (Muthén & Muthén, 1997-2008). To determine the accuracy of a single-factor self-efficacy construct, Model 2 defined a one-factor model in which all self-efficacy behaviors (persistence, main strategies used (positive and negative), and flexibility of strategies (positive and negative)), were specified to load onto a single factor. In order to confirm the presence of a similar factor structure across time, Model 3 was a time-series model consisting of four 15-second time-points over the course of the task, at each of which all 5 observed behaviors were specified to load onto a single factor. Analyses used maximum likelihood estimation, and in each of these confirmatory factor (CFA) models persistence was fixed at 1 to set a scalar variance for the factor. Based on these results, I derived mean-weighted construct scales and confirmed internal consistencies of these self-efficacy constructs by running alphas. These scales were used in further analyses exploring growth in self-efficacy across the impossible task and to test this dissertation's primary hypotheses in Aim 3.

To address the second aim, I used latent growth curve modeling (LGM) to quantify individual differences in self-efficacy trajectories across the impossible task. LGM estimates two latent factors to describe children's self-efficacy behavior across four time-points during an impossible task (Muthén & Muthén, 1997-2008; Cole et al., 2007). Maximum likelihood estimation fit a regression line across these data, estimating for each child a latent intercept and a slope reflecting change in levels across time. In these analyses the intercepts represented initial self-efficacy behaviors when presented with an impossible task. Neutral and positive slopes reflected increasing levels of self-efficacy, while negative slopes indicated a decreasing self-efficacy trajectory. I tested linear and nonlinear models, including a nonlinear quadratic term.

To assess model fit in CFA and all LGM models, I used a variety of tests to evaluate discrepancies between the posited model and the data (i.e., discrepancies between the means and covariances implied by the fitted model and those observed in the sample data). I used multiple fit statistics including chi-square, root mean square error of approximation (RMSEA), and the comparative fit index (CFI). The chi-square goodness of fit test measures how well the specified model fits the actual observed data, and lower values (less significant differences between models) indicate greater fit. RMSEA, or root mean square error of approximation, refers to the square root of the mean of the squared discrepancies between the observed covariance matrix and the implied covariance matrix, thus representing an average of the absolute discrepancies between matrices. The comparative fit index (CFI) assesses where a particular model fits compared against a perfect model and a null or baseline model representing an

arbitrary, highly restricted model (Loehlin, 1992). Conventional guidelines suggest that adequate fit is indicated by a non-significant chi-square, an RMSEA of .05 or lower, and a CFI of .90 or higher (McDonald & Ho, 2002).

As an additional method of exploring latent growth trajectories, I tested for distinct classes of children's self-efficacy behavior using growth mixture modeling (GMM). LGM models assume that observed growth trajectories are sampled from a single population characterized by a single average initial status parameter (intercept) and a single average growth trajectory (slope). However, GMM assumes that the distribution of the entire sample consists of unobserved subpopulations, each with relatively common initial intercepts and slopes, and produces a categorical latent variable representing each of these unobserved subpopulations. Individuals are categorized based on posterior probabilities, which indicate how likely it is that a particular case belongs in a specific group. Means and variances of the growth parameters (i.e. intercept and slope) are estimated for each trajectory group, though in these analyses variance was held equal across classes, thus limiting within group heterogeneity (Jung & Wickrama, 2008; Muthén & Muthén, 1998-2007).

In these GMM analyses, I used maximum likelihood procedures to explore the extent to which underlying latent classes of growth trajectories in self-efficacy behavior exist. This approach accommodates missing data by estimating the model parameters using all available information. Individual trajectories are identified and individuals are classified into latent classes based on their likelihood of class membership given their individual level information about growth parameters. GMM tests the fit of a growth

model for varying numbers of trajectory classes. Since models with varying numbers of classes are not nested, chi-square difference tests cannot be used to compare models. Instead, statistical tests of relative fit are used, such as the Bayesian Information Criterion (BIC, a parsimonious goodness of fit index, where lower values indicate improved fit), Akaike's Information Criteria (AIC, a parsimonious goodness of fit index derived from information theory, similar to BIC but less penalizing of free parameters, where lower values indicate improved fit), entropy (a summary measure of membership probability for the most likely class, where higher values indicate improved fit), and significance of the Vuong-Lo-Mendell-Rubin Likelihood Ratio test (VLMR), which indicates whether a model with k classes fits better than a model with k-1 classes (Jung & Wickrama, 2008; Loehlin, 1992; Muthén & Muthén, 1998-2007). Other considerations for choosing the most appropriate model include parsimony, interpretability, and face-validity of groups.

Finally, in the third aim of this dissertation I was interested in predictors and correlates of self-efficacy behavior in 17-month-old toddlers. This investigation was conducted in two steps, first using a univariate regression approach in MPlus. This series of analyses allowed an extensive examination of self-efficacy regressed on predictors at an aggregate construct level (e.g., maternal sensitivity) and at a more micro-analytic scale-level (e.g., maternal non-intrusive behavior versus maternal responsiveness). Next I took a structural equation modeling approach in MPlus and conducted a series of path models examining a set of multivariate relationships. These analyses expanded the LGM approach in Aim 2 by measuring associations between

self-efficacy latent intercept and slope and several key variables initially hypothesized as primary predictors and correlates of self-efficacy (including maternal anxiety, maternal behavior, infant temperament-based fear and shyness as predictors, and latency to engage, challenge preference, and BITSEA symptom scores as correlates). This approach allowed for testing multivariate patterns of association between predictors and outcomes where indirect or mediated effects might have been constrained in previous univariate models. An SEM framework allowed specification of a latent growth model to predict from observed maternal and child characteristics and behaviors to individual differences in latent self-efficacy intercepts and slopes. I additionally was able to consider the role of self-efficacy as a predictor or mediator of child-centered correlates (e.g., BITSEA problem symptoms). Thus, linear growth path models allowed me to examine associations between all hypothesized primary predictors, correlates, and outcomes at a multivariate level.

Finally, to further test whether associations existed between risk factors and children's discreet subgroups of self-efficacy, I tested predictors of class membership. These analyses were conducted at a univariate and multivariate level in SPSS and MPlus using binary logistic regression.[1]

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[1] There is debate within the mixture modeling literature regarding whether it is most appropriate to run conditional or unconditional models when determining what trajectory classes best approximate the data. Muthén & Muthén (1998-2007) advocate running conditional models including covariates and predictors within MPlus in order to take into account the probabilistic nature of group membership in estimating standard errors for the model. However, Nagin (2005) recommends deriving trajectory classes from an unconditional model and exporting this class membership information into another statistical platform in order to explore predictors and covariates of class membership. Nagin additionally suggests confirming these conditional models in MPlus. In this dissertation, Nagin's recommended approach was employed. Trajectory class membership was determined through GMM analyses in MPlus, predictors and correlates were then examined in SPSS, and models were finally confirmed using conditional models run in MPlus.

CHAPTER IV

RESULTS

Descriptive Statistics and Relationships Among Variables

Table 3 presents means and standard deviations for the five primary components of toddler self-efficacy behavior coded during the impossible task. Of the five coded categories comprising this self-efficacy measure, toddlers' level of persistence and their main strategies used showed particularly noteworthy variation across the task. Toddlers' persistence and also their use of positive or goal-oriented strategies decreased significantly over the course of the task (persistence: $F(3, 237) = 21.25, p = .00$); positive strategies: $F(3, 237) = 6.97, p = .00$), and even decreased significantly from each 15-second block to the next. Thus with more task experience, fewer children used positive strategies, somewhat more children used negative strategies (e.g. disengagement, passive observation) ($F(3, 237) = 2.04, p = .11$), and persistence decreased. There was a gradual increase in children's flexibility over the task, such that toddlers tended to try more strategies as the task progressed – both positive and negative in nature. However, while number of positive strategies (flexibility) used increased at a nonsignificant level ($F(3, 237) = 2.05, p = .11$), toddlers used significantly more negative strategies later in the task ($F(3, 237) = 4.47, p = .004$). Interestingly, there was a large degree of variance overall in number of strategies used, suggesting individual differences in how children used coping strategies during this impossible task.

Table 3
Observed Means and Standard Deviations for Toddler Self-Efficacy Behaviors During the Impossible Task

	Impossible Task Block				Total Behaviors
	15s	30s	45s	60s	
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M(SD)*
Persistence	5.46 (1.15)	4.85 (1.39)	4.40 (1.59)	4.00 (1.59)	4.70 (.92)
Main Strategy - Positive	.86 (.35)	.75 (.44)	.72 (.45)	.60 (.49)	2.88 (1.19)
Main Strategy - Negative	.05 (.21)	.11 (.31)	.11 (.32)	.15 (.36)	.40 (.81)
Flexibility - Positive	1.57 (.68)	1.79 (.71)	1.67 (.75)	1.64 (.82)	6.55 (2.09)
Flexibility - Negative	.19 (.40)	.31 (.54)	.44 (.69)	.41 (.67)	1.32 (1.57)
Affect	2.99 (.19)	2.99 (.33)	2.98 (.35)	2.97 (.22)	2.98 (.22)

Table 4 illustrates that intercorrelations between these 6 variables were in expected directions, and behaviors and flexibility were more closely associated than either construct was with affect. Finally, it was also noteworthy that almost no change was observed in mean level or variability of children's affect across the task.

Table 4
Correlations Between Toddler Self-Efficacy Behaviors During the Impossible Task

	2	*3*	*4*	*5*	*6*
1. Persistence	.773**	-.714**	.34**	-.548**	.103
2. Main Strategy - Positive	--	-.615**	.494**	-.445**	.111
3. Main Strategy - Negative		--	-.219*	.685**	-.104
4. Flexibility - Positive			--	-.231*	.189^{+}
5. Flexibility - Negative				--	.000
6. Affect					--

* $p < .05$, ** $p < .01$, $^{+}p < .10$

Next, I examined means, standard deviations, and relationships between maternal characteristics that were investigated as predictors of self-efficacy (Table 5). Maternal anxiety symptoms were highest prenatally, and decreased significantly between prenatal and 5 month visits ($F(1,80) = 38.73, p = .00$) and non-significantly at the 17 month visit ($F(1,80) = 1.13, p = .29$). Maternal depression symptoms were also highest when measured prenatally, and decreased significantly between prenatal and 5 month visits ($F(1,77) = 5.11, p = .027$) then increased non-significantly at the 17 month visit ($F(1,77) = 3.17, p = .079$). Mean levels of both depression and anxiety were below clinical levels (BAI of 19 and above indicates moderate to severe anxiety, Beck, Epstein, Brown and Steer, 1988; CES-D of 16 and greater indicates clinical levels; Wellisch & Lindberg, 2001) and revealed some positive skewness in these data, however this was not a concern in the current study given that these distributions fit with distribution expectations for anxiety and depression symptoms in a sub-clinical population (i.e. greater frequency of low symptom levels). As expected, maternal anxiety and maternal depression were highly correlated at each of the three time-points (prenatal, 5 months, and 17 months). Additionally, mothers with greater anxiety symptoms prenatally tended to have greater anxiety symptoms when their infants were 5-months and 17-months-old. This association between maternal symptoms over time was evident for depression as well. In addition to anxiety and depression symptoms, maternal sensitivity was measured when infants were 5-months-old. I found no significant associations between maternal anxiety or depression (prenatal, 5 month, or 17 month) and maternal sensitivity.

Table 5

Observed Means, Standard Deviations, and Correlations for Maternal Prenatal, 5-Months Postnatal, and 17-Months Postnatal Variables

Maternal Variable	*N*	*Mean (SD)*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Prenatal									
1. Maternal Anxiety (BAI)	105	11.73 (8.29)	.68**	.29**	.37**	.28**	.52**	-.09	-.07
2. Maternal Depression (CESD)	105	14.46 (8.58)	-	.25*	.41**	.40**	.32**	-.16	-.15
5-months Postnatal									
3. Maternal Anxiety (BAI)	95	6.74 (7.45)		-	.70**	.45**	.33**	-.04	-.06
4. Maternal Depression (CESD)	93	10.15 (8.48)			-	.39**	.45**	-.16	-.18
17-Months Postnatal									
5. Maternal Anxiety (BAI)	88	6.13 (5.90)				-	.66**	.01	.01
6. Maternal Depression (CESD)	87	11.97 (9.36)					-	-.01	-.01
Maternal Sensitivity									
7. Total Sensitivity	91	2.99 (.95)						-	.98**
8. Sensitivity with Intrusiveness	91	3.14 (.88)							-

* $p < .05$, ** $p < .01$, $^{+}p < .10$

Table 6
Observed Means and Standard Deviations for Child Temperament Scales at 5-months Postnatal, and 17-Months Postnatal

5-months Postnatal	*N*	*Mean (SD)*	*17-Months Postnatal*	*N*	*Mean(SD)*
Fear	95	2.41 (.85)	Fear	88	2.24 (.78)
Sadness	95	3.21 (.74)	Sadness	88	2.64 (.78)
Falling Reactivity	95	5.07 (.74)	Soothability	88	5.39 (.59)
Distress to Limitations	95	3.49 (.76)	Frustration	88	3.39 (.94)
			Shyness	88	3.14 (.96)

Child temperament characteristics are described in Table 6. Temperament was examined as a predictor (at 5 months) and correlate (at 17 months) of self-efficacy, and scales measuring negative affect dimensions were of primary interest given their associations with anxiety risk (e.g. Kagan & Snidman, 1999). As illustrated in Table 6, several dimensions were measured at both 5 and 17 months including Fear, Frustration (Distress to Limitations), Soothability (Falling Reactivity), and Sadness. Mean levels of these dimensions remained relatively consistent across time, with the exception of Sadness, which demonstrated a mean-level decrease. Correlations between these dimensions over time showed strong continuity for Fear ($r = .32$, $p <. 01$) and Distress to Limitations/Frustration ($r = .25$, $p < .05$) between 5- and 17-months of age.

Aim 1: Identifying Early Self-Efficacy

My first aim was to identify and describe patterns of self-efficacy behavior in toddlers. Self-efficacy has been demonstrated in children as young as 18-months of age as a summary index of greater persistence and positive affect during challenging tasks (Jennings & Abrew, 2004). Prior research on helplessness in early childhood (25- and

32-months) demonstrated that toddler behavior during an impossible task consistently produced two factors – a behavioral and an affect-related factor (Kelley & Jennings, 2003). This dissertation expanded the dimensions rated in describing early self-efficacy patterns to additionally include coping domains. I used a series of factor analytic models to determine how these added domains related to components of an existing self-efficacy construct. As discussed earlier, I used behavioral observations coded during an impossible task to measure individual variability in persistence, main strategies used, flexibility of strategies, and affect.

As a first step, an individual principal components analysis (PCA) with Varimax rotation was run (in SPSS 16.0) that included toddler behavior and affect aggregated across the 60-second task. This confirmatory model (Model 1, see Table 7) indicated a well-fitting two-factor unrotated solution, where persistence, main strategy, and flexibility of strategies loaded onto one factor accounting for 51.9% of variance, and affect loaded onto a second factor (18.26% of variance).[2] This two-factor model, presented in Table 7, generally replicated previous research demonstrating orthogonal behavioral and affective components of self-efficacy (Jennings & Abrew, 2004), though these previous studies examined older children.

[2] Model 1 was additionally run as an exploratory factor analysis and factor loadings were almost identical, with a behavioral factor consisting of persistence (.89), main positive strategies (.86), main negative strategies (-.85), flexibility positive (.53), flexibility negative (-.74), and an affect factor including the affect measure (.81).

Table 7
Two-Factor Confirmatory Principal Components Analysis of Toddler Self-Efficacy During Impossible Task: Factor Loadings for Model 1

	Model 1	
	Behavioral Factor	*Affective Factor*
Persistence	.89	--
Main Strategy – Positive	.86	--
Main Strategy – Negative	-.85	--
Flexibility – Positive	.53	--
Flexibility – Negative	-.74	--
Affect	--	.81

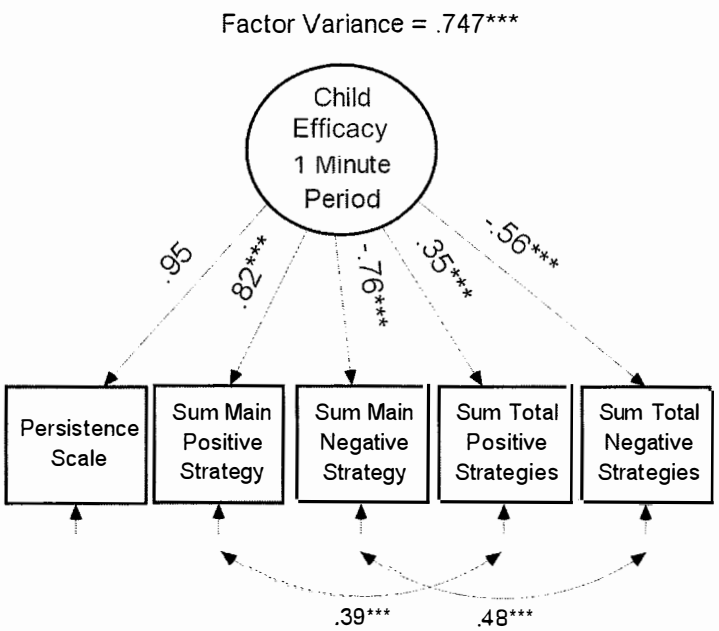
All Eigenvalues > 1

Previous researchers measured mastery-related affect in older toddlers, however the measure of general affect valence (e.g. positive, negative, and neutral affect) used in this dissertation may not have been appropriately sensitive for this notably younger population, and I found minimal variance in affect across the impossible task. Though affect was entered into the initial confirmatory PCA model, I was interested in looking at toddler behavior using time-series analyses and the low variability in this dimension would exclude it from further models, particularly confirmatory models run in MPlus which did not converge when affect was entered. Thus, affect was trimmed from further model-testing.

Two confirmatory factor models were specified and estimated using MPlus. Model 2 specified a single factor reflecting the behavioral dimension described by Kelley and Jennings (2003). This model consisted of persistence behaviors as well as main strategies used and coping flexibility, all measured as 60-second aggregates;

Tables 3 presents the means, standard deviations, and correlations for the individual items used under the Total Behaviors column. This confirmatory model specified a single-factor latent variable structural equation model using maximum likelihood estimation. One advantage of using this SEM approach to CFA was the ability to freely estimate covariance between the error terms for main strategies used and flexibility of strategies. These indicators were based on aggregates of the same coded behaviors and, while different conceptually, inherently retained some measurement dependence. This single-factor confirmatory model demonstrated strong model fit (χ^2 = 1.77, *df* = 3, *p* = .62, CFI = 1.00, RMSEA = .00), and standardized factor loadings are reported in Figure 1.

Figure 1
Single-Factor Confirmatory Analysis for Toddler Self-Efficacy During Impossible Task: Factor Loadings for Model 2

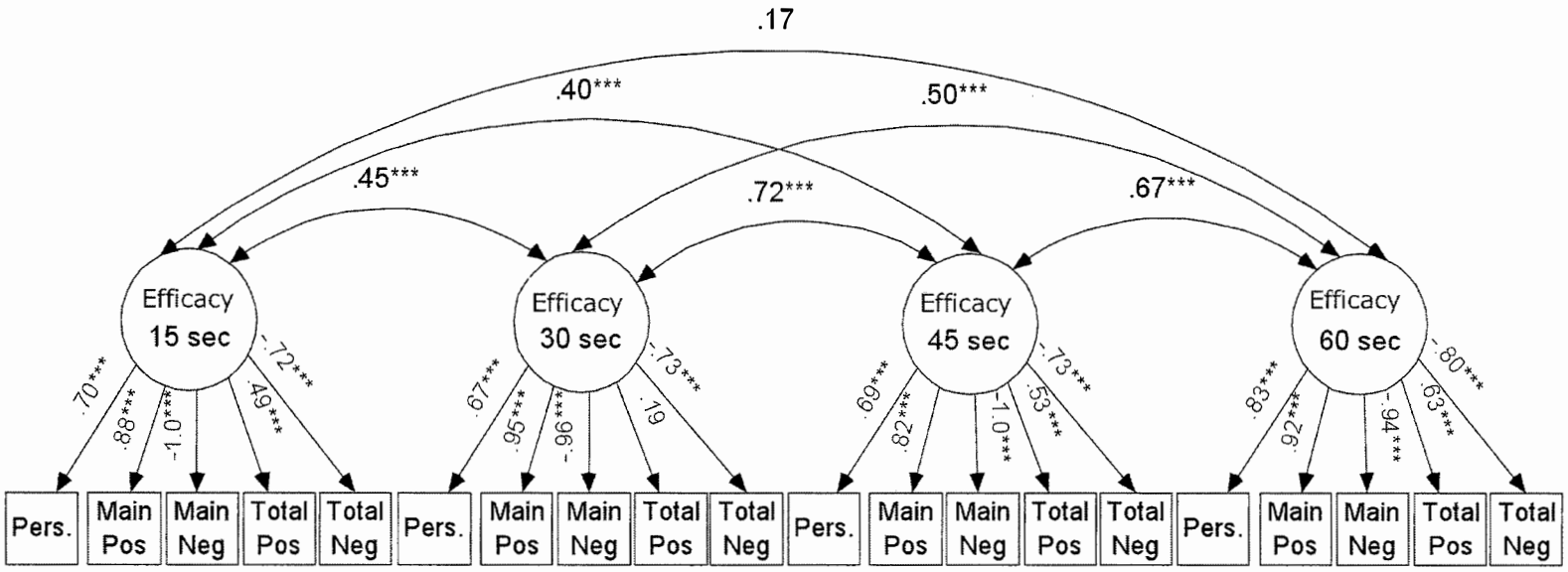


As would be expected, negative main strategies and flexibility of negative strategies both loaded negatively (-.76 and -.56 respectively). Persistence loaded strongly on this self-efficacy factor (.95), as did main positive strategies (.82), while positive flexibility was the weakest loading component of self-efficacy (.35), although all variable loadings were above a threshold of .3. Thus according to this model, greater persistence was associated with increased use of positive strategies (e.g., goal-oriented or problem-solving behaviors), decreased use of negative strategies (e.g., passive behavior or disengagement), decreased flexible use of negative strategies, and also was somewhat related to greater flexibility in trying different positive strategies.

As a second method of measuring self-efficacy through internal replication, I next examined consistency of factor structure across four 15-second task trials. In this second confirmatory analysis, I modeled efficacy using a time-series CFA model. As illustrated in Figure 2, I modeled the 5 components (persistence, main strategy positive, main strategy negative, flexibility positive, flexibility negative) as a single-factor during each 15-second period. I specified correlations between consecutive time-blocks given that autocorrelation was expected due to their sequential nature, but paths were not opened across all time blocks. This model, a time-series extension of the single-factor Model 2, demonstrated borderline adequate model fit ($\chi^2 = 54.24$, $df = 27$, $p = .001$, CFI = .85, RMSEA = .11). Similar to Model 2 where positive flexibility demonstrated the lowest loading, in Model 3 positive flexibility also loaded weakly when a single factor was specified.

Figure 2

Time-Series Confirmatory Factor Analysis for Self-Efficacy Construct over Four 15-Second Epochs: Factor Loadings for Model 3



This association was particularly noteworthy during the first two time-blocks, while positive flexibility loadings increased to .35 during the third time block and .43 during the fourth. A second time-series model with flexibility (positive and negative) trimmed was run and this model showed better model fit ($\chi^2 = 70.836$, $df = 39$, $p = .001$, CFI = .95, RMSEA = .087).

However, factor structure based on Model 3 was retained for further analyses for reasons of theory and face validity. This model, including flexibility and strategies used, was theoretically warranted based on definitions of self-efficacy as a construct combining persistence and coping (Bandura, 1997). Additionally, given strong fit for this theoretically-based and face-valid self-efficacy construct in Model 2 as well as acceptable factor loadings at the majority of time-points in Model 3, I included positive flexibility in a final self-efficacy aggregate.

The adequate and consistent factor structure demonstrated by these three models indicated the presence of a unitary construct of self-efficacy measured during this impossible task. I created a summary construct of self-efficacy at each 15-second time-point from the five self-efficacy indicators examined (persistence, main strategy positive, main strategy negative, flexibility positive, flexibility negative). Each continuous indicator was re-scaled from 0-1 in order to aggregate count and continuous variables while retaining the meaning of their scales. For example, the minimum and maximum ranges of persistence was rescaled from 0-1 at each time point. Count data were bounded by the same minimum and maximum values across time, and were already on this 0 to 1 scale. Once indicators were rescaled, I averaged them to compute

self-efficacy construct scores, and these construct scores were used in further analyses exploring growth in self-efficacy across the impossible task. Table 8 displays means, standard deviations, and associations between these construct scores.

Table 8
Means, Standard Deviations, and Correlations for Self-Efficacy Construct Scores

	M (SD)	*30 Seconds*	*45 Seconds*	*60 Seconds*	*Cronbach's α*
Time 1 – 15 Seconds	.48 (.10)	.256*	.11	-.014	.53
Time 2 – 30 Seconds	.46 (.12)	--	.214*	.316**	.36
Time 3 – 45 Seconds	.44 (.14)	--	--	.563**	.24
Time 4 – 60 Seconds	.40 (.15)	--	--	--	.53

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

In sum, confirmatory analyses were conducted over the full task and also using a time-series model to examine factor structure of self-efficacy behaviors during an impossible task. Both a two-factor and a single-factor CFA indicated that persistence, main strategies used (positive and negative), and flexibility of strategies (positive and negative) were highly associated. A time-series confirmatory analysis similarly suggested that these five indicators were related across time. Thus, a self-efficacy construct was calculated for each child consisting of toddler persistence, main strategies used, and flexibility of strategies.

Aim 2: Modeling Individual Differences in Self-Efficacy Trajectories

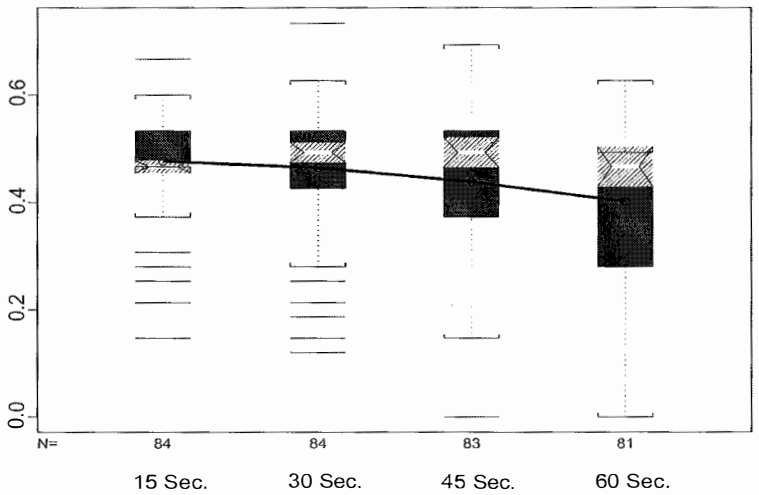
A second aim was to identify and describe individual differences in toddlers' self-efficacy behavior during the impossible task. I was interested in observing patterns of self-efficacy behavior based on initial levels and trajectories over time. This aim

primarily examined an overall model describing variations in shape and slope of self-efficacy, but in secondary analyses I additionally explored presence of possible subgroups of children's self-efficacy behavior. I used a linear growth model framework to examine baseline individual differences in self-efficacy, as well as change in self-efficacy behaviors across the impossible task. I additionally explored the possibility of identifying specific self-efficacy trajectories using growth mixture modeling.

First, I examined how these self-efficacy construct scores changed over the course of the impossible task. As illustrated in Figure 3, mean level of self-efficacy showed a marked decrease across the impossible task, shown by the downward slope of the black line. Variance in efficacy increased over time, indicated by the increasing length of shaded bars in Figure 3. Median efficacy level remained consistent, shown by the white bar at each time point. Examining mean levels across the five self-efficacy components (see Table 3), several variables appeared to play primary roles in driving this pattern of self-efficacy; children generally decreased in persistence over time and used fewer positive strategies. Toddlers also demonstrated greater flexibility, on average, later in the task.

Next, to describe the best-fitting pattern of growth in self-efficacy over time, I used latent curve growth modeling (LGM). LGM is specified by fixing factor loadings using chronometric time weights to obtain an initial status latent variable and a slope factor, with the slope factor representing individual differences in change or growth trajectories. I specified an unconditional LGM across four time-points, which allowed

Figure 3
Mean and Variance of Self-Efficacy Construct Scores Examined Across 60-Second Impossible Task

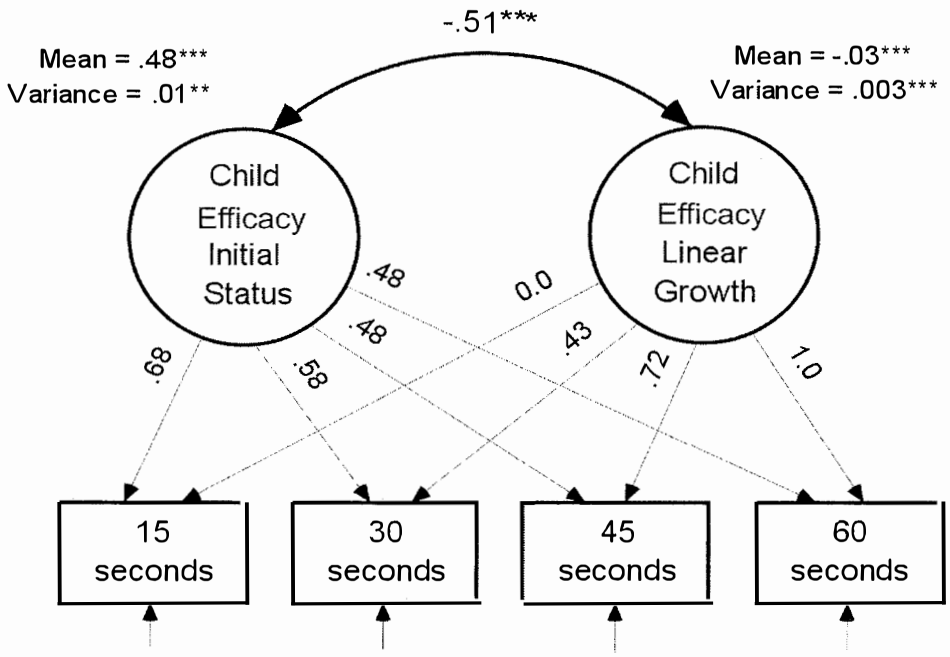


for estimation of random intercept, linear growth, and nonlinear growth models. In examining this series of models, I looked for optimal fit based on linear and nonlinear growth, as well as means and variances among factors. Based on the graphical evidence described above (see Figure 3), I expected to see individual differences in self-efficacy among toddlers, both in initial levels of efficacy and in variance over the impossible task. To define the intercept as this initial level of self-efficacy, I fixed time weights to start at 0 (Time 1) and to proceed in equal increments (Time 2 = 1, Time 3 = 2, Time 4 = 3).

To assess for the possible presence of nonlinear trends, in initial analyses a latent intercept, slope, and nonlinear (quadratic) trend were extracted. The mean and variance of the quadratic trend were not significant, consequently the quadratic trend

was dropped from further consideration. However, the linear growth model demonstrated excellent fit, suggesting a strong linear pattern of change in self-efficacy behaviors over time (χ^2 = 1.91, df = 5, p = .86, CFI = 1.00, RMSEA = .00). This model, shown in Figure 4, indicated significant negative mean slope and significant variance at the intercept and slope, as well as a significant negative association between toddler's initial efficacy status (i.e., intercept) and toddler linear growth (i.e. slope). These results indicated that both initial self-efficacy and growth trajectories differed significantly from zero, and there were significant individual differences in toddler's starting point and trajectory of self-efficacy behavior over time. Negative association between intercept and slope suggested that toddlers with lower efficacy behaviors at the start of the task tended to increase in self-efficacy across the task while children with higher initial levels tended to decrease across the impossible task. In general, this LGM demonstrated that, as predicted, I found significant individual differences in toddlers' efficacy-related behaviors during challenge.

Figure 4
Self-Efficacy Linear Growth Model



Residual variance, 15 seconds: *Estimate* = .006, *SE* = .002, *Estimate/SE* = 2.821**
Residual variance, 30 seconds: *Estimate* = .011, *SE* = .002, *Estimate/SE* = 5.711**
Residual variance, 45 seconds: *Estimate* = .013, *SE* =.002, *Estimate/SE* = 5.508**
Residual variance, 60 seconds: *Estimate* = .003, *SE* = .003, *Estimate/SE* = 1.149

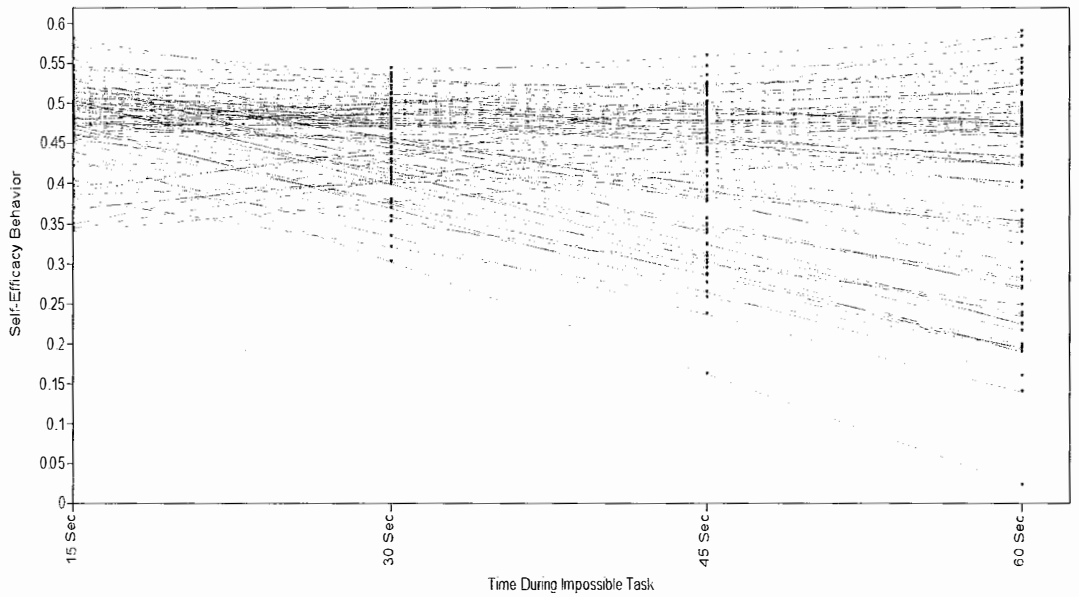
To better understand these individual differences, Figure 5 displays mean level change in self-efficacy as well as individual trajectories across the impossible task. Mean level self-efficacy trajectories indicated that in general children significantly decreased in self-efficacy behavior across the task. According to individual trajectories however, while some children showed a pattern of greater efficacy (persistence, goal-oriented strategies, and flexibility) at the start of the task followed by decreasing efficacy over the course of the task, other children showed continued persistence and use of strategies or even an increase in efficacy as the challenge continued. This latter group of children may demonstrate a propensity for coping in their response to challenge, while toddlers with consistently low or decreasing efficacy behaviors may be at greater risk for developing problem behavior.

Latent Class Growth Mixture Modeling of Toddler Self-Efficacy. As a secondary method of examining toddler self-efficacy trajectories, I used growth mixture modeling (GMM) to identify classes, or discreet subgroups, of children demonstrating particular patterns of self-efficacy behavior across the impossible task. In each of these unconditional models (i.e. models run without covariates), intercept and slope variances were set as equal across all classes, and growth parameter variances were estimated freely (Jung & Wickrama, 2008). To identify the optimal number of trajectory groups, models were run with varying numbers of classes. As in previous LGM analyses, these GMM models were specified with an intercept set at children's initial behaviors at the start of the task and the slope parameter estimating linear growth in self-efficacy across the impossible task.

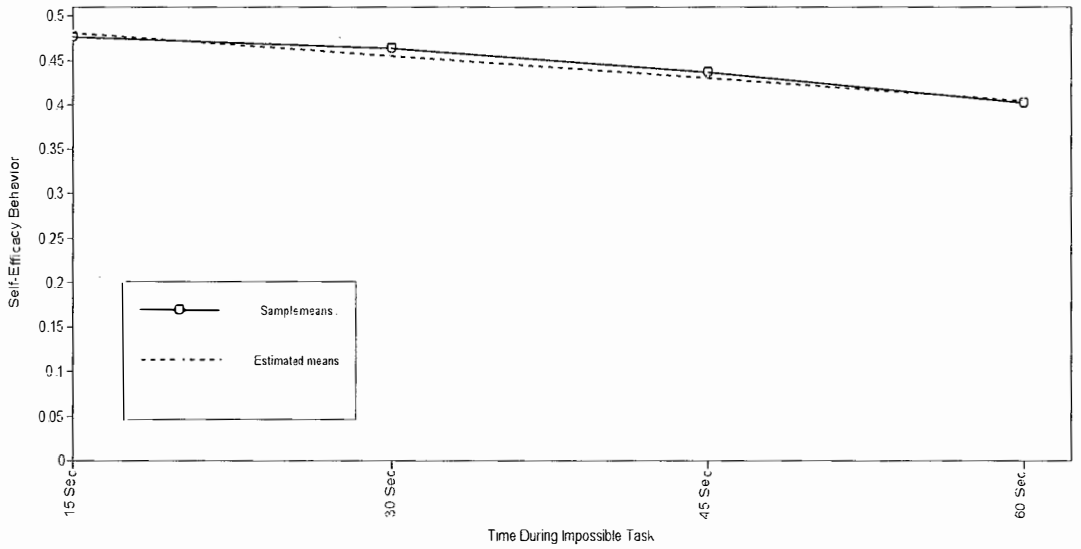
Figure 5

Fitted Individual Change and Mean-Level Change in Self-Efficacy According to Linear Growth Model

a.



b.



Models for 2- and 3- classes of toddlers were run, and model-fit statistics for these GMM analyses are presented in Table 9. A 4-class solution was attempted, but this model did not converge. A combination of factors was used to choose the best-fitting model, including model-fit statistics, interpretability of groups, and parsimony.

Table 9
Model-Fitting Statistics for the 1-, 2-, and 3-Class Growth Mixture Models

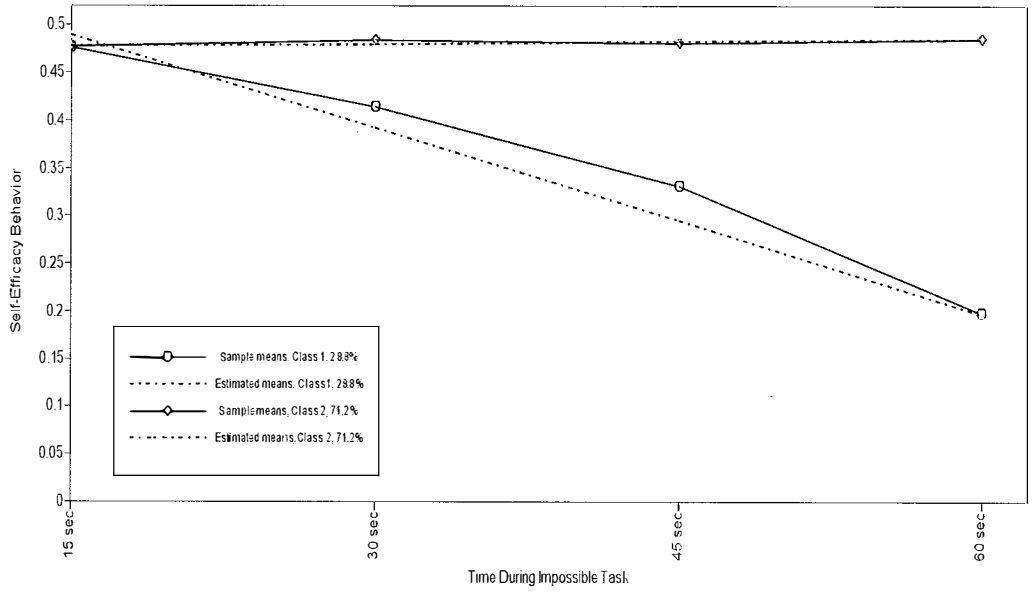
	K-1 test VLMR (p)	*Free Parameters*	*BIC*	*AIC*	*SSABIC*	*Entropy*
1 class	--	9	-436.13	-458.01	-464.52	--
2 classes	.004	12	-460.25	-489.42	-498.11	.91
3 classes	.26	15	-473.82	-510.29	-521.14	.94

VLMR = Vuong-Lo-Mendell-Rubin Likelihood ratio test, BIC = Bayesian Information Criteria, AIC = Akaike's Information Criteria, SSABIC = Sample Size Adjusted Bayesian Information Criteria

According to model-fit statistics, the two-class model represented the data well and showed some improvement over a single-class solution (VLMR $p < .004$). Twenty-seven percent of children (n = 23) were classified as decreasing in self-efficacy, while 73% of children (n = 61) were classified as stable or increasing (illustrated in Figure 6). While a 3-class model demonstrated slightly lower BIC and AIC values and slightly higher entropy than the 2-class model, VLMR was not significant ($p = .26$) – indicating that the three-class model did not fit these data better than a two-class model, and one class of individuals consisted of only 8 members. In contrast, the two-class model had adequate fit and the proportions of group membership were more substantial. Thus, the

two-class model was deemed the most appropriate in terms of adequate fit, classification quality, and greater parsimony and interpretability of classes.[3]

Figure 6
Observed and Estimated Mean-Level Change for Two-Class Model of Self-Efficacy Latent Class Trajectories



Parameters for this two-class model are displayed in Table 10. The first class consisted of children with decreasing self-efficacy behavior over time, while children in the second class tended to increase or remain stable in self-efficacy across the task. Children in both groups demonstrated similar initial starting points that were significantly

[3] Because of our small sample size it was necessary to rule out a local maximum solution. When starting values were re-set to 1000 – increasing the number of random sets of starting values for maximum likelihood iterations - final state loglikelihood values indicated a global maximum solution (i.e., parameter estimates associated with the largest loglikelihood).

above 0, indicated by almost equal mean intercept for both classes. However, the first class demonstrated a decreasing slope (-.097), indicating a significant rate of decline in self-efficacy over time. Children in class two exhibited a positive, almost flat, non-significant slope, suggesting stability in self-efficacy behavior across the task. Variance was held constant across groups.

Table 10
Parameter Estimates for the 2-Class Unconditional Growth Mixture Model

	Estimate	*SE*	*Estimate/SE*
Class 1 (Decreasing)			
Intercept mean	.489	.019	25.696**
Slope mean	-.097	.007	-14.103**
Class 2 (Increasing)			
Intercept mean	.478	.013	36.342**
Slope mean	.002	.006	.709
Common Parameters[a]			
Intercept variance	.005	.002	2.768*
Slope variance	.001	.000	2.915*
Residual variance, 15 seconds	.006	.003	2.318*
Residual variance, 30 seconds	.011	.002	5.748**
Residual variance, 45 seconds	.014	.002	5.794**
Residual variance, 60 seconds	.000	.002	-.205

[a] = Parameters were the same across groups because they were constrained to be equal
*= $p < .05$, ** = $p < .001$

In sum, an examination of the overall sample using a linear growth model demonstrated excellent fit for these data. According to this model, significant variance was evident in mean level of initial behaviors and change over time. As a method of further understanding children's individual differences in self-efficacy, I additionally used growth mixture modeling to determine whether there were discreet subgroups of children demonstrating particular patterns of self-efficacy behavior. I found that within a

GMM framework, a two-class model best fit these data. In this two-class model, a smaller class of children decreased in self-efficacy while the majority remained stable across the task.

Aim 3: Prediction of Self-Efficacy Behaviors

In Aim 3, I explored predictors and correlates of self-efficacy, using both the LGM latent variables and GMM classifications. Due to small sample size and the strong fit parameters of the LGM model, primary prediction analyses tested associations with this LGM intercept and slope. These analyses allowed for an answer to focal research questions regarding early risk factors for individual differences in self-efficacy behaviors. Additional analyses were run predicting to class membership for the two subgroups of children identified in the above GMM analyses.

The third major aim of this dissertation was to identify predictors and correlates of toddler self-efficacy, initially by examining prediction of LGM-based initial self-efficacy levels and trajectories. Specifically, I explored whether maternal variables (e.g. anxiety, depression, sensitivity) and infant characteristics (temperament, BITSEA symptom measures, cognitive development) were related to toddler self-efficacy. A series of univariate and multivariate regression analyses were conducted in MPlus examining predictors of children's initial self-efficacy levels (intercept) and self-efficacy trajectories (slope). All of the following analyses controlled for child gender.

Maternal Psychopathology Predicting Self-Efficacy. I first examined the role of maternal psychopathology. I measured mothers' anxiety and depression symptoms prenatally, when infants were 5-months-old, and concurrent with self-efficacy

measurement at 17 months. Due to high levels of collinearity when these symptomatology constructs were examined collectively, I could not run multivariate analyses including both depression and anxiety. Thus analyses were run first with anxiety, then with depression.

At a univariate level I found no significant associations between mothers' anxiety at any of the three time-points and toddlers' initial self-efficacy levels or self-efficacy trajectory. Similar univariate analyses were run with prenatal, 5 month, and 17 month depression predicting toddler self-efficacy intercept and slope, and these associations were also non-significant. Next I ran multivariate analyses examining concurrent (17 month) maternal anxiety as a predictor of self-efficacy, controlling for prior anxiety (prenatal and 5 month), and similarly found no significant prediction of toddler self-efficacy slope (see Table 11). Multivariate analyses of maternal depression symptoms also did not predict either toddler self-efficacy intercept or slope (Table 11).

Beyond examining the differential predictive roles of maternal anxiety/depression at particular time-points (e.g. current symptoms controlling for past symptoms), an additional question of this dissertation was whether *change over time* in mothers' symptomatology predicted individual differences in toddler self-efficacy. In order to determine this change in symptoms, indicating cumulative effects of exposure to maternal psychopathology over time, I again created latent curve growth models specified by fixing factor loadings using chronometric time weights to obtain an initial symptom status latent variable and slope factor, with the slope factor representing individual differences in symptom change over time.

Table 11

Maternal Anxiety and Depression Variables Predicting to Self-Efficacy Intercept and Slope

	Self-Efficacy Intercept				*Self-Efficacy Slope*			
	Estimate	*SE*	*Estimate/SE*	*P*	*Estimate*	*SE*	*Estimate/SE*	*p*
Control Variables								
Gender	--	--	--	--	--	--	--	--
Predictors/Covariates								
Model 1								
Maternal Anxiety – Prenatal	.001	.002	.813	.416	.00	.001	.282	.778
Maternal Anxiety – 5-months	.00	.002	-.225	.822	.00	.001	.063	.950
Maternal Anxiety – 17-months	.002	.002	.95	.342	.001	.001	-.464	.642
Model 2								
Maternal Depression – Prenatal	.001	.001	.812	.417	.00	.001	-.099	.921
Maternal Depression – 5-months	-.001	.002	-.605	.545	.00	.001	-.171	.864
Maternal Depression – 17-months	.001	.001	.819	.413	.00	.001	-.005	.996

Similar LGM models were specified separately for maternal anxiety and for maternal depression. Both of these models were centered based on time weights at prenatal symptom level (i.e., prenatal symptom level was fixed at 0), given that prenatal symptoms served as the best indicator of infant's initial mothering experience during the early neonatal time-period. Thus, these models measured mothers' symptom trajectory over time at 5 months and 17 months compared to initial prenatal symptom levels.

Descriptive statistics indicated a quadratic model as best-fitting for both variable sets, and repeated measures ANOVAs for anxiety and depression symptoms demonstrated significant quadratic trends (anxiety: $F(1,80) = 4.56, p = .036$; depression: $F(1,77) = 8.73, p = .003$). Additionally, linear models demonstrated adequate fit for anxiety ($\chi^2 = 17.698$, $df = 14, p = .22$, CFI = .96, RMSEA = .056) but poor fit for depression ($\chi^2 = 10.15$, $df = 1, p = .0014$, CFI = .68, RMSEA = .33). In order to run quadratic models in Mplus with only three time-points available, I fixed the error variance at 20%, or estimated the models with the assumption of 80% reliability. A quadratic model demonstrated a just-identified fit for growth in maternal anxiety ($\chi^2 = .00$, $df = 0, p = .00$, CFI = 1.00, RMSEA = .00) and depression ($\chi^2 = .00$, $df = 0, p = .00$, CFI = 1.00, RMSEA = .00), and in order to capture the quadratic trends evidenced by other analyses (e.g. repeated measures ANOVA, poor linear model fit) this quadratic model was used in prediction analyses. Table 12 presents significant means and significant variances for intercept, slope, and quadratic terms for both anxiety and depression symptoms. These results indicate growth in symptoms across time, and

variability in how mothers' symptoms changed across this period. For both anxiety and depression, mothers' symptoms tended to decrease from prenatal to 5 month levels then increased again by 17-months postnatal.

Table 12
Maternal Anxiety and Depression Quadratic Growth Models

	Estimate	*SE*	*Estimate/SE*
Maternal Anxiety			
Intercept mean	11.476	.903	12.705**
Slope mean	-6.054	1.452	-4.169**
Quadratic mean	1.428	.439	3.256**
Intercept variance	54.665	10.575	5.169**
Slope variance	123.589	29.585	4.177**
Quadratic variance	11.230	2.678	4.194**
Maternal Depression			
Intercept mean	13.762	.917	15.00**
Slope mean	-4.982	1.386	-3.593**
Quadratic mean	1.486	.422	3.522**
Intercept variance	56.395	10.91	5.169**
Slope variance	99.845	26.284	3.799**
Quadratic variance	8.861	2.374	3.733**

*= $p < .05$, ** = $p < .001$

The intercept, slope, and quadratic terms from each of these models were used to predict toddler self-efficacy slope and intercept. Similar to other predictive models relating maternal symptomatology and children's self-efficacy, change over time in depression or anxiety - controlling for initial levels - did not significantly predict toddlers' self-efficacy intercept or slope. Table 13 illustrates that mothers demonstrating growth in depression symptoms over time tended to have children with higher initial levels of self-efficacy and decreasing self-efficacy trajectories.

Table 13

Maternal Anxiety and Depression Quadratic Growth Models Predicting to Self-Efficacy Intercept and Slope

	Self-Efficacy Intercept				*Self-Efficacy Slope*			
	Estimate	*SE*	*Estimate/SE*	*p*	*Estimate*	*SE*	*Estimate/SE*	*p*
Control Variables								
Gender	--	--	--	--	--	--	--	--
Predictors/Covariates								
Model 1								
Maternal Anxiety – Intercept	.003	.002	1.605	.109	.00	.001	-.341	.733
Maternal Anxiety – Slope	.008	.012	.699	.405	-.004	.008	-.471	.638
Maternal Anxiety – Quadratic	.027	.038	.702	.483	-.011	.024	-.460	.645
Model 2								
Maternal Depression – Intercept	.001	.002	.823	.411	.00	.001	-.262	.793
Maternal Depression – Slope	.003	.005	.607	.544	.00	.003	-.049	.961
Maternal Depression – Quadratic	.012	.016	.769	.442	.00	.011	-.004	.997

This direction of effects was contrary to expectations, however it should be noted that these associations were far from significant.

Maternal Parenting Behavior Predicting Self-Efficacy. Next I examined maternal behavior, measured when children were 5-months-old, as a predictor of toddlers' self-efficacy at 17 months. I compared two indicators of maternal behavior, one a measure of maternal sensitivity (MS; including warmth, acceptance, nondemandingness, responsiveness, and sensitivity) and a second overlapping composite variable measuring maternal sensitive behaviors (MB; including warmth, acceptance, nondemandingness, responsiveness, sensitivity and additionally non-intrusive behavior and non-intrusive speech) (Note that as overlapping constructs, MS and MB were highly correlated, $r = .98$, $p = .00$). Maternal sensitivity is most often used as a measure of parenting behavior in infant-parent dyads, and I wanted to examine its association with self-efficacy and toddler symptomatology. In addition, combinations of maternal coldness, control, unresponsiveness and intrusive behavior have been linked with anxiety symptoms in older children. Thus I was interested in examining how maternal sensitivity (MS) as well as the maternal behavior composite (MB) were related to self-efficacy in toddlers. I found that MS was a significant predictor of toddlers' initial levels of self-efficacy, *Estimate* = -.025, $p = .025$, and of toddlers' change in self-efficacy, *Estimate* =.017, $p = .014$.

MB was a slightly stronger predictor of self-efficacy intercept, *Estimate* = -.027, $p = .024$, and self-efficacy slope, *Estimate* = .019, $p = .011$ than MS. Thus for both measures of maternal behavior, greater sensitivity (and less intrusiveness) predicted

lower levels of initial self-efficacy, however, both measures also predicted significant growth in self-efficacy across the task. As I would expect, maternal sensitive behavior predicted a pattern of increasing efficacy with extended exposure to challenge, a behavior pattern suggesting toddler coping abilities associated with a robust self-efficacy style.

A recent meta-analysis on parenting and childhood anxiety suggested disaggregating parenting dimensions in order to better understand specific behaviors accounting for associations with childhood anxiety (McLeod et al., 2007). Based in part on McLeod and colleagues' recommendation, I aimed to identify what elements of maternal behavior were most related to self-efficacy; thus I looked separately at associations between each of the seven sub-scales composing MS and MB and self-efficacy. As shown in Table 14, I found that lower initial self-efficacy (intercept) was significantly predicted by more accepting maternal behavior, greater responsivity and sensitivity, and less intrusive behavior. However, growth in self-efficacy across the impossible task was predicted by more accepting maternal behavior and less intrusive speech. While these individual scales of maternal behavior parallel MS- and MB-level results, these analyses indicate that specific maternal behaviors are particularly associated with initial levels of self-efficacy compared to growth of self-efficacy during challenge.

Gender Moderating Maternal Behavior as Predictor of Self-Efficacy. I additionally examined the role of gender as a moderator of maternal sensitive behavior. It should be noted that in order to examine these associations, I confirmed a lack of

correlation between maternal sensitive behaviors and gender. Maternal behavior was measured using all seven sensitivity scales separately as well as the overall MS and MB construct scores, and an interaction term was created for each one using a centered maternal behavior term and gender in SPSS.

Results from regression analyses, displayed in Table 14, suggest that in contrast to the overall sample, mothers of boys who demonstrated greater warmth, acceptance, and sensitivity in parenting at 5 months were more likely to have children showing greater initial levels of self-efficacy at 17 months. Gender did not moderate associations with self-efficacy for maternal responsiveness, undemandingness, and non-intrusive behavior and speech. Gender additionally did not moderate associations with self-efficacy at the overall construct level for maternal sensitivity or maternal behavior.

Maternal Behavior Moderating Maternal Psychopathology as Predictor of Self-Efficacy. To test hypotheses relating to joint effects of maternal behavior and anxiety symptoms I ran interaction analyses testing MS and MB as moderators of the association between maternal anxiety and self-efficacy. As shown in Table 5, both MS and MB composite scores were not significantly correlated with maternal anxiety, allowing for this test of moderation. Separate interaction terms were created in SPSS for MS and MB composites with each anxiety variable; all variables were centered prior to calculation of interaction terms and regression models included centered main effect variables as well as interaction terms. However, I found no significant moderator interactions for MS or MB with maternal anxiety prenatally, at 5-months, and at 17-months postnatal.

Table 14
Maternal Sensitive Behavior at 5-Months Predicting to Self-Efficacy Intercept and Slope

	Self-Efficacy Intercept			*Self-Efficacy Slope*		
	Estimate	*SE*	*Estimate/SE*	*Estimate*	*SE*	*Estimate/SE*
Control Variable						
Gender	--	--	--	--	--	--
Predictors/Covariates						
Warm/Positive – Cold/Hostile	-.003	.014	-.187	.006	.009	.684
Warm/Positive x Gender	.04	.015	.383**	.013	.009	-.212
Accepting – Rejecting	-.021	.009	-2.35*	.014	.005	2.62**
Accepting x Gender	.022	.009	.327*	-.005	.009	-.082
Responsive – Unresponsive	-.029	.009	-3.13**	.019	.006	3.25**
Non-demanding – Demanding	-.012	.009	-1.37	.01	.005	1.81^{+}
Sensitive – Insensitive	-.022	.010	-2.29*	.012	.006	1.92^{+}
Sensitive x Gender	.02	.011	$.251^{+}$	-.007	.01	-.096
Non-intrusive behavior – Intrusive behavior	-.019	.008	-2.27*	.009	.005	1.63^{+}
Non-intrusive speech – Intrusive speech	-.006	.011	-.566	.015	.007	2.14*
Maternal Sensitivity	-.025	.011	-2.24*	.017	.007	2.45*
Maternal Overall Behavior	-.027	.012	-2.25*	.019	.007	2.53*

$^{+} = p < .10$, * = $p < .05$, ** = $p < .01$

There were additionally no significant interactions with LGM anxiety growth parameters (i.e. intercept, slope, or quadratic terms). The seven component measures of maternal sensitive behavior (maternal warmth, acceptance, responsiveness, undemandingness, sensitivity, non-intrusive behavior, and non-intrusive speech) were additionally examined in interaction with maternal anxiety, and these terms were also non-significant. Models testing maternal sensitivity as a moderator of maternal depression on toddler self-efficacy, although not a primary hypothesis of this dissertation, were additionally non-significant. Gender of child was included in all moderator analyses, and analyses using gender as a moderator of maternal anxiety and depression did not demonstrate significant prediction of self-efficacy slope or intercept.

Child Characteristics as Predictors of Self-Efficacy. The primary child predictor variables in this dissertation were mother-reported temperament domains, measured at 5-months postnatal and also when toddlers were 17-months-old. A series of univariate regression models were run predicting toddler self-efficacy intercept and slope from temperament domains. As in earlier models, I additionally controlled for child gender.

As shown in Table 15, infant 5 month temperament showed no prediction of initial toddler self-efficacy levels. However there was a trend-level association between greater 5 month fearful temperament and increasing self-efficacy trajectory (slope) (*Estimate* = .016, p = .053). At 17 months, greater temperamental sadness (*Estimate* = .022, p = .10) and shyness (*Estimate* = .034, p = .002) predicted greater initial self-efficacy, and higher levels of sadness predicted decreasing self-efficacy (*Estimate* = -.018, p = .03) (see Table 15).

I additionally examined possible moderating effects of gender on temperament, as gender differences have been shown in the development of temperament characteristics (Putnam, Rothbart, & Gartstein, 2008). Interaction terms were created in SPSS using centered temperament terms. I found that gender moderated the predictive effect of Fear at 5 months, such that for boys, greater Fear predicted an increasing self-efficacy slope at 17 months. I found that gender similarly moderated the predictive influence of Sadness and Distress to Limitations at 5 months, such that boys scoring higher on these domains tended to show greater self-efficacy at 17 months. However, there were no interactions between temperament domains and gender at 17 months postnatal.

Table 15

Child 5-Month and 17-Month Temperament Predicting to Self-Efficacy Intercept and Slope

	Self-Efficacy Intercept			*Self-Efficacy Slope*		
	Estimate	*SE*	*Estimate/SE*	*Estimate*	*SE*	*Estimate/SE*
Control Variables						
Gender	--	--	--	--	--	--
5-Month Predictors						
Fear	-.012	.013	-.877	.016	.008	1.93^{+}
Fear x Gender	-.006	.015	-.062	.025	.013	.272*
Sadness	.011	.015	.729	-.011	.009	-1.23
Sadness x Gender	-.029	.016	-.318^{+}	.038	.014	.453**
Falling Reactivity	.00	.015	1.37	-.001	.009	-.127
Distress to Limitations	.018	.014	1.37	.004	.008	-.484
Distress to Limitations x Gender	-.017	.015	-.184	.029	.013	.343*
Control Variables						
Gender	--	--	--	--	--	--
17-Month Predictors						
Fear	.007	.014	.47	.006	.009	.633
Sadness	.022	.014	1.64^{+}	-.018	.008	-2.17*
Soothability	.001	.019	.042	.01	.011	.909
Frustration	.00	.011	.019	.001	.007	.111
Shyness	.034	.011	3.15**	.00	.007	-.043

$^{+}$ = p<.10, * = $p < .05$, ** = $p < .01$

Associations of Child Cognitive Development, Problem Symptoms, and Competence with Self-Efficacy. Past research and theory suggest positive associations between self-efficacy and children's cognitive development (e.g., Bandura, 1993). In addition, given past research finding associations between self-efficacy and anxiety in older children I anticipated associations between greater self-efficacy and lower symptom levels in this young population (Muris, 2002). Using a univariate regression approach similar to the previous models, I explored how my measure of self-efficacy was associated with these related constructs. Cognitive development was measured as children's developmental index scores on the Mental and Motor subscales of the Bayley Scales of Infant Development at 17-months of age. A composite score of children's symptom level was measured from mothers' BITSEA responses; subscales for competence and general problem symptoms were calculated.

Though greater self-efficacy and related mastery behaviors have been associated with higher cognitive development, cognitive development and self-efficacy are not identical constructs. Thus it was unexpected but not surprising that I did not find a significant predictive association between self-efficacy and either mental (intercept: *Estimate* = -28.82, p = .399; slope: *Estimate* = -2.42, p = .949) or motor (intercept: *Estimate* = 2.53, p = .943; slope: *Estimate* = -62.55, p = .114) components of cognitive development as measured using the Bayley Scales.

In examining associations between self-efficacy and toddler symptomatology, I ran a series of regression models. I controlled for child gender in all models. I found that self-efficacy intercept and slope did not predict toddlers' total symptoms (intercept:

Estimate = -10.53, p =.406; slope: *Estimate* = -6.20, p = .635). In addition, neither component of the self-efficacy measure predicted toddler competence according to the BITSEA (intercept: *Estimate* = -7.504, p = .295; slope: *Estimate* = -6.29, p = .362).

Alternate Outcomes Related to Self-Efficacy. During the third part of the impossible task, toddlers were given a choice between playing with an easy puzzle and the impossible box, both of which they had used previously. This toy choice was anticipated to determine toddler preference for continuing a challenging task compared with returning to an easily mastered task, and differences in this choice (i.e. preference for challenge) have been associated with greater achievement-oriented self-efficacy in preschoolers and school-aged children (Burhans & Dweck, 1995; Dweck, 1991; Smiley & Dweck, 1994). As an exploratory component of this dissertation, I was interested in whether this association played out in toddler toy preference. I was additionally interested in associations between self-efficacy and individual differences in toddlers' latency to engage in the impossible shape-sorting box for a second time during this third task phase. I hypothesized that toddlers showing growth in self-efficacy during the task would demonstrate a shorter latency to engage.

I ran a binary logistic regression predicting the categorical variable indicating choice of toy (shape-sorter: n = 53; puzzle: n = 26) during the third phase of the task. These results did not indicate either self-efficacy measure as significantly predictive of toy choice (intercept: *Estimate* = -4.38, p = .165; slope: *Estimate* = -4.39, p = .20). A univariate regression model was run predicting toddlers' latency to engage (M = 11.67,

SD = 20.78) in the shape-sorter box from self-efficacy. Again, I found that neither self-efficacy intercept nor slope predicted latency to engage (intercept: *Estimate* = -3.79, p=.19; slope: *Estimate* = -2.06, p=.466).

Prediction of Latent Class Group Membership. In addition to the preceding discussion of associations between maternal and child characteristics with self-efficacy based on growth model initial levels and growth trajectories for the overall sample, I next conducted similar analyses predicting class membership from maternal anxiety and depression symptoms (prenatal, 5-months postnatal, and 17-months postnatal), maternal sensitive behavior, and child temperament characteristics. These secondary analyses aimed to determine whether hypothesized risk factors predicted self-efficacy trajectories for particular subgroups of children. In accordance with Nagin's (2005) recommended analytic strategy, univariate and multivariate logistic regression analyses were run initially in SPSS, and final predictive models were confirmed in MPlus. Analyses in both statistical platforms indicated no significant prediction of class membership.

Modeling Paths Between Predictors, Correlates, and Self-Efficacy. As a final step in predicting self-efficacy, I used MPlus regression path models to summarize multivariate patterns of association between hypothesized predictors and correlates of self-efficacy. Preceding univariate regression analyses aimed to identify key predictors of self-efficacy, and allowed for deconstruction of these risk factors in order to conduct a more nuanced, micro-analytic examination into the role of precursors to self-efficacy. However, a primary research question of this dissertation was the joint role of maternal anxiety symptoms, maternal sensitive behavior, and child temperament in predicting

self-efficacy and social-emotional symptoms in toddlers. I was additionally interested in how these variables were associated with mother's report of toddler competence and children's helplessness behaviors (lack of challenge preference and longer latency to engage) during the impossible task. Using these SEM models, I was able to control for maternal factors in examining infant characteristics, and vice versa. In addition, I investigated for presence of suppression effects, as well as direct and indirect effects that may have been constrained in previous univariate models predicting toddler outcomes. Identical models were run for maternal anxiety and depression in order to determine their differential effects on child outcomes.

An initial SEM path model extended the linear growth model specified in Aim 2 to include predictors and correlates of self-efficacy. Autoregressive predictive relationships were specified to self-efficacy latent intercept and slope, and associations with 17 month child behaviors were specified directly from these autoregressive predictors and from self-efficacy latent variables. Specifically, this model regressed maternal 17 month anxiety - controlling for prenatal anxiety - as well as maternal sensitive behavior (the full composite including non-intrusiveness), infant fearful temperament controlling for current temperament, and toddler shyness on self-efficacy (Figure 7, Table 16). Additionally, this model predicted toddler BITSEA competence, problem symptoms, and toddler latency to engage from self-efficacy, and directly from prenatal anxiety, 17 month maternal anxiety, and maternal sensitive behavior. Child gender was controlled for throughout this model.

Figure 7

Regression Path Model with Maternal Anxiety – Predicting to Self-Efficacy and Continuous Outcomes

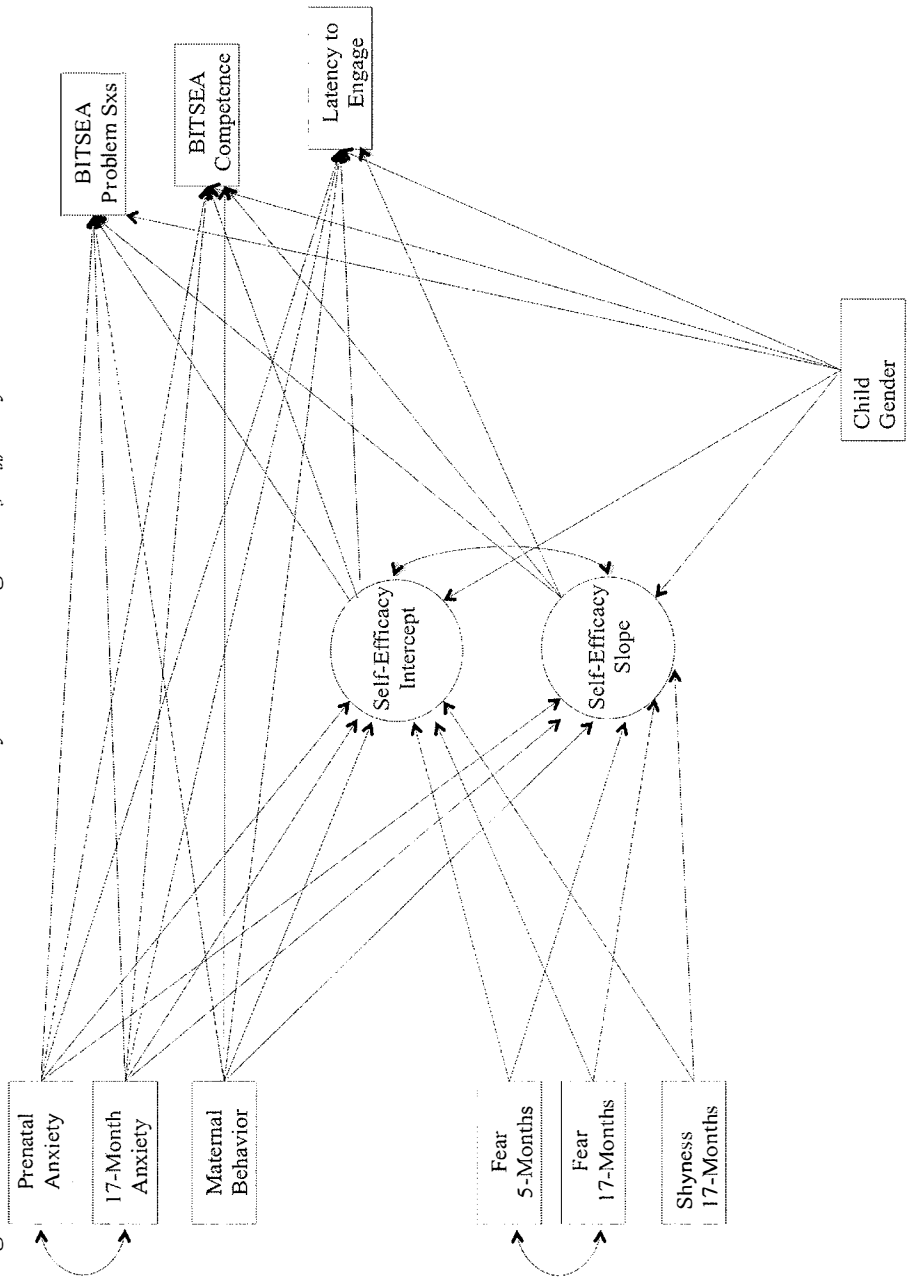


Table 16

Regression Path Model with Maternal Anxiety – Predicting to Self-Efficacy and Continuous Outcomes

	Self-Efficacy Intercept			*Self-Efficacy Slope*		
	Estimate	*SE*	*E/SE*	*Estimate*	*SE*	*E/SE*
Predictors						
Gender	-.001	.03	-.025	.014	.017	.847
Prenatal Maternal Anxiety	-.001	.002	-.374	.001	.001	.914
Maternal 17-month Anxiety	.004	.002	1.64^{+}	-.003	.001	-1.99*
Maternal Behavior	-.044	.019	-2.343*	.031	.011	2.93**
Fear - 5-month	-.036	.022	-1.637^{+}	.017	.012	1.467
Fear - 17-month	.001	.018	.029	-.002	.01	-.211
Shyness – 17-month	.046	.018	2.343*	.005	.01	.461

	BITSEA – Problem Symptoms			*BITSEA – Competence*			*Latency to Engage*		
	Estimate	*SE*	*E/SE*	*Estimate*	*SE*	*E/SE*	*Estimate*	*SE*	*E/SE*
Self-Efficacy Intercept	-26.808	15.492	-1.730^{+}	-6.379	8.005	-.797	-3.783	3.445	-1.098
Self-Efficacy Slope	32.234	30.599	1.055	-6.932	15.104	-.459	.793	6.405	.124
Gender	.927	1.542	.601	-1.472	.882	-1.668^{+}	-.043	.349	-.123
Prenatal Maternal Anxiety	.065	.104	.63	-.029	.054	-.543	-.005	.022	-.238
Maternal 17-Month Anxiety	.439	.187	2.34*	.046	.092	.496	.072	.039	1.858^{+}
Maternal Behavior	-2.796	1.516	-1.844^{+}	.855	.743	1.15	-.12	.332	-.361

$^{+} = p < .10$, * $= p < .05$, ** $= p < .01$

The model (Model 1) described above demonstrated adequate fit ($\chi^2 = 37.73$, $df = 35$, $p = .346$, CFI = .96, RMSEA = .043). Specific variable estimates are reported in Table 16. In Model 1, maternal 17 month anxiety, controlling for prenatal anxiety levels, maternal behavior, and infant characteristics, significantly predicted greater toddler BITSEA negative symptoms at 17 months (*Estimate* = .44, $p = .019$). Maternal 17-month anxiety also predicted greater initial self-efficacy at a trend level (*Estimate* = .004, $p = .10$) and greater initial self-efficacy predicted lower BITSEA symptoms at a trend level (*Estimate* = -26.81, $p = .084$). In combination, these paths suggest that there was not an indirect association through initial self-efficacy behaviors for maternal anxiety and toddler problem symptoms. Maternal 17 month anxiety did significantly predict a decreasing self-efficacy trajectory (*Estimate* = -.003, $p = .046$), however self-efficacy trajectory did not predict to toddler problem symptoms, competence, or latency to engage. An additional noteworthy finding was a near-significant association between maternal 17 month anxiety and longer latency to re-engage in the impossible task (*Estimate* =.07, $p = .063$), suggesting a possible tendency toward helplessness for children whose mothers were currently anxious.

Similar in pattern to maternal anxiety, greater maternal sensitive behaviors predicted lower initial self-efficacy (*Estimate* = -.044, $p = .019$), while lower initial self-efficacy predicted higher BITSEA symptoms at a trend level (*Estimate* = -26.81, $p = .09$); however, in a direct path greater maternal sensitive behavior predicted lower BITSEA symptoms (*Estimate* = -2.79, $p = .065$). Thus maternal sensitivity did not demonstrate an indirect path predicting social-emotional problems through self-

efficacy, but was predictive of both toddler outcomes. Maternal sensitive behavior additionally predicted an increasing self-efficacy trajectory (*Estimate* = .03, p = .003).

An identical path model was specified predicting to a categorical endogenous variable of challenge preference (see Figure 8 and Table 17). This model (Model 2) also demonstrated good model fit (χ^2 = 13.65, *df* = 14, p = .476, CFI = 1.00, RMSEA = .00). In this second model, fewer multivariate associations emerged; associations between maternal anxiety and self-efficacy or other toddler outcomes were no longer present. Maternal sensitive behavior was again significantly associated with lower initial self-efficacy (*Estimate* = -.026, p = .05) and increasing self-efficacy trajectories (*Estimate* = .02, p = .025), but maternal behavior was not related to challenge preference. Greater infant fearful temperament at 5 months predicted lower initial self-efficacy (*Estimate* = -.025, p = .081) and in contrast to expectations also predicted an increasing pattern of self-efficacy trajectory (*Estimate* = .020, p = .054). While there was no effect of 17 month fearfulness, 17 month shyness significantly predicted initial self-efficacy (*Estimate* =.043, p = .002). These associations between child temperament and self-efficacy were similar to those found in univariate models. Finally, increasing patterns of self-efficacy trajectory predicted preference for a challenging toy at a trend level (*Estimate* =-7.5, p = .07), which is the association I would expect to see between greater efficacy and lower helplessness-related behavior.

Third and fourth models were run repeating the model structure of SEM Models 1 and 2, however maternal prenatal and 17 month depression symptoms were

Figure 8
Regression Path Model with Maternal Anxiety – Predicting to Self-Efficacy and Categorical Outcome

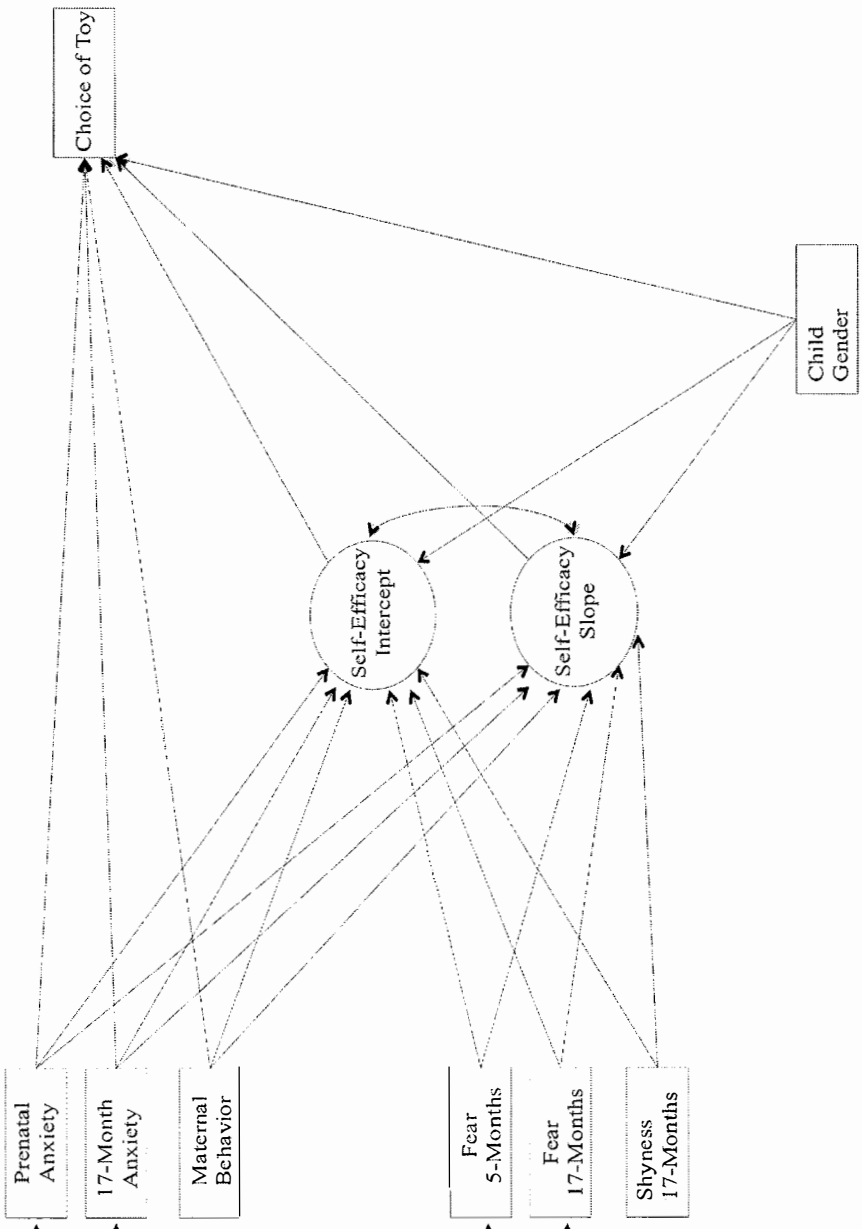


Table 17

Regression Path Model with Maternal Anxiety – Predicting to Self-Efficacy and Categorical Outcome

	Self-Efficacy Intercept			*Self-Efficacy Slope*		
	Estimate	*SE*	*E/SE*	*Estimate*	*SE*	*E/SE*
Predictors						
Gender	.045	.026	1.764^{+}	-.008	.015	-.539
Prenatal Maternal Anxiety	.001	.002	.349	.001	.001	.623
Maternal 17-month Anxiety	.003	.003	1.094	-.002	.002	-1.153
Maternal Behavior	-.026	.013	-1.944*	.02	.009	2.244*
Fear 5-month	-.025	.015	-1.743^{+}	.02	.01	1.925*
Fear 17-month	-.021	.022	-.979	.011	.014	.869
Shyness – 17-month	.043	.014	3.158**	-.005	.01	-.48

	Choice of Toy		
	Estimate	*SE*	*E/SE*
Self-Efficacy Intercept	-2.543	3.958	-.643
Self-Efficacy Slope	-7.50	4.145	-1.81^{+}
Gender	-.019	.408	-.046
Prenatal Maternal Anxiety	.017	.029	.594
Maternal 17-month Anxiety	.016	.033	.469
Maternal Behavior	.155	.216	.719

$^{+} = p < .10$, * $= p < .05$, ** $= p < .01$

substituted for anxiety symptoms. While maternal anxiety was a primary interest of this dissertation, because of high comorbidity between anxiety and depression, particularly when measured via self-report, I examined models with both symptom measures in order to fully examine how maternal characteristics may serve as risk factors for toddler self-efficacy and anxiety risk.

Model 3, illustrated in Figure 9 and Table 18, demonstrated adequate model fit ($\chi^2 = 40.94$, $df = 35$, $p = .226$, CFI = .94, RMSEA = .045). Unlike anxiety symptoms specified in Model 1, depression symptoms demonstrated no significant association with self-efficacy intercept or slope. However, controlling for current depression, prenatal maternal depression significantly predicted higher 17 month toddler symptoms on the BITSEA (*Estimate* = .277, $p = .00$). As in earlier models 1 and 2, greater maternal sensitive behavior predicted lower initial self-efficacy (*Estimate* = -.025, $p = .017$) and increasing self-efficacy trajectory (*Estimate* = .019, $p = .006$), however maternal behavior did not predict toddler symptoms in this model. Additionally, greater toddler shyness predicted higher initial self-efficacy (*Estimate* = .045, $p = .000$), while infant fearfulness predicted growth in self-efficacy trajectory (*Estimate* = .018, $p = .026$), similar to the previous model (Model 2).

Model 4, a path model identical to the previous model apart from being specified to predict to categorical challenge preference (see Figure 10 and Table 19), also demonstrated adequate fit ($\chi^2 = 11.59$, $df = 13$, $p = .561$, CFI = 1.00, RMSEA = .00). As in Model 3, neither maternal prenatal nor 17 month depression predicted

Figure 9

Regression Path Model with Maternal Depression – Predicting to Self-Efficacy and Continuous Outcomes

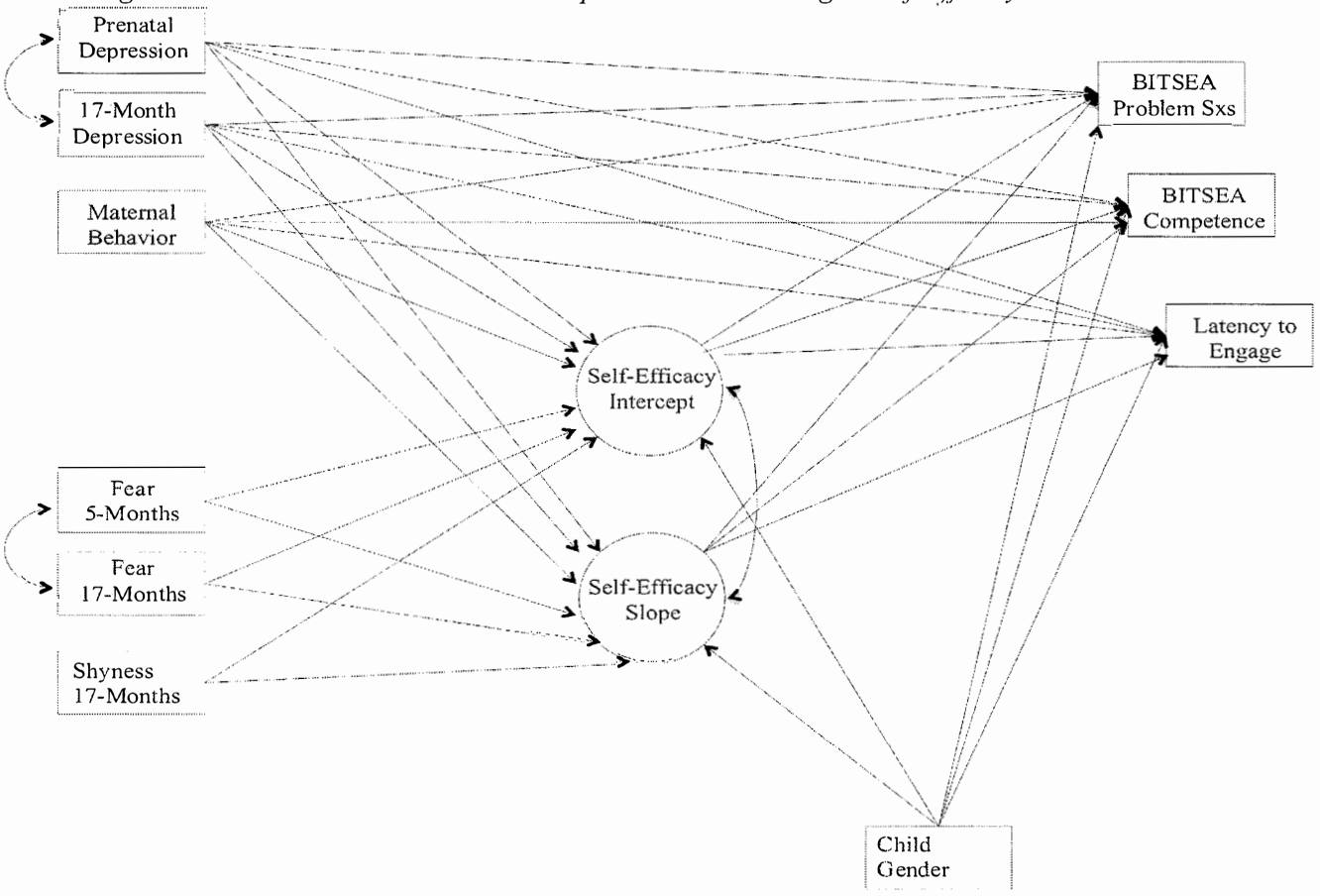


Table 18

Regression Path Model with Maternal Depression – Predicting to Self-Efficacy and Continuous Outcomes

	Self-Efficacy Intercept			*Self-Efficacy Slope*		
	Estimate	*SE*	*E/SE*	*Estimate*	*SE*	*E/SE*
Predictors						
Gender	.038	.02	1.89^{+}	-.008	.013	-.60
Prenatal maternal Depression	.001	.001	.895	.00	.001	-.44
Maternal 17-month Depression	.001	.001	.697	.00	.001	-.244
Maternal behavior	-.025	.011	-2.383*	.019	.007	2.745**
Fear 5-month	-.02	.013	-1.619^{+}	.018	.008	2.233*
Fear 17-month	-.02	.016	-1.29	.004	.01	.352
Shyness – 17-month	.045	.012	3.779**	-.004	.007	-.553

	BITSEA – Problem Symptoms			*BITSEA – Competence*			*Latency to Engage*		
	Estimate	*SE*	*E/SE*	*Estimate*	*SE*	*E/SE*	*Estimate*	*SE*	*E/SE*
Self-Efficacy Intercept	-4.263	14.08	-.457	-3.197	6.995	-.457	-3.446	3.298	-1.045
Self-Efficacy Slope	-9.20	13.49	-1.027	-7.909	7.70	-1.027	-1.277	3.356	-.38
Gender	1.282	1.067	1.20	-1.51	.606	-2.494*	.177	.266	.663
Prenatal maternal Depression	.277	.058	4.779**	-.028	.035	-.817	.006	.015	.375
Maternal 17-month Depression	-.019	.053	-.35	-.045	.031	-1.465	.011	.014	.80
Maternal Behavior	-.026	.723	-.036	.566	.395	1.432	-.081	.183	-.445

$^{+} = p < .10$; * $= p < .05$, ** $= p < .01$

Figure 10

Regression Path Model with Maternal Depression – Predicting to Self-Efficacy and Categorical Outcome

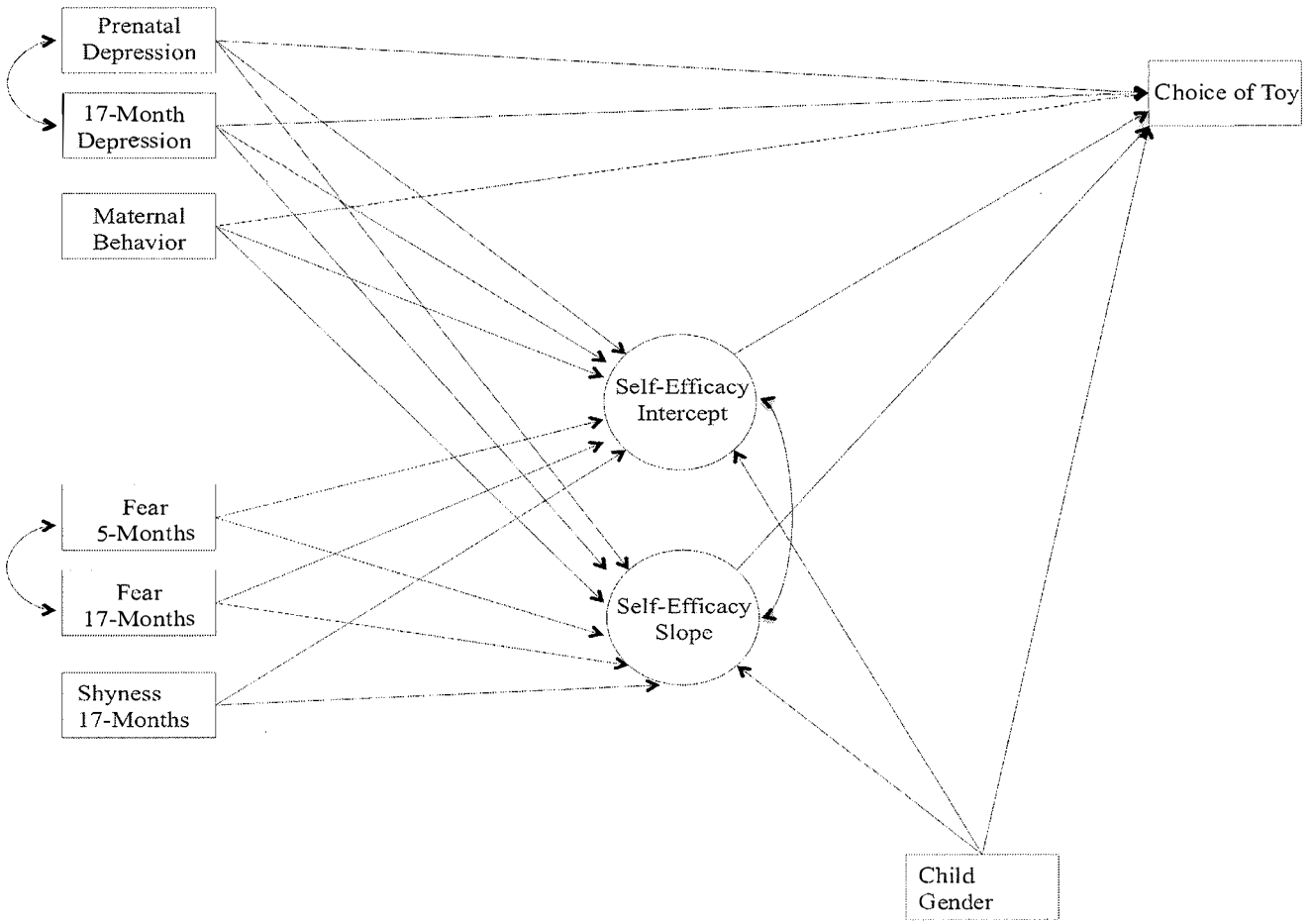


Table 19

Regression Path Model with Maternal Depression – Predicting to Self-Efficacy and Categorical Outcome

	Self-Efficacy Intercept			*Self-Efficacy Slope*		
	Estimate	*SE*	*E/SE*	*Estimate*	*SE*	*E/SE*
Predictors						
Gender	.044	.026	1.657^{+}	-.006	.015	-.398
Prenatal maternal Depression	.001	.002	.664	-.001	.001	-.423
Maternal 17-month Depression	.001	.002	.876	-.001	.001	-1.09
Maternal Behavior	-.025	.014	-1.835^{+}	.019	.009	2.102*
Fear 5-month	-.027	.014	-1.958*	.022	.01	2.188*
Fear 17-month	-.019	.024	-.79	.009	.014	.692
Shyness – 17-month	.047	.015	3.20**	-.006	.009	-.688

	Choice of Toy		
	Estimate	*SE*	*E/SE*
Self-Efficacy Intercept	-3.09	3.458	-.894
Self-Efficacy Slope	-7.756	4.422	-1.754^{+}
Gender	-.058	.38	-.152
Prenatal maternal Depression	-.026	.028	-.90
Maternal 17-month Depression	.02	.018	1.116
Maternal Behavior	.151	.208	.73

$^{+}$ = $p < .10$, * = $p < .05$, ** = $p < .01$

toddler self-efficacy or challenge preference. Also similar to model 3, greater maternal sensitive behavior and infant fearful temperament predicted lower initial self-efficacy (Maternal behavior: *Estimate* = -.025, p = .067; Infant fear: *Estimate* = -.027, p = .05) and increasing growth (Maternal behavior: *Estimate* = .019, p = .036; Infant fear: *Estimate* = .022, p = .029), while toddler shyness predicted greater initial self-efficacy (*Estimate* = .047, p = .001). Of primary interest, increasing self-efficacy trajectory predicted preference for the challenging toy (*Estimate* = -7.756, p = .079), suggesting again - as in Model 2 - an expected trend-level association between these two efficacy/helplessness behaviors.

In sum, these SEM path models demonstrated the added benefit of examining multivariate associations between predictors and concomitants of self-efficacy in toddlers. While univariate models demonstrated somewhat limited predictive associations for self-efficacy, these multivariate analyses further explicated the role of various predictors. Maternal concurrent anxiety demonstrated a predictive association with 17 month self-efficacy, while maternal depression did not show this association. Maternal anxiety at 17 months additionally predicted toddlers' problem symptoms at 17 months, as did maternal prenatal depression, suggesting that there may be a different time-course of impact for maternal anxiety compared to depression.

Across path models, maternal sensitive behavior at 5 months predicted lower initial self-efficacy and increasing self-efficacy trajectories, suggesting in conjunction with univariate analyses that sensitive maternal behavior is particularly robust in its association with self-efficacy. Additionally, similar to univariate models, greater

shyness was associated with greater initial self-efficacy while greater 5 month fearful temperament was associated with lower initial self-efficacy and increasing self-efficacy trajectories. While fear and shyness are both components of a behaviorally inhibited temperament profile and were moderately correlated ($r = .28, p = .011$), these results suggest that fear and shyness do not behave similarly across time in their associations with self-efficacy. Finally, these analyses demonstrated some measurement validity to this self-efficacy construct; an increasing self-efficacy trajectory demonstrated a trend-level association with preference for challenge. These results and their implications are discussed further in the following section.

CHAPTER V

DISCUSSION AND CONCLUSIONS

I aimed in this dissertation to identify and describe patterns of self-efficacy behaviors in toddlers, and to examine associations among mother and infant risk factors, toddler self-efficacy during an impossible task, and toddlers' problem symptoms. Lower self-efficacy has been linked with anxiety in older children, and variations in toddlers' early self-efficacy behaviors were conceptualized as potential vulnerabilities for anxiety. In order to examine individual and group differences among toddlers, I used latent growth and growth mixture modeling approaches in describing self-efficacy patterns, neither of which analytic approach has been used previously in studying children's self-efficacy. Predictive associations and links between self-efficacy and problem symptoms were also approached through a structural equation modeling framework to examine multivariate associations among hypothesized risk factors and concomitants of self-efficacy. Thus, this dissertation provided a novel approach to measurement and analysis of self-efficacy in 17-month-old toddlers, a younger population than those studied previously, and explored associations among self-efficacy behaviors, their antecedents, and correlates. A review of the results and their implications for future work is provided below.

Identification of Early Self-Efficacy in Toddlers

The first aim of this dissertation examined self-efficacy as an expanded construct compared to past research on young children, which has focused primarily on self-efficacy defined as persistence and affect (Jennings & Abrew, 2004). In this dissertation, toddler behavior during an impossible task was coded for persistence, strategies used, and flexibility of strategies, and these behaviors were determined to be closely associated constructs; persistence, strategies used, and flexibility consistently loaded onto a single factor in a series of three confirmatory factor analyses looking at overall task behavior and variations in behaviors over time. Bandura (1977) suggests that in adults and older children self-efficacy beliefs determine coping efforts as well as persistence during challenge, and these results are consistent with this definition. In addition to measuring persistence comparably to previous research (Jennings & Abrew, 2004, Kelley & Jennings, 2003), measurement of self-efficacy in this dissertation was unique in its inclusion of flexibility and coping behaviors, two novel aspects of self-efficacy in terms of early childhood research. Based on Bandura's definition of self-efficacy and measurement of efficacy in older children, I anticipated toddlers' flexibility and coping abilities would be closely related to their persistence during this challenging task.

Before aggregation into a self-efficacy construct, component behaviors of self-efficacy were examined and toddler reactions to the impossible task were found to conform to expectations. Specifically, children demonstrated significant decreases in persistence, decreases in their use of positive strategies, and increases in their use of

negative strategies over the course of the task; thus when presented with an impossible situation toddlers demonstrated decreasing effort to accomplish the task, indicating that in general this task was experienced by children as challenging. In addition, toddlers demonstrated greater flexibility as the task continued, a pattern of behavior suggesting attempts to determine alternate solutions, interpreted as an adaptive coping response. However, significant variance in these behaviors for the sample overall indicated the presence of individual differences in how children behaved during the impossible task. As such, this construct of self-efficacy likely reflects a trait on which children differ, similar to mastery and helplessness behaviors (e.g. Jennings & Abrew, 2004; Kelley & Jennings, 2003; Cole et al., 2007). These variations may also reflect individual differences in level of self-efficacy development, such that some children appear to be developing efficacy at a faster rate than others, however this type of dynamic developmental process in self-efficacy growth has not been supported in prior literature.

Persistence was measured in this dissertation using similar criteria as in earlier studies. However, affect was measured in a more global fashion than methods used by earlier researchers. Prior research on 18-, 25-, and 32-month-olds has reported difficulty measuring specific emotions in younger children, for example pride and shame were challenging to measure in 18-month-olds suggesting that these emotions, or expressions indicating these emotions, are not well-developed at this age (Jennings & Abrew, 2004; Kelley & Jennings, 2003). To measure affect in an even younger population (17 months), I used a general affective valence measure rather than coding for specific emotions. However, during exploratory data analysis I discovered that children's affect

remained relatively flat or neutral throughout the task, with few episodes of smiling or distress. It was possible that this lack of affective variability was due to the method of global affect coding used, and that this strategy did not pick up on what little affect was expressed by children during the impossible task.

While I was able to initially examine associations between affect and self-efficacy behaviors in aggregated forms, when examined over time the lack of variability in affect became problematic. However, an initial confirmatory analysis demonstrated that coded dimensions of persistence and affect replicated the two-factor models of self-efficacy and helplessness (behavioral and affect-related dimensions) reported in past research with toddlers (ages 18-months through 32-months) (Jennings & Abrew, 2004; Kelley & Jennings, 2003). These findings indicate that this dissertation was likely measuring a similar construct to these earlier studies despite a modified task and an expanded coding system (Jennings & Abrew, 2004; Kelley & Jennings, 2003). Namely, measures of coping and flexibility loaded onto the same factor as persistence, and demonstrated negative associations with affect, thus appearing to represent the behavioral (e.g., persistence) dimension rather than the affective component of self-efficacy. While this combination of persistence and coping was consistent with Bandura's conceptualization of self-efficacy in older children and adults, in which affect plays less of a role than do coping strategies and competence cognitions (Bandura, 1977), the limited role of affect was contradictory to past studies of self-efficacy and related constructs in young children (Jennings & Abrew, 2004; Kelley & Jennings, 2003). Additionally, though self-efficacy is a mainly cognitive construct and

not defined by affect, it is closely associated with emotional well-being (Maddux & Gosselin, 2003). Thus the role of affect within this extended definition of self-efficacy in toddlers requires further exploration.

Two additional confirmatory models were tested to examine associations between persistence, coping strategies, and flexibility, with affect removed from these analyses. Results from both models provided evidence for a reliable self-efficacy construct in early childhood, supporting the hypothesis that this early self-efficacy construct can be measured similarly to the model Bandura has described in adults and older children (Bandura 1977). This expanded measurement domain for self-efficacy included toddlers' flexibility, quantified as the amount of strategies a child used, as well as toddlers' coping capacity, measured as the types of positive and negative strategies used throughout the task, and additionally included toddler persistence. According to confirmatory models these domains were highly correlated, either examined as aggregates over the entire impossible task, or when explored in 15-second increments across the task. Thus, in both of these models, the self-efficacy behaviors measured converged to create a multi-faceted efficacy construct similar to that described by Bandura (1977), and anticipated in this study.

Past research on early childhood self-efficacy consists of a single study in which self-efficacy was measured in 18-month-olds (Jennings & Abrew, 2004) based on dimensions similar to those used in studies of mastery and helplessness (e.g., Kelley & Jennings, 2003; Moorman & Pomerantz, 2008). In Jennings' above-mentioned study, self-efficacy was nearly analogous to helplessness and mastery, two admittedly related

constructs; in young children self-efficacy, mastery, and helplessness have been measured primarily based on observed persistence behavior or task engagement during challenge. However, at a theoretical level object-based mastery reflects a child's cognitive development, associated with expectations regarding actions and outcomes (Weems & Silverman, 2006). Helplessness indicates learned responses from repeated experiences with failure in a particular context, where a child adopts a global attributional style about her abilities (Weems & Silverman, 2006). Yet self-efficacy reflects a global and social-emotionally-based construct, encompassing non-contextual beliefs about one's competence that influence behavior, coping, and emotional well-being (Bandura, 1997; Maddux & Gosselin, 2003; Weems & Silverman, 2006). While past measurement of early self-efficacy proposed a simplified construct consisting primarily of a child's persistence behaviors, the self-efficacy construct developed in this dissertation builds on these earlier models (Jennings & Abrew, 2004; Kelley & Jennings, 2003) by including coping and flexibility domains. This current measure of self-efficacy reflects a construct that, while not equivalent to adult questionnaire-based measures of efficacy, consists of a more nuanced approach to this multi-faceted definition of self-efficacy.

In sum, I identified a modified construct of self-efficacy in young toddlers, in which flexibility and coping during challenge were found to additionally define self-efficacy beyond earlier definitions centered around persistence behaviors. This modified conceptualization of self-efficacy builds on past early efficacy literature (Jennings & Abrew, 2004) and begins to link early self-efficacy with mulit-dimensional measures of

efficacy in older children and adults (Muris, 2001; Muris, 2002; Wheeler & Ladd, 1982). Previous measures of self-efficacy, helplessness, and mastery in toddlers have universally measured these constructs in terms of behavioral and affective responses to challenge (see Table 1), however this is the first study to expand self-efficacy to include coping behaviors, an important component of adult self-efficacy. Additionally, this dissertation reliably measured self-efficacy at an earlier age than in previous studies. Thus, these results suggest that the requisite cognitive and social-emotional abilities for self-efficacy may be present in younger children than previously indicated, and this can impact how we understand early childhood mental health and child development.

While affect has been an important component in efficacy-related measurement among toddlers in the past, I did not find that to be the case. However, a lack of effects for affect in this dissertation's measurement of self-efficacy may be due primarily to methodological limitations. A global measure of affect was used in coding, and only the level of affect present for the majority of a 15-second time-block (measured at four points over a 60-second period) was recorded. While toddlers did express positive and negative affect of varying levels, these expressions were often only a few seconds long and were thus not recorded in this global measure unless the emotion expression was long-lasting, a rare occurrence. Alternately, the predominantly neutral affect expressed by toddlers could have been due to the younger age of this sample compared to those in previous studies; at 17 months toddlers were too young to express shame and pride in response to the impossible task (Jennings & Abrew, 2004). Though mastery smiles

described by Kagan (1981) would be expected even at this age, the impossible task may not have pulled for these types of emotional responses.

Thus, despite the minimal role played by affect in this study, further examination of affect as a component of self-efficacy is necessary. Prior research implicating affect in self-efficacy has tended to study more middle-class samples. Perhaps decreased emotional expression in the low-SES toddlers in this sample is indicative of their experience in environments with fewer resources. As such, these toddlers may have experienced less one-on-one play with a caregiver, and were not accustomed to providing this type of expressive feedback. Similarly, frequent experience with frustration and inconsistent or lack of support in managing this frustration may also lead to a response style of decreased emotional expression. Parental discouragement of self-directed behavior and more restrictive parenting in low SES families (Evans et al., 2005) may additionally train children to express less emotion during frustration or challenge. Consistent with these interpretations, Brody and colleagues found that parenting practices and maternal involvement played an important role in development of children's emotional competency, particularly in low SES families (Brody, Flor, Morgan Gibson, 1999).

Even with the unexpectedly limited role of affect, this dissertation's examination of flexibility, coping, and persistence determined these domains to be highly related across the impossible task and across toddlers. These domains as well may have been impacted by the lower SES nature of this sample. Given past research finding that uncontrollable stressors may lead to greater helplessness in children (Evans et al.,

2005), associations between flexibility, coping, and persistence may be altered if examined in a sample with greater socio-economic variance. Notable variations in patterns of these behaviors over time for different children may be due in part to buffering effects of parental behavior or child characteristics, perhaps moderating SES-based environmental characteristics. These individual differences were examined further in subsequent analyses.

Modeling Individual and Group-Level Differences in Toddler Self-Efficacy

In the second aim of this dissertation, I was interested in exploring individual differences in toddlers' self-efficacy behaviors across the impossible task. Self-efficacy was examined in terms of children's initial coping reaction when faced with an impossible task, and also as a trajectory of efficacy behaviors across the task. As hypothesized, children demonstrated significant variation in both latent measures of self-efficacy (initial level and slope). In addition a well-fitting linear growth model indicated a linear pattern of self-efficacy in which children tended to consistently decrease over time. Thus, toddlers tended to show lower self-efficacy with more exposure to the impossible task, a response pattern suggesting that they experienced this task as challenging and decreased their efforts to engage with it.

Few studies of young children's self-efficacy and related constructs (e.g., helplessness and mastery) have used this type of advanced statistical modeling in examining behavior patterns. However, as in this dissertation, Cole and colleagues (2007) modeled kindergartener's helplessness responses to a series of failure trials using a linear growth analysis to estimate behavioral trajectories. Cole similarly interpreted

decreasing trajectories of positive affect, motivation, and hopefulness as learned helplessness, and found significantly decreasing slopes as children gained increasing experience with failure across trials (Cole et al., 2007). Thus, normatively speaking one would expect to see decreasing efforts in response to failure or challenge in early childhood populations, and this was the case both in Cole's research and in this dissertation.

Toddler self-efficacy in this dissertation was understood using two separate but related indicators; initial responses to the impossible task (intercept) and trajectory across the task (slope). Initial response was interpreted as a measure of immediate reaction to challenge, primarily indicating coping-related efficacy behavior. Self-efficacy trajectories were considered to represent a child's extended response to challenge. Intercept and slope were negatively associated, and as such reflected related but not overlapping components of self-efficacy. Accordingly, children who started at low initial levels of self-efficacy tended to show increasing efficacy trajectories, while those who started high tended to decrease in efficacy across the task. Alternatively, it may be that toddlers' initial levels may not be properly calibrated to a specific task, with some demonstrating unsustainable initial efforts and others insufficiently effortful behaviors. In both cases, with sustained challenge we might see effort adjusted upward or downward.

Specifically, at an overall group level, toddlers tended to start moderately high and decrease in their level of persistence across the impossible task. Thus, similar to patterns apparent in an initial examination of individual behaviors (see previous

section), levels of toddler efficacy decreased with continued exposure to challenge. This decreasing trajectory is consistent with Cole and colleagues' (2007) finding of decreasing motivation and hopelessness behaviors over a series of failure trials. Cole interpreted these trajectories as representing learned helplessness, levels of which tended to increase with repeated exposure to failure. In this study, toddlers were exposed to a single failure task, and decreases in positive or efficacy behaviors across this challenge can similarly be understood as evidence of learned helplessness during an abbreviated version of Cole's stimulus. Thus, I found similar patterns of response to failure in toddlers as were illustrated by Cole in kindergarteners, indicating a downward behavioral extension of self-efficacy related constructs. Additionally, consistent with Cole's findings and analytic strategy, this dissertation's linear growth model indicated significant individual differences in children's behaviors across time, suggesting that even as early as 17 months, toddlers demonstrate individual differences in an established behavioral response indicating a tendency for lower or higher self-efficacy.

As a secondary method of analyzing toddler patterns of self-efficacy behavior, I examined group differences in efficacy by looking at latent classes of self-efficacy behavior. While the preceding linear growth model described the overall sample and indicated a general decrease in self-efficacy behavior across the task, using growth mixture modeling I compared two- and three-class models representing discreet subgroups of children based on patterns of task behavior. Model fit testing, in conjunction with theory and parsimony, supported a two-class model solution. The first of these two groups represented children who were on average high and stable on self-

efficacy across the task, and a second, smaller group consisted of children who started around the same level as in group one but decreased over the impossible task.

Given the hypothesis in this dissertation that self-efficacy serves as an early vulnerability for anxiety, I expected to find a class of children that, even at this early stage, showed a pattern of response to challenge consistent with lower self-efficacy and a class of resilient or high-efficacy children. Thus, the stable high efficacy class of children was interpreted as a high self-efficacy or resilient group based on toddlers' consistent persistence and flexibility across the impossible task, indicating an adaptive response to challenge and one that would serve children well during the many frustrations and impossible tasks typically faced by toddlers. While studies have not yet examined self-efficacy using this type of latent class modeling, research has demonstrated that on their own, greater persistence (Jennings & Abrew, 2004; Kelley & Jennings, 2003; Moorman & Pomerantz, 2008) and increased competence behaviors (Messer & Beidel, 1993; Smiley & Dweck, 1994) are components of higher self-efficacy and related constructs.

Alternately, the children with a decreasing pattern of self-efficacy were interpreted as exhibiting low-self-efficacy, based on decreasing efforts and increasing futility as challenge continued. This pattern of decreasing persistence and less flexible coping may indicate the lower levels of self-efficacy hypothesized as a vulnerability for later social-emotional problems. The low persistence behaviors exhibited by this decreasing self-efficacy group were similar to those described by Dweck and colleagues in "non-persisters," a group of high helplessness/low efficacy preschoolers. Dweck's

non-persisters demonstrated more helpless thoughts, negative self-evaluations, and negative affect than did persisters (Burhans & Dweck, 1995; Dweck, 1991; Smiley & Dweck, 1994), paralleling the lower persistence, decreased use of positive strategies, and lower flexibility observed in this dissertation's low self-efficacy group. This type of dichotomized classification of helplessness or efficacy behaviors has not been used widely, either for categories based on observed characteristics or latent analyses. Thus replication of these subgroups of children will be important, as well as analyses examining predictors and concomitants of self-efficacy behavior patterns.

Latent variables modeled through LGM and GMM growth models in this dissertation provided exciting new perspectives on early self-efficacy in toddlers. Similar to prior research, greater persistence, as well as flexibility and coping, indicated greater self-efficacy in general. However, this dissertation additionally examined self-efficacy over time, and as such I was able to measure individual differences based on changes in behavior over time. Analyses indicate that normative developmental transitions from simple agency awareness in infancy to self-efficacious, goal-oriented actions are to a large extent established by 17-months of age. In fact, this identification of an expanded self-efficacy construct in a younger population was additionally noteworthy in that it was accomplished based on a high risk, low SES sample, a population in which children tend towards lower self-efficacy and delayed developmental progress compared to higher income groups (Evans et al., 2005). Previous research on adolescents and older children has reported that in lower income families children tend to show lower mastery beliefs and self-efficacy compared to

children from middle class families (Bandura et al., 2001; Evans et al., 2005). These associations have been attributed to more restrictive parenting, and parental discouragement of self-direction in their children in low SES families, as well as greater chaos and unpredictability in impoverished households (Evans et al., 2005). Thus, the toddlers studied in this dissertation represent a subgroup of the general population, prone to lower self-efficacy, and would be predicted to show less variability in self-efficacy behavior than a sample representing a wider range of socio-economic strata. Measurement of variability in self-efficacy in this type of constrained sample would appear challenging, however significant differences in toddler efficacy behavior across the impossible task were found, and two interpretable groups of children displaying markedly different patterns of efficacy were indicated as well. Thus, self-efficacy appeared to function as an individual difference trait even among, or perhaps particularly in, a high risk sample.

Measurement of self-efficacy in a high risk, low SES sample additionally pulled for the possibility of novel behavioral responses. While this study did not measure household chaos or determine degree that routines were maintained, assumed experience with these types of less consistent environments may have contributed to efficacy behavioral patterns found in these analyses, for example the identification of a low decreasing and a stable subgroup of children in GMM latent class analyses, rather than a clearly high self-efficacy group, may be related to the low SES conditions experienced by toddlers.

In sum, even more than identification of self-efficacy, I identified discreet forms of self-efficacy behavior. Toddlers demonstrating lower self-efficacy, based on greater initial efficacy and decreasing trajectories across the task, may be the children who are most vulnerable to future anxiety, and thus I was interested in how individual differences in self-efficacy related to known predictors of anxiety disorders. Additionally, I was interested in how differences in toddler efficacy related to elevated symptoms of social-emotional problems in these 17-month-olds.

Prediction of Self-Efficacy Behavior and Social-Emotional Problems

While the first aim of this dissertation focused on how to conceptualize and measure self-efficacy in this early childhood population, and the second aim examined variation in individual and group-level self-efficacy behavior, the third aim tested predictors of anxiety disorders related to self-efficacy, and how self-efficacy related to early problem symptoms. Specifically, I was interested in whether previous or concurrent maternal psychopathology (anxiety and depression), maternal sensitive behaviors during infancy, and infant temperament served as developmental antecedents for variations in toddlers' self-efficacy. I was additionally interested in how self-efficacy related to general psychopathology symptoms, measured by toddlers' current social-emotional problems on the BITSEA.

Using structural equation path models to examine multivariate associations among variables, I found strong positive predictive associations between maternal sensitive behavior during infancy, and toddler self-efficacy. In addition, within an SEM multivariate framework, I found that more fearful infant temperament, lower shyness in

toddlers, prenatal maternal depression and concurrent maternal anxiety were associated with greater self-efficacy. However, links between self-efficacy and both maternal and toddler symptomatology were relatively weak, and reasons and implications for these findings are discussed.

Self-Efficacy and Maternal Behavior. One major risk factor examined in the third aim of this dissertation was the role of maternal behavior in predicting self-efficacy, as well as social-emotional symptomatology. Maternal behavior was measured in three ways: as maternal sensitivity, a broader maternal behavior construct, and divided into the seven component scales of which maternal sensitivity and maternal behavior constructs consisted. First, maternal sensitivity (consisting of five measurement subscales) has been studied extensively in the infant literature, and refers to sensitive and contingent patterns of maternal behavior that have been associated with secure attachment styles in toddlers and fewer anxiety symptoms in older children (e.g., Cox, Owen, Lewis, & Henderson, 1989; Smith & Pederson, 1988). Studies of preschool-aged and older children with anxiety have also measured maternal behavior, however these studies focus more on particular dimensions of parenting such as lower warmth and greater intrusiveness and control, all of which have been associated with anxiety disorders in children (McLeod, Sigman, Hwang, & Chu, 2003; Moore, Whaley, & Sigman, 2004; Whaley et al., 1999; Wood et al., 2007). Several studies have additionally shown associations between these same maternal behaviors and young children's self-efficacy (Cole et al., 2007; Messer & Beidel, 1993; Moorman & Pomerantz, 2008). Thus, a second variable measured was maternal sensitive behavior,

consisting of the same five dimensions as maternal sensitivity but additionally including intrusive behavior and speech.

I measured both of these overlapping constructs – maternal sensitivity and general maternal behavior - using two highly correlated aggregates. Univariate analyses demonstrated a somewhat stronger effect for the general maternal behavior measure, which consisted of the same dimensions as maternal sensitivity with the addition of non-intrusive behavior and speech. Additionally, because studies of maternal behavior and anxiety disorders have indicated an important role for maternal intrusiveness as a risk factor (e.g., Moore, Whaley, & Sigman, 2004), the more general maternal behavior measure was used in multivariate analyses.

Across univariate analyses and multivariate SEM models, maternal behavior showed robust associations with self-efficacy; greater sensitivity and less intrusiveness in maternal behavior when infants were 5-months-old predicted lower initial self-efficacy and increasing self-efficacy trajectories across the impossible task. While this association seems paradoxical, high negative associations between initial self-efficacy and self-efficacy trajectories mean that children with lower initial self-efficacy also tended to show increasing efficacy across the task. Thus, this profile of low initial level and increasing trajectory for self-efficacy suggests a toddler who may be cautiously calibrating initial levels of self-efficacy, and then increasing efforts as the context becomes better known. The role of maternal behaviors was robust enough that associations were replicated in all SEM models, including those controlling for maternal anxiety and depression. As expected, more sensitive mothers who were more accepting

of and responsive to their infant's cues had toddlers who responded with increasing levels of self-efficacy during challenge. This pattern of increasing efficacy with extended exposure to challenge suggests that these toddler may have developed coping abilities such that they exhibited flexibility during distress.

It is important to note that maternal behavior was coded when infants were 5-months-old, and it was strongly predictive of toddler behavior a full year later. Past research has demonstrated the significant role of positive and warm parenting compared to controlling, harsh, or negative parenting in predicting concurrent helplessness, mastery, or persistence (Cole et al., 2007; Kelley & Jennings, 2003; Nolen-Hoeksema et al., 1995). However, few studies have examined prospective associations between maternal behavior and self-efficacy related behaviors. While Moorman and Pomerantz (2008) found that greater maternal control predicted children's decreased mastery orientation six months later, this dissertation is the first known study to demonstrate predictive associations between maternal behavior and toddler self-efficacy measured longitudinally, in this case a full year apart. As a core component of early regulatory development, sensitive maternal behavior - and specifically toddlers' extended exposure to this sensitive caregiver over time - may provide children with a greater range of adaptive self-regulatory skills. These regulatory abilities serve infants and toddlers in coping with challenges throughout development. As toddlers, this history of sensitive and responsive caregiving provides a well-developed sense of the world as a safe place and builds children's confidence. Thus, consistent experience with a responsive

interpersonal environment, measured here as maternal sensitive behavior, provides toddlers with the roots of a high competence and confidence self-efficacy belief system.

A recent meta-analysis on parenting and childhood anxiety suggested disaggregating parenting dimensions in order to better understand specific behaviors accounting for associations with childhood anxiety (McLeod et al., 2007). Based on McLeod and colleagues' recommendation, I examined which maternal behaviors were most related to self-efficacy; thus I looked separately at associations between each of the seven sub-scales composing maternal sensitive behavior and self-efficacy. Mothers who were more accepting, sensitive, and responsive towards their infants had toddlers with a higher self-efficacy profile (i.e., lower initial self-efficacy and increasing self-efficacy trajectory). These findings support the theoretical and empirical evidence linking positive maternal behavior and greater child efficacy-related behaviors (Cole et al., 2007; Kelley & Jennings, 2003; Nolen-Hoeksema et al., 1995). For example, mothers who were more positive and less controlling had children showing greater efficacy and less helplessness (Cole et al.; 2007; Moorman & Pomerantz, 2008). As described previously, while lower initial levels of efficacy seem counter-intuitive, initial levels and trajectories of self-efficacy were negatively correlated, such that less initial efficacy behavior indicated a likely increasing self-efficacy trajectory.

Warmth in parenting did not significantly predict toddler self-efficacy, however gender moderated this association such that boys with mothers who were coded as more warm had greater initial self-efficacy behaviors. Sons of warm mothers additionally tended to show increasing self-efficacy trajectories, however this association was not

significant. In general when examining gender differences as a moderator of maternal behavior, results indicated that positive maternal behavior tended to predict greater initial self-efficacy in boys but did not affect their trajectory over time. Perhaps this finding points to the important role of maternal sensitive behavior in teaching coping skills. When initially faced with frustration in a distressing situation, these children called on these regulatory strategies initially, perhaps demonstrating unsustainably effortful strategies that decreased in the long run, and this was particularly true for boys. In contrast, daughters of sensitive mothers tended to show low initial self-efficacy levels. While this gender difference is not supported by prior early self-efficacy literature (Jennings & Abrew, 2004; Kelley & Jennings, 2003), these results may indicate that initial self-efficacy and self-efficacy trajectories, two novel measurement dimensions resulting from advanced statistical procedures, represent somewhat different components of this construct. Perhaps the initial strategy used accesses an element of self-efficacy related to impulse control or self-regulation, and due to later developing impulse control and effortful control in boys (Putnam, Gartstein, & Rothbart, 2006), the teaching effects of early maternal behavior are most apparent in male toddlers.

Social-Emotional Problems and Maternal Behavior. In addition to associations with self-efficacy, I was interested in examining how maternal behavior predicted toddlers' problem symptoms. SEM multivariate models controlling for maternal anxiety and maternal depression both showed a similar direction of association between greater maternal sensitive behavior and lower problem symptoms. However, this relation was non-significant in the model with depression and only approached significance (trend

level) when the model controlled for maternal anxiety. These findings provide some support for the hypothesis that greater maternal sensitivity in infancy is a protective factor for later toddler social and emotional problems. In addition, a lack of relation between maternal behavior and toddler symptoms when controlling for depression indicates that in depressed mothers maternal behavior is less related to toddler outcomes, while for mothers with anxiety maternal sensitivity plays a role independent of mothers' symptoms in predicting social-emotional problems. Thus, maternal sensitive behavior appears to have a greater impact in the context of maternal anxiety than maternal depression symptoms. These findings indicate maternal anxiety and maternal sensitive behavior as inter-related areas of risk for child psychopathology, and conversely as areas for intervention.

In addition, associations between sensitive maternal behaviors and lower social-emotional problems support prior research among older children in which greater acceptance and responsiveness in parenting were associated with lower anxiety symptoms (Moore, Whaley, & Sigman, 2004; Whaley et al., 1999; Wood, McLeod, Sigman, Hwang, & Chu, 2003). In this dissertation mothers who were less intrusive additionally had toddlers following a similarly adaptive efficacy pattern, consistent with research findings among older children (Moorman & Pomerantz, 2008; Whaley et al., 1999; Wood, McLeod, Sigman, Hwang, & Chu, 2003; Wood et al., 2007).

Maternal Psychopathology, Self-Efficacy, Social-Emotional Problems. Examining maternal symptomatology as a predictor on its own, univariate models predicting self-efficacy from maternal anxiety and depression symptoms were

universally non-significant, whether measured as observed symptom levels prenatally, at 5 months, and at 17 months, or using growth model terms created to reflect change over time in mothers' anxiety and depression symptoms. Thus, on their own maternal anxiety or depression symptomatology did not predict children's self-efficacy. Even more, there were no differences in the impact of maternal symptoms on toddlers based on recency or length of exposure, findings counter to those reported in relevant literature (Kelley & Jennings, 2003). These results indicate that maternal symptomatology was not uniquely related to toddler self-efficacy, perhaps resulting from the relatively low and non-clinical levels of symptomatology in this sample.

However, when maternal prenatal and 17 month anxiety were included in multivariate SEM models controlling for maternal behavior and children's temperamental fear and shyness, maternal 17 month anxiety predicted greater self-efficacy initial levels and decreasing self-efficacy trajectories over time. Thus, in this larger multivariate context, a lower self-efficacy profile was associated with recency of exposure to maternal anxiety, indicating the hypothesized link between increased maternal anxiety and early vulnerability for childhood anxiety. In addition, maternal 17 month anxiety predicted increased toddler problem symptoms, a finding consistent with past literature (Beidel and Turner, 1997; Biederman et al., 2005; Schreier et al., 2008). Thus, while there was not a direct relationship in this model between self-efficacy and problem symptoms (see later section for discussion), the hypothesized predictive association of maternal anxiety with both toddler self-efficacy and anxiety symptoms was significant, as expected. Differential findings for univariate and multivariate

associations among maternal anxiety and toddler self-efficacy demonstrate the importance of considering broader environmental factors, such as maternal behavior and child temperament traits, when measuring the impact of maternal symptomatology.

Next, an SEM model including maternal prenatal and 17 month depression as well as maternal sensitive behavior and infant temperament domains, did not show significant associations between maternal depression and self-efficacy behaviors, although prenatal depression (rather than 17 month symptoms as in the previous model) significantly predicted problem symptoms. In comparison to the previous model testing associations among maternal anxiety and self-efficacy, this model indicated a non-significant association between self-efficacy and maternal depression than with maternal anxiety. Previous research has demonstrated significant effects of concurrent maternal depression in predicting toddler self-efficacy, and Jennings and Abrew (2004) actually showed a recency effect of exposure to maternal depression predicting lower toddler self-efficacy. While the association in this dissertation between maternal anxiety and self-efficacy was consistent with this research, a lack of effects for maternal depression may be due to the comparatively strong effect of maternal behavior in the depression SEM model. Consistent with this interpretation, Kelley and Jenning's (2003) similarly found a lack of direct association between maternal depression and toddler helplessness, however maternal behavior acted as a moderator between maternal symptomatology and helplessness behavior in children (Kelley & Jennings, 2003).

Interestingly, this model also points to a greater impact of maternal depression on toddler symptoms during prenatal and neonatal time-periods compared to concurrent

depression, suggesting that something about this early period is more formative in early childhood symptom levels than concurrent influences. Studies examining the persisting effects of prenatal anxiety and depression in the postnatal period have indicated a predictive association between this early maternal symptomatology and negative infant behavior (Davis, Snidman, Wadhwa, Glynn, Schetter, & Sandman, 2004), and the important role of the prenatal environment is similarly supported by these results. Taken together, these findings indicate that maternal anxiety and depression both play a role, but may show differential timing effects in the development of toddler social-emotional problems.

Self-Efficacy and Temperament. A final exogenous component of this dissertation's SEM path models was child temperament, specifically infant and toddler fearfulness and toddler shyness. These domains are components of a difficult temperament profile and are also central to behavioral inhibition; one study found associations between difficult temperament and lower social competence, and greater behavioral inhibition has been linked to anxiety disorders (Houck, 1999; Kagan & Snidman, 1999; Muris, 2002). In this study, children who were more fearful as infants (at 5 months) and those who were less shy at 17 months demonstrated an increasing trajectory of self-efficacy as toddlers. Infants with more fearful temperaments were anticipated to show lower self-efficacy behavior patterns as toddlers, and these findings are contrary to expectations. However, less shy toddlers were expected to show greater efficacy, and this was the case in these analyses. Moderate positive correlations between infant fear and toddler shyness, as well as general stability in toddler fear over time,

additionally confuse this finding. These contradictory results may indicate that infant fearfulness actually served as a protective factor for infants. Perhaps these fearful infants received more early experience with distress and thus developed self-regulatory abilities that they displayed in self-efficacy behavior as toddlers during the impossible task, similar to evidence that some children inexplicably (or due to family or environmental factors) decrease in behavioral inhibition characteristics between infancy and preschool (Kagan & Snidman, 1999).

Self-Efficacy and Helplessness Measures. An additional area of interest in multivariate SEM prediction models was that of the two helplessness-related measures developed for this dissertation. Latency to engage in the challenging task and toddlers' challenge preference were both measured during the third phase of the impossible task when toddlers were 17 months. As in previous studies, I found that greater self-efficacy, indicated by an increasing slope trajectory, predicted a greater likelihood of choosing the challenging toy. While this effect was not significant, it was robust at a trend level in both SEM models controlling for maternal anxiety and depression. This association provides some validation for this measure of self-efficacy, in that there appears to be an anticipated association between high efficacy and low helplessness. Dweck and colleagues demonstrated in a series of studies with preschoolers that children who chose a solvable puzzle, or did not show a preference for challenge, tended to demonstrate more helplessness characteristics (Burhans & Dweck, 1995; Dweck, 1991; Smiley & Dweck, 1994). Another study using a similar helplessness measure to Dweck's found that helplessness measured in part using challenge preference at age 5 predicted greater

depression when children were 10. However, use of the modified helplessness task in this dissertation serves as the first example of this widely used unsolvable task in such a young population, and provides some unique evidence of early inducement of learned helplessness

As a second helplessness measure, based on a task developed by Kelley and Jennings (2003), I measured latency to re-engage in the impossible task when presented with it for a second time. Unfortunately, results showed no significant associations between this behavior and self-efficacy, perhaps indicating that at 17 months toddlers were too young to experience this type of learned helplessness response extended over a several-minute period. Alternately, this helplessness measure may have been too subtle to pick up on toddlers' response to a single failure trial, particularly compared to the more robust previous measure of challenge preference. However, there was a small (non-significant) association between maternal 17 month anxiety and latency to engage, indicating perhaps a concurrent association between maternal anxiety and children's feelings of helplessness. Theoretical links between anxiety and helplessness indicate that children with mothers who are more anxious would be expected to show more helpless behavior, and though limited in quantity, research confirms this association (Chorpita & Barlow, 1998; Messer & Beidel, 1993; Muris, 2006).

Self-Efficacy and Social-Emotional Problems. A final goal of this dissertation was to understand the association between risk factors in infancy, self-efficacy, and early anxiety, however it must be noted that a pure measure of anxiety was not available for these analyses. Measurement and reliable diagnosis of anxiety in toddlers is

challenging from a clinical perspective (Warren et al., 2006), and a diagnostic research tool was not available. Instead, the Brief Infant-Toddler Social and Emotional Assessment (BITSEA) was used as a screening tool for general social-emotional problems. The BITSEA is scored using two scales, a problem symptom scale including items measuring anxiety as well as other internalizing and externalizing symptoms, and a competence scale. Among the questions that make up the problem symptom scale are four that measure anxiety (Is afraid of certain places, like stores, elevators, parks, or cars; Is very worried about getting dirty; Seems nervous, tense or fearful; Worries a lot or is very serious). However, due to the small number of anxiety items and the screening nature of these questions, as well as the general lack of specificity in children's symptomatology at this early age, the anxiety scale alone did not provide enough variability and the full problem symptom measure was determined to be a more robust variable and more suitable for examination. Additionally, this BITSEA problem symptom scale has been used in past research and showed concurrent, predictive, and discriminant validity in measuring social-emotional and behavioral problems (Briggs-Gowan et al., 2004).

Social cognitive theory posits that early experiences with lack of control over one's environment lead to lower self-efficacy, while Chorpita's interpretation of cognitive theory suggests that similar experiences in early childhood lead to subsequent anxiety disorders. However, prospective research empirically linking early environments, self-efficacy, and anxiety symptoms does not yet exist. The literatures on self-efficacy and anxiety disorders have been primarily cross-sectional, and self-

efficacy has rarely been measured in very young children (Cowen et al., 1991; Messer & Beidel, 1993; Muris, 2001; Muris, 2002; Suveg & Zeman, 2004; Townsend, Dimigen, & Fung, 2000; Wheeler & Ladd, 1982). In fact, despite theoretical indications of the importance of early environments for self-efficacy and anxiety, few studies have explicitly made this link (Frodi, Bridges, & Grolnick, 1985; Gilmore, Cuskelly, & Purdie, 2003).

A primary hypothesis was the expected association between lower self-efficacy and increased problem symptoms in young toddlers. Univariate analyses predicting social-emotional toddler problem symptoms from self-efficacy were not significant, and in a multivariate path model controlling for maternal anxiety, maternal sensitive behavior, and child temperament, associations were similarly non-significant. This finding was contrary to hypotheses, however a lack of significant relation between these toddler behaviors provides valuable insight into the early development of self-efficacy and anxiety disorders in infants and toddlers.

I measured self-efficacy earlier than it has been examined in prior research, and thus the lack of association between self-efficacy and social-emotional symptoms may be developmentally-based. Whereas past studies linking self-efficacy and anxiety have involved older children or adolescents, and used questionnaires or interviews to measure self-efficacy (Cowen et al., 1991; Muris, 2001; Muris, 2002; Suveg & Zeman, 2004; Wheeler & Ladd, 1982), these cross-sectional studies do not speak to the longitudinal associations between self-efficacy and psychopathology. Self-efficacy as a vulnerability for or mechanism of anxiety etiology has been posited to develop over

time (Bandura, 1977; Bandura 1997). While I aimed to measure early manifestations of self-efficacy, perhaps practice with interpreting one's environment using this self-efficacy frame is necessary in the development of anxiety. In other words, early repeated experiences are responsible for developing self-efficacy (Bandura, 1997; Maddux & Gosselin, 2003), whereas subsequent experiences ingrain these self-efficacy beliefs and in some children lead to anxiety development (Chorpita & Barlow, 1998). Measuring self-efficacy and social-emotional problems simultaneously in this young sample may not allow for observation of symptom development over time. Thus, longitudinal examination of later anxiety symptoms in these children would be more likely to demonstrate the proposed association between self-efficacy and anxiety. From a prevention perspective, this explanation is encouraging, since it posits early self-efficacy behavior as an easily observed risk marker preceding anxiety development in children. Thus, future research looking at the longitudinal impact of early-measured self-efficacy will provide important contributions to research and prevention efforts.

Alternately, the sample of mother-infant dyads in this study were selected due to greater risk of parenting problems. Thus, these mothers are particularly at risk for inaccurately perceiving and responding to their children's behaviors. As such, low associations between toddler self-efficacy behavior and social-emotional problems may be a function of maternal misinterpretation of toddler behavior. Greater self-efficacy at 17 months may be interpreted as independence and agency by some mothers, and as assertiveness, aggression, or stubbornness by other mothers. For example, mothers with higher concurrent anxiety reported greater child problem behavior. In this case, due to

symptom-related cognitive biases these anxious mothers may have been more likely to interpret toddler behavior negatively, and thus reported greater child problem symptoms (Najman, Williams, Nikles, Spence, Bor, et al., 2001). Thus, efficacy behaviors could have differentially informed mothers' reporting of children's problem behaviors. Accessing information on children's problem symptoms from multiple reporters and contexts, or using observational measures to determine children's symptom profile in future research may help resolve this issue.

The limited association between self-efficacy and problem symptoms in these 17-month-old toddlers may also be related to the behavioral nature of early efficacy measurement. While united by the overall framework of Bandura's social cognitive theory, behavioral manifestations of self-efficacy in toddlers may represent a categorically different construct from cognitive measures of self-efficacy used in studies of older children. While theoretically connected, the cognitive vulnerability to anxiety measured as self-efficacy in adolescents may be substantively different from the behavioral vulnerability measured in this dissertation. Past research has not examined this cognitive-behavioral continuity, and longitudinal research measuring self-efficacy behaviorally and cognitively across development may be necessary to determine whether different measures of self-efficacy access identical constructs.

Additional Considerations

A number of important considerations should additionally be addressed regarding this study overall. First, toddlers' participation in what I have described as an "impossible" task requires some commentary. Although analyses included a general

measure of cognitive development, there is a possibility that cognitive level or other related variations in toddlers' developmental level (e.g., experience with similar tasks, frustration tolerance, regulatory abilities) may have contributed to differential understandings of the impossible nature of the focal shape-sorter task used in this dissertation. Perhaps self-efficacy behaviors are ideally measured during frustration, but that an unachievable task incites a different type of reaction. In fact, children who realized the impossible nature of this task may have reacted most adaptively by disengaging from the task. In the current study, the mean level decreasing slope for self-efficacy across the task may be due to children's disengagement from an impossible task, whereas a more stable slope across the task might indicate steady perseverance despite frustration. Thus, future research may benefit from exploration of differential reactions to impossible tasks compared to frustrating but achievable tasks. Past studies on helplessness behavior have generally used impossible puzzles in which pieces were missing, however this distinction between an unachievable and a frustrating task has not been addressed even in these studies of older children (Cole et al., 2007; Dweck, 1991; Smiley & Dweck, 1994).

Additionally, as demonstrated in LGM analyses, toddlers' initial responses to the impossible task were negatively related to their behavioral trajectories across the task. In predictor analyses as well, this negative association was generally found, suggesting that children who were lower on initial efficacy tended to increase over the task. However for several risk factors, for example particular temperament characteristics, this interpretable association between initial self-efficacy and self-

efficacy trajectories was not found (e.g., 17-month shyness was associated with greater initial self-efficacy and increasing self-efficacy across the task). These types of differences in association, as well as a moderate though significant association (r = -.51) between initial efficacy and efficacy trajectories, suggest that toddlers' initial status during the first 15-seconds of the impossible task may represent something different from those behaviors exhibited during extended exposure. These initial behaviors may indicate more of a self-regulatory response during immediate distress, or could represent toddlers' degree of impulsivity. A lower initial status may reflect a child's slower or more deliberate approach to a novel situation, whereas a higher initial score indicates a more impulsive toddler who acts before fully considering response options. While in some children these regulatory behaviors or response tendencies may be highly related to extended efficacy response, this was not true for all toddlers in this sample.

Thus, the difficulty in fully interpreting both initial status and slope in behavior patterns over time brings into question whether these measurements of toddler behavior can rightly be considered self-efficacy, or rather should be qualified as *precursors to self-efficacy* at this young age. Perhaps these behaviors reflect toddler characteristics or abilities that precede and influence the development of self-efficacy, but on which toddlers do not yet demonstrate a consistent response pattern. These two separate measures (intercept and slope) of precursors to self-efficacy may indicate tendencies for lower or higher efficacy, and it may be that for some children they cohere into an interpretable self-efficacy profile, while in others the coherency is still developing.

Longitudinal examination and investigation of long-term continuity will be important in deciphering the meaning of these slightly different efficacy components or correlates. An additional terminology-based caveat to this discussion is that the construct measured here as self-efficacy - or a precursor to self-efficacy - reflects a behavioral efficacy measure. Given that the cognitive construct of self-efficacy measured in older children and adults (e.g., Bandura, 1977) cannot be observed at this young age, it may be preferable to consider this impossible task and coding procedure as a measure of *behavioral* self-efficacy rather than as synonymous with the cognitive self-efficacy construct.

Finally, the strong negative association between initial self-efficacy and efficacy trajectories in these toddlers presents a possibility of regression to the mean, specifically in terms of toddlers' level of self-efficacy behaviors across the task. Regression to the mean tendencies have been well noted in modified time series data in particular, where participants often re-calibrate attitudes, emotions, and behavior relative to their initial levels. However, because I used a composite measure of self-efficacy in the present study, this may have lessened the chance that children were exhibiting this tendency in a coherent manner across all of the component measures (Barnett, van der Pols, & Dobson, 2005). Furthermore, the correlation between initial status and trajectories for toddlers was significant but moderate, indicating that a good deal of individual variations existed in this sample, and while regression to the mean may have occurred in a select few cases, this may not have been prevalent across the sample. Thus, the possibility of regression to the mean in these data should be noted and examined or

controlled for in future research, but these findings are likely robust against this statistical phenomenon.

Limitations and Future Directions

Although results from this dissertation provide novel insight into the development of self-efficacy and how self-efficacy may function as a risk factor for childhood anxiety problems, there are several limitations that should be acknowledged. One major limitation was the lack of a specific child anxiety measures in these analyses despite research questions expressly addressing anxiety etiology. Measurement and reliable diagnosis of anxiety in toddlers is challenging from a clinical perspective (Warren et al., 2006), however use of a more comprehensive questionnaire or parent interview addressing children's symptomatology could aid measurement of anxiety as well as more specifically gauging children's general social-emotional symptoms.

Similarly, given the low base rates of maternal anxiety, replication with an anxiety-specific clinical sample is warranted. High anxiety symptoms were relatively rare in mothers across the three waves of data collection, and this was generally true of depression scores as well, demonstrated by positively skewed distributions for anxiety and depression variables. Given that so few studies have examined self-efficacy behaviors in early childhood, in order to identify central behaviors and risk factors for low self-efficacy it will be helpful in future research to measure self-efficacy in a clinical sample selected for maternal or child anxiety symptoms. This may be particularly relevant in examining prediction of self-efficacy trajectories, and even more in identifying discreet subgroups of efficacy behavior as it relates to anxiety risk. A

related additional limitation of this dissertation was use of self-report measures for anxiety and depression. Future research should incorporate clinical diagnostic interviews for a more stringent and reliable measure of maternal symptomatology.

Measurement of self-efficacy in this 17 month population provides a useful downward extension of prior research, however this dissertation's measure of self-efficacy is limited in how easily it can be linked to other studies of self-efficacy in early childhood as well as studies in older children. Self-efficacy measured at this young age was difficult to differentiate from helplessness and mastery, and further research is needed to fully explore the similarities and differences between these important constructs. A longitudinal approach to self-efficacy will be an important future direction for understanding the trajectory of self-efficacy development and growth across infancy and childhood, as well as for investigating the hypothesized links with anxiety.

Another limitation was the relative homogeneity of the sample, specifically in that mother-infant dyads were drawn from an exclusively low-income group. Whereas these participants were selected due to this lower income level, prior research on self-efficacy and anxiety risk has studied more comprehensive samples in which there is greater variability in families' socio-economic status (Messer & Beidel, 1995; Muris 2001; Muris 2002). Past studies have shown a link between low SES, low efficacy, and increased problem symptoms, however in these studies poverty was considered a primary causal factor of this cognitive style and of child symptoms (Evans et al., 2005). I was unable to examine the role of family SES on toddler efficacy given the lack of variability in this sample's status. Since this study was the first to examine self-efficacy

in 17-month-old toddlers, and past research has shown these unique associations between self-efficacy and related outcomes for children living in poverty (Evans et al., 2005), it will be important in future research to determine how these results generalize across social strata to a middle class sample, or if findings were specific to this high risk group, in which we would expect to see more severely low self-efficacy.

Replication with a larger sample may also prove useful, particularly in identification and prediction of self-efficacy latent classes. While a focus of this dissertation was prediction of group membership, analytic power was limited when predicting to subgroups of this already small population, and sample size may be a source of limited significance in results. Further research should additionally address longitudinal associations between toddler self-efficacy and anxiety symptoms as they emerge in a measurable diagnostic form, ideally around preschool or school-age. In the current sample, continued data collection at a fourth wave will assess mothers and children at age 5. Using these data, it will be possible in the future to determine whether self-efficacy at 17 months predicts anxiety symptoms at age 5.

Clinical Implications

Findings from this dissertation can meaningfully inform anxiety prevention and early intervention efforts. By linking early self-efficacy as a measureable behavior pattern to factors known to increase risk for anxiety in some children - such as temperamental reactivity, maternal psychopathology, and insensitive maternal behavior - this study introduces an additional marker for risk in young children. While low self-efficacy does not universally predict anxiety disorders, less robust self-efficacy

increases risk for anxiety, and additionally serves as a non-specific risk factor for psychopathology and maladaptive outcomes (Bandura, 1997, Houck, 1999), indicating it as an important vulnerability to assess for at an early age. These results provide additional support for a tenable link between lower self-efficacy and social-emotional problems in children as young as 17 months. Early intervention and prevention efforts can intercede before low self-efficacy beliefs and problem symptoms begin to more severely impact academic, interpersonal, or emotional functioning.

Self-efficacy in toddlers can be assessed behaviorally, as an objective measurement not subject to reporter biases or lack of reporter awareness. Research has shown that parents are often not aware of children's anxiety or social-emotional problems, in part due to the often compliant and non-disruptive nature of anxious children, and that caregivers tend to minimize young children's anxiety issues (Donovan & Spence, 2000). Findings from this dissertation demonstrated that mothers experiencing anxiety and exhibiting lower sensitivity tended to have toddlers with less self-efficacy behaviors and greater social-emotional problem symptoms. These associations suggest that precisely these mothers of lower-efficacy, possibly anxious children may have difficulty accurately interpreting and reporting on their children's behavior and symptomatology. Since few toddlers are able to report on their own experiences, this type of behavioral measure may be particularly useful in assessment as an alternative or in addition to maternal report.

Given the established importance of early assessment and intervention, the results of this study can inform how self-efficacy behaviors are measured and

interpreted during this early childhood period. The impossible task used in this dissertation is brief and easily translated into similarly challenging puzzles or goal-oriented toys, thus administration of these types of tasks in a range of settings – from school-based assessments to well-child pediatrician visits - would be a simple addition. Given the robust finding of associations between maternal behavior and self-efficacy, parenting-based interventions may prove useful in altering self-efficacy trajectories. While anxiety-based treatments for children such as Coping Cat (Kendall, 1994) introduce efficacy concepts at an older age, interventions with mothers of infants and toddlers may instead focus on supporting the sensitive maternal behaviors associated with greater child self-efficacy. For example, attachment-based treatments such as Lieberman's Infant-Parent Psychotherapy or sensitivity-focused interventions such as the Steps Toward Effective Enjoyable Parenting (STEEP) or Video Intervention to promote Positive Parenting (VIPP) programs successfully target dyadic processes and social-emotional problems, in infancy and in toddlerhood (Lieberman, 1985; Lieberman, 1992; Bakermans-Kranenburg, Van Ijzendoorn, &Juffer, 2005).

Synthesis

I expanded the measurement and conceptualization of self-efficacy in toddlers from an index focusing on persistence to additionally include coping strategies and flexibility. These behaviors, combined with persistence, were found to reflect a multi-faceted construct of efficacy that reflected the more nuanced self-efficacy construct measured in older children and adults. These results indicate that competence and

coping components of self-efficacy, in addition to task-persistence, can be accurately measured in young children.

By studying the role of self-efficacy in toddlers, particularly using a multi-dimensional construct resembling definitions of efficacy in older populations, we can better understand the development of psychopathology - specifically anxiety, which has been associated with lower self-efficacy. However, results suggest that self-efficacy and social-emotional problem symptoms are not directly linked in early childhood. Nonetheless, similar predictive associations, in particular with maternal psychopathology and maternal behavior predicting both self-efficacy and social-emotional problems, indicate a connection between these two important outcome variables. The lack of a direct association between children's self-efficacy and problem symptoms was considered to be likely due to developmental factors, such that this emerging self-efficacy construct may eventually serve as a risk factor for future symptomatology but in its initial stages the link is not yet apparent. A lack of relation in toddlerhood additionally supports theorized pathways of anxiety symptoms developing *from* established self-efficacy beliefs. Other important findings in this dissertation, in particular a strong link between sensitive maternal behavior at 5 months and self-efficacy at 17 months, support this idea of compounded developmental effects, with continued experiences having a greater impact over time.

APPENDIX A

TODDLER IMPOSSIBLE TASK PROTOCOL

1. ☐ While mom is filling out forms, engage child in puzzle task – hand child pieces and prompt "**put the [shape] in**," point at puzzle. Give help when necessary, but allow child to complete puzzle on own.
2. ☐ Take away puzzle and place box in front of child. You will need 4 balls: 2 smaller balls and 2 larger balls. Say "**Watch me!**" and put first small ball in the hole, then hand other small ball to child. Say, "**now you try**." When child is able to put small ball in hole (if necessary, repeat demonstration), give child other two balls (larger size) and say "**Now I want to see you do it all by yourself**." Be sure to remove the two smaller balls from child's vicinity. If child asks for help from experimenter or from mom, say "**you try it, I want to see you do it all by yourself**." If child becomes distressed or does not engage in task for 30 seconds, end task. After 60 seconds of persistence remove box and pieces and offer child toys for break.
3. ☐ Take break for approx. 2 minutes.
4. ☐ Taking away toys, show child same puzzle and box with new pieces (i.e., the pieces that fit.). Ask "**which toy do you want to play with now – the puzzle, or the shapes?**" If child chooses puzzle, allow child to complete puzzle then give box to child with 2 small balls and say, "**Now let's do *this* one**." If child chooses box, put puzzle away and give the child the box with 2 small balls. Prompt once with "**Put these balls into the box**." Wait 30 seconds to see if child acts. If necessary, repeat prompt. After 30 seconds, if child has not started task, put one ball in and say "**See, the ball goes in the hole. Now you try all by yourself**." If child still does not act, show with additional ball and put ball in child's hand – "**now you try**."
5. ☐ After child completes task, take first set of larger balls and say "**You know what? I made a mistake, these pieces were too big to fit in this box. You did a really good job playing.**"

APPENDIX B

MPLUS SYNTAX FOR CFA MODEL TWO

```
TITLE:  Confirmatory Factor Analysis Model Two
DATA: FILE IS F:\Dissertation analyses\Help CFA.dat;
VARIABLE: NAMES ARE
ID ScalePer SumPO1 SumNE1 SumallPO SumallNE;

MISSING ARE ALL (-999);

USEVARIABLES ARE ScalePer SumPO1 SumNE1 SumallPO SumallNE;

ANALYSIS:

MODEL:  Help by ScalePer SumPO1 SumNE1 SumallPO SumallNE;

sumpo1 with sumallpo;
sumne1  with sumallne;

PLOT: type is Plot3;

OUTPUT: SAMPSTAT STANDARDIZED;
```

APPENDIX C

MPLUS SYNTAX FOR CFA MODEL THREE

```
TITLE:      Time-Series Confirmatory Factor Analysis Model 3
DATA:       FILE IS F:\Dissertation analyses\Help CFA.dat;
VARIABLE:   NAMES ARE ID per15 per30 per45 per60 Main15Po Main30Po
            Main45Po Main60Po Main15Ne Main30Ne Main45Ne Main60Ne
            allpo15 allpo30 allpo45 allpo60 allne15 allne30 allne45 allne60 Per1mn
            MnPO1min MnNE1min alPO1min alNE1min ScalePer SumPO1
            SumNE1SumallPO SumallNE;

MISSING ARE ALL (-999);

CATEGORICAL are
   Main15PO Main30PO Main45PO Main60PO
   Main15NE Main30NE Main45NE Main60NE
   allpo15 allpo30 allpo45 allpo60
   allne15 allne30 allne45 allne60 ;

USEVARIABLES ARE
per15 per30 per45 per60 Main15Po Main30Po Main45Po Main60Po Main15Ne
Main30Ne Main45Ne Main60Ne allpo15 allpo30 allpo45 allpo60 allne15 allne30
allne45  allne60 ;

ANALYSIS:

MODEL:
Help15 by per15@1 Main15Po*.5 Main15Ne*-.8 allpo15 allne15;
Help30 by per30@1 Main30Po*.5 Main30Ne*-.8 allpo30 allne30;
Help45 by per45@1 Main45Po*.5 Main45Ne*-.8 allpo45 allne45;
Help60 by per60@1 Main60Po*.5 Main60Ne*-.8 allpo60 allne60;

PLOT:
type is Plot3;
```

APPENDIX D

MPLUS SYNTAX FOR LINEAR GROWTH MODEL

```
TITLE:  Self-efficacy Linear Growth Model
DATA: FILE IS H:\Dissertation analyses\Helplessness2.22.10.dat;

VARIABLE: NAMES ARE
FFPID help_15 help_30 help_45 help_60 ;

MISSING ARE ALL (-999);

USEVARIABLES ARE help_15 help_30 help_45 help_60;

ANALYSIS:

MODEL:  iHELP sHELP | help_15@0 help_30@1 help_45@2 help_60@3;

PLOT: type is Plot3;
series is help_15 - help_60 (sHELP);

OUTPUT: SAMPSTAT STANDARDIZED;
```

APPENDIX E

MPLUS SYNTAX FOR GMM – TWO CLASS MODEL

```
TITLE:  Self-Efficacy Growth Mixture Model – Two Class Solution
DATA: FILE IS H:\Dissertation analyses\Helplessness2.22.10.dat;
VARIABLE: NAMES ARE
FFPID help_15 help_30 help_45 help_60 ;

MISSING ARE ALL (-999);

CLASSES = c(2);

USEVARIABLES ARE help_15 help_30 help_45 help_60;

ANALYSIS:  TYPE = MIXTURE;
           STARTS = 100 5;
           OPTSEED = 285380;
           ITERATIONS = 10000;
           CONVERGENCE = 0.00005;
           COVERAGE = 0.10;

MODEL:
%overall%

iHELP sHELP | help_15@0 help_30@1 help_45@2 help_60@3;

PLOT:
type is Plot3;
series is help_15 - help_60 (sHELP);

OUTPUT: TECH11 TECH14 SAMPSTAT STANDARDIZED;
```

APPENDIX F

SAMPLE MPLUS SYNTAX FOR ANXIETY PATH MODEL

```
TITLE:  SEM Path Model Predicting Self-Efficacy from Maternal Anxiety, Continuous
Outcomes
DATA: FILE IS H:\ Dissertation Analyses\Efficacy.dat;

VARIABLE: NAMES ARE ID TBAI1 TBAI3 SexB M5MibqFE M16ebqF M16ebqSH
Sens_Int help_15 help_30 help_45 help_60 T_Time2 Competen Total_NE;

MISSING ARE ALL (-999);

USEVARIABLES ARE
TBAI1 TBAI3 SexB M5MibqFE M16ebqF M16ebqSH Sens_Int help_15 help_30
help_45 help_60 T_Time2 Competen Total_NE;

ANALYSIS:

MODEL:

iSE sSE | help_15@0 help_30@1 help_45@2 help_60@3;

iSE sSE on SexB TBAI1 TBAI3 M5MibqFE M16ebqF M16ebqSH Sens_Int ;

Competen Total_NE T_Time2 on iSE sSE SexB TBAI1 TBAI3 Sens_Int;

PLOT: type is Plot3;

OUTPUT: SAMPSTAT STANDARDIZED;
```

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