

2013-07-22

The Influences of Early Temperament and Emotion Regulation on Social Competence in Middle Childhood

Elizabeth Carmen Penela
University of Miami, elizabeth.penela@gmail.com

Follow this and additional works at: https://scholarlyrepository.miami.edu/oa_dissertations

Recommended Citation

Penela, Elizabeth Carmen, "The Influences of Early Temperament and Emotion Regulation on Social Competence in Middle Childhood" (2013). *Open Access Dissertations*. 1053.
https://scholarlyrepository.miami.edu/oa_dissertations/1053

This Open access is brought to you for free and open access by the Electronic Theses and Dissertations at Scholarly Repository. It has been accepted for inclusion in Open Access Dissertations by an authorized administrator of Scholarly Repository. For more information, please contact repository.library@miami.edu.

UNIVERSITY OF MIAMI

THE INFLUENCES OF EARLY TEMPERAMENT AND EMOTION REGULATION
ON SOCIAL COMPETENCE IN MIDDLE CHILDHOOD

By

Elizabeth Carmen Penela

A DISSERTATION

Submitted to the Faculty
of the University of Miami
in partial fulfillment of the requirements for
the degree of Doctor of Philosophy

Coral Gables, Florida

August 2013

©2013
Elizabeth Carmen Penela
All Rights Reserved

UNIVERSITY OF MIAMI

A dissertation submitted in partial fulfillment of
the requirements for the degree of
Doctor of Philosophy

THE INFLUENCES OF EARLY TEMPERAMENT AND EMOTION REGULATION
ON SOCIAL COMPETENCE IN MIDDLE CHILDHOOD

Elizabeth Carmen Penela

Approved:

Heather A. Henderson, Ph.D.
Associate Professor of Psychology

M. Brian Blake, Ph.D.
Dean of the Graduate School

Rebecca J. Bulotsky Shearer, Ph.D.
Associate Professor of Psychology

Jill Ehrenreich May, Ph.D.
Associate Professor of Psychology

Brian D. Doss, Ph.D.
Associate Professor of Psychology

Neena M. Malik, Ph.D.
Assistant Professor of Psychology

PENELA, ELIZABETH CARMEN
The Influences of Early Temperament and Emotion
Regulation on Social Competence in Middle Childhood

(Ph.D., Psychology)
(August 2013)

Abstract of a dissertation at the University of Miami.

Dissertation supervised by Professor Heather Henderson.

No. of pages in text. (75)

Behaviorally inhibited children are predisposed toward social difficulties, but other environmental and within-child characteristics, such as emotion regulation, also influence social development. This study longitudinally examined: (1) independent influences of behavior inhibition and emotion regulation on future social competence, (2) associations between behavior inhibition and emotion regulation, and (3) the moderating role of emotion regulation on the relation between behavior inhibition and social competence. Participants (N = 257) were enrolled in a larger study of temperament and social development. Maternal-report questionnaires and behavioral observations (ages 2 and 3) were used to assess behavior inhibition. Children's active and passive regulation strategy usage (age 5) was observed during a laboratory-based sadness-eliciting situation. Lastly, children participated in a free play task with an unfamiliar peer in the laboratory (age 7). Types of initiations, peers' responses to initiations, and play sophistication during this task were coded to assess social competence. Latent variables for behavior inhibition, emotion regulation, and social competence were created. The structural model was analyzed using structural equation modeling. Results show that highly behaviorally inhibited children are predisposed to utilize less competent regulation strategies in a sadness-eliciting situation. Furthermore, competent sadness regulation was found to

influence the relation between early behavior inhibition and future social competence with an unfamiliar peer. Overall study findings elucidate developmental trajectories of risk and resilience, which informs prevention practices, particularly for highly inhibited children who are at-risk for a range of social, emotional, and academic difficulties.

TABLE OF CONTENTS

LIST OF TABLES	v
LIST OF FIGURES	vi
Chapter	
1 INTRODUCTION	1
Temperament	3
Social Competence	4
Behavior Inhibition and Social Development	6
Outcomes in Adolescence	7
Outcomes in Middle Childhood	8
Emotion Regulation and Social Development	9
Development of Emotion Regulation Strategies	9
Temperament and the Development of Emotion Regulation	12
Influence of Negative Reactivity	13
Influence of Behavior Inhibition	13
Regulation of Sadness and Social Outcomes	14
Emotion Regulation as a Moderator Between Temperament and Social Functioning	16
Predicting Negative Social Outcomes	17
Predicting Positive Social Outcomes	18
Current Proposal	21
2 METHOD	23
Participants	23
Procedure	24
Measures	25
Temperament	25
Emotion Regulation	26
Social Competence	28
Social Initiations	28
Response to Initiations	29
Level of Play	29
Analytic Strategy	30
3 RESULTS	31
Descriptive Statistics and Preliminary Analyses	31
Behavior Inhibition	31
Emotion Regulation	32
Social Competence	32
Structural Equation Modeling	33
Measurement Model	33
Structural Model	35
4 DISCUSSION	38

Behavior Inhibition and Emotion Regulation.....	40
Moderation Hypothesis	43
Behavior inhibition predicting social competence.....	43
Sadness regulation predicting social competence.....	45
Behavior inhibition and sadness regulation jointly predict social competence.....	47
Clinical Implications	49
Limitations and Future Directions.....	52
Conclusion.....	54
 TABLES.....	 55
FIGURES	59
REFERENCES	65

LIST OF TABLES

TABLE 1: Descriptive statistics and N per measure.....55

TABLE 2: Correlation between indicators of behavior inhibition latent variable.....56

TABLE 3: Correlation between ER strategies across contexts.....57

TABLE 4: Sex differences in ER strategies.....58

LIST OF FIGURES

FIGURE 1: Proposed Model.....	59
FIGURE 2: Behavior inhibition latent variable with standardized estimates.....	60
FIGURE 3: Competent emotion regulation latent variable with standardized estimates...	61
FIGURE 4: Social competence latent variable with standardized estimates.....	62
FIGURE 5: SEM model with unstandardized estimates.....	63
FIGURE 6: Competent ER at age 5 moderates the relation between behavior inhibition (ages 2 and 3) and social competence (age 7).....	64

CHAPTER 1: INTRODUCTION

Social competence in early childhood is as a strong predictor of future well-being in various socio-emotional and academic domains (Rubin, Bukowski, & Laursen, 2009). Though some debate surrounds precise definitions of social competence, researchers generally agree that it reflects children's abilities to form positive, successful social relationships (Fabes, Gaertner, & Popp, 2006). Extensive empirical evidence has demonstrated that positive peer relationships throughout childhood lead to positive social and academic outcomes (Ladd, 2005). The middle childhood period seems particularly important, as research has found that peer rejection and a lack of reciprocal friendships during this period places children at risk for loneliness and depression in adolescence (Pedersen, Vitaro, Barker, & Borge, 2007). Furthermore, a meta-analysis showed that low peer acceptance and aggression with peers puts children at risk for later life difficulties, such as dropping out of school, criminality, and adult psychopathology (Parker & Asher, 1987). Thus, identifying predictors of individual differences in social competence in middle childhood is of utmost importance, as it will provide greater understanding of developmental trajectories of risk and resilience.

One important construct to consider in this regard is behavior inhibition; toddlers with an inhibited temperament show a high degree of vigilance and fear reactivity, withdrawal and anxious behaviors, and proximity-seeking toward caregivers in novel situations. Individual differences in behavior inhibition predict increased risk for socially withdrawn behavior in childhood (Rubin et al., 2006), as well as various disorders in adolescence (Chronis-Tuscano et al., 2009) and adulthood (Caspi, Moffitt, Newman & Silva, 1996). The ability to regulate emotions is another important predictor of social

competence with peers (Eisenberg et al., 1995). Past research has found that children who are better able to regulate their emotions tend to achieve better social outcomes (Diener & Kim, 2004; Ramani, Brownell, & Campbell, 2010). Although both behavior inhibition and emotion regulation skills influence social development, little is known about the specific regulatory challenges of highly inhibited children, or the joint effect of these constructs on social competence with peers. Because highly inhibited children are at heightened risk for future socio-emotional problems, it is particularly important to investigate the role of regulatory abilities as a protective factor.

Overall, the understanding of developmental mechanisms in childhood is limited by reliance on concurrent study designs that exclusively use parent- and/or teacher-report measures of temperament, regulation, and social outcomes. These designs lead to problems of shared variance and reporter bias, making it difficult to identify directions of effects and mechanisms leading to developmental change. Unique to this study is the inclusion of observational measures for each construct—a necessary extension to the current literature. Using a longitudinal design and a multi-method assessment approach, I examined: 1- the independent influences of behavior inhibition (ages 2 and 3) and emotion regulation strategy usage (age 5) on social competence (age 7) with an unfamiliar peer, 2- the associations between behavior inhibition and types of emotion regulation strategies used in a sadness-eliciting situation, and 3- the moderating role of emotion regulation on the relation between early behavior inhibition and later social competence (see Figure 1).

Temperament

Beginning in infancy, children show observable differences in how they respond and interact with their environment. Temperament refers to these biologically-based individual differences, which can be classified into two domains: reactivity and regulation (Rothbart & Bates, 2006). Regulation entails individual differences in attentional and motoric control systems that emerge in early development and function to modulate reactivity (Calkins & Degnan, 2006; Rothbart & Bates, 2006). Although temperament is influenced by experiences in the environment (e.g., parenting, peer relationships), past research has consistently found a moderate degree of stability in temperament from early infancy to early childhood (Kagan, Snidman, & Arcus, 1998), middle childhood (Hirshfeld-Becker et al., 2007) and even into adulthood (Caspi & Silva, 1995). Thus, the influence of temperament on social development is continuous and therefore important to consider throughout the lifespan.

Reactivity is defined as the speed, strength, and valence of an individual's characteristic responses to changes in the external or internal environment (Henderson & Wachs, 2007; Rothbart & Bates, 2006). Early on, infants show physiological and behavioral differences in their threshold to respond to novel stimuli, and these responses are characterized by vocal, motor, and facial indices of negativity (Calkins, Fox & Marshall, 1996). In infancy, these responses are thought to reflect generalized distress, but as children develop, differentiated negative emotional responses, such as fear and anger, become apparent (Calkins & Degnan, 2006). The reactivity dimension of temperament also includes action tendencies, such as approach and withdrawal, and the

expression of these behaviors can in turn influence a child's ongoing reactivity (Rothbart & Bates, 2006).

It has been proposed that negative reactivity in response to novelty is an antecedent in the development of behavior inhibition, a tendency toward withdrawal in the face of novel situations (Kagan et al., 1998). In toddlerhood, behavioral markers of inhibition can be observed when children are confronted with unfamiliar people or stimuli. These behaviors include facial expressions and vocalizations of distress (e.g., crying, fretting), extended latencies to approach a novel person or object, and general apprehension or withdrawal (Garcia-Coll, Kagan, & Reznick, 1984). Past research has also identified various physiological correlates of behavior inhibition, including displays of high and stable heart rate, elevated baseline cortisol, and right frontal electroencephalogram (EEG) asymmetry (Calkins et al., 1996; Fox, Schmidt, Calkins, Rubin, & Coplan, 1996; Schmidt, Fox, Schulkin, & Gold, 1999). Based on these behavioral and physiological observations, it seems that a hypersensitive fear system is at the core of inhibition.

Social Competence

Past research has investigated how differences in early temperament influence social development in early childhood and beyond (Caspi et al., 1996; Rapee, 2010). Social competence is a particularly important aspect of social development, as research has shown that it is a predictor of various aspects of later functioning, including internalizing and externalizing outcomes in childhood (Burt & Roisman, 2010), academic and school performance (Ladd, 1990), as well as serious adjustment problems later in life (e.g., adolescent delinquent behavior; Parker & Asher, 1987). Defining social

competence has been challenging for researchers, but “effectiveness in interaction” is a theme that has emerged consistently (Rose-Krasnor, 1997).

Four distinct approaches have been used in the assessment of social competence and Rose-Krasnor (1997) reviewed the strengths and weaknesses of each of these methods. First, some researchers have focused on a set of specific social skills (e.g., role-taking, problem solving; Cavell, 1990), but this approach overlooks the importance of examining the overall quality of the social interaction. Sociometric approaches, which measure popularity and peer acceptance, have also been used to assess social competence (Newcomb, Bukowski, & Pattee, 1993), but the downfall of this approach is that it does not take into account the ability to initiate and maintain a relationship. Measurement of the quality of friendships is another common approach to the assessment of social competence (Hartup, 1989), which takes into consideration the quality of the interaction, but often misses the individual contributions of each child. Therefore, it becomes difficult to unpack to what extent a friendship exists due to the social competence of one child versus another. Lastly, the functional approach to the assessment of social competence focuses on the outcomes of social behaviors. Specifically, outcomes are defined as a joint product of an individual’s actions and the peer’s responses to those actions (Rose-Krasnor, 1997).

To assess social competence in middle childhood, I utilized a functional approach that focused on the quality of children’s initiations, peers’ responses to these initiations, and the sophistication of their play. Importantly, this data was gathered via behavioral observations of children’s social interactions with an unfamiliar peer. The target child’s contribution to the interaction was isolated in this novel social situation, a difficult task to

accomplish when observing friendship dyads with a previously established social history. Furthermore, the pairing with an unfamiliar peer was likely particularly challenging for highly inhibited children, given their tendency toward negative reactivity in novel social situations. Observations of these interactions are important because although highly behaviorally inhibited children can often generate competent responses when asked to discuss hypothetical social situations, they demonstrate difficulty *enacting* socially competent behavior (Moas, Henderson, & Degnan, 2011). Researchers have proposed that a functional approach to the assessment of social competence appears to most accurately capture the essence of social competence, or the effectiveness of a child's social interaction (Brown, Odom & Holcombe, 1996; Fabes, Martin, & Hanish, 2009; Odom & Ogawa, 1992).

Behavior Inhibition and Social Development

A large body of literature has found that behavior inhibition places children at risk for future social difficulties, such as social withdrawal from peers and anxiety problems (for a review, see Sanson, Hemphill, & Smart, 2004). The current study integrated maternal-report and observational methods in the assessment of behavior inhibition to longitudinally predict observed social competence with peers. Approximately fifteen percent of typically developing toddlers display temperamental characteristics that can be classified as behaviorally inhibited. When confronted with unfamiliar objects or persons, these children tend to demonstrate distressed vocalizations and facial expressions, extended latencies to approach, and general apprehension or withdrawal (Fox, Henderson, Marshall, Nichols, & Ghera, 2005; Garcia-Coll et al., 1984). Though many studies have examined the influence of behavior inhibition on social outcomes, a large

portion of these have examined behavior inhibition beyond early childhood and/or used concurrent designs (Biederman et al., 1990; Coplan, Wilson, Frohlick, & Zelenski, 2006). These studies yielded insight on correlates of behavior inhibition; however, given the early appearing and biologically-based nature of behavioral inhibition, it is important to examine these associations using a longitudinal design in order to better understand the developmental mechanisms linking behavioral inhibition and social adjustment.

Outcomes in adolescence. Results of longitudinal studies indicate that high levels of behavior inhibition across several time points in early childhood are a significant risk factor for the onset of anxiety disorders in middle to late adolescence (Chronis et al., 2009; Hirshfeld et al., 1992; Perez-Edgar & Fox, 2005). Importantly, behavior inhibition appears to be uniquely predictive of anxiety disorders, and particularly Social Anxiety Disorder (SAD). Adolescence is the period of time when there is greatest risk for the onset of SAD and onset in adolescence demonstrates relatively stable trajectories of anxiety disorders into adulthood (Pine, Cohen, Gurley, Brook, & Ma, 1998). Chronis and colleagues (2009) conducted post-hoc analyses to identify when clinically significant anxiety was present in the group of children who demonstrated stability of high behavior inhibition. An exact age of onset could not be pinpointed, but results indicated that this group demonstrated clinically significant anxiety after the age of seven, based on parent and child interviews. Thus, although clinically significant anxiety problems could not be identified at the age of seven, it is important to determine whether significant deficits in socio-emotional functioning among highly inhibited children can be identified at this time. Middle childhood may be a

particularly important time during which to examine social outcomes, as social difficulties at this age may be indicators of more chronic and clinically severe outcomes.

Outcomes in middle childhood. Several studies have examined the influence of behavior inhibition in toddlerhood on social outcomes in middle childhood. For example, Williams and colleagues (2009) found that higher levels of observed behavior inhibition in toddlerhood predicted higher levels of maternal-reported internalizing problems in preschool, as well as across childhood and adolescence; however, these effect sizes were small. The largest proportion of variance in children's internalizing problems was explained by the joint influence of behavior inhibition and permissive parenting, suggesting that the effect of behavioral inhibition is small and likely interacts with other factors to influence social development. Another study found that inhibited toddlers did not show significantly more reticent behavior with an unfamiliar examiner, compared to low-reactive toddlers (Stifter, Putnam, & Jahromi, 2008). These findings indicate that social deficits in behaviorally inhibited toddlers may be most apparent during interactions with unfamiliar peers. Perhaps most important, however, these studies illustrate that the majority of behaviorally inhibited children do not go on to develop clinically significant social-emotional problems and instead show a variety of outcomes (Degnan & Fox, 2007).

In the current study, a composite measure of behavior inhibition, composed of observational and maternal-report measures at ages two and three, was examined as a predictor of social competence at age seven. In contrast to previous studies, which have relied heavily on parent-report of clinically significant diagnostic outcomes, the current study measured children's social competence using behavioral observational coding. This

method captured the variation in social interactions with peers at this age, which helps move the field forward toward identifying the mechanisms contributing to the development of children's social adaptation.

Emotion Regulation and Social Development

Another important predictor of social development throughout childhood is emotion regulation (ER), which involves action or behavior used to change arousal levels (Kopp, 1989). Specifically, ER consists of “extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goal” (Thompson, 1994, p. 27). As individuals experience cognitive, motor and socio-emotional development throughout the lifespan, different strategies are added to their repertoire of ways of dealing with emotions.

Development of ER strategies. Throughout infancy, ER relies heavily on the support of the primary caregiver (Crockenberg & Leerkes, 2004). Infants also engage in reflexive regulatory behaviors such as non-nutritive sucking, gaze aversion, and eye closing (Kopp, 1989). At four months of age, the ability to shift attention emerges—a critical component in the development of ER that allows infants to begin using reorienting of attention as a way of regulating emotion (Johnson, Posner, & Rothbart, 1991). Between 12 and 18 months of age, infants make significant gains in motor development, allowing them to more actively explore or withdraw from objects in the environment during emotionally arousing situations. Children also start to use social referencing more frequently as a guide for the appropriateness of emotional expressions, particularly in ambiguous social situations (Kopp, 1989).

In the toddler years children develop a sense of agency and become increasingly aware of the causes of distress; this awareness, coupled with their ability to behave in ways that can alter the situation, facilitates more mature forms of regulation (Kopp, 1989). For example, research has shown that at the age of two, children begin to engage in more active forms of ER, such as initiating self-distraction, help-seeking behavior, and problem solving in frustration and fear-eliciting situations (Diener & Mangelsdorf, 1999; Grolnick, Bridges, & Connell, 1996). As in infancy, however, studies have found that maternal involvement in emotion-eliciting situations continues to play an important role in toddler's ability to use ER strategies (Calkins & Johnson, 1998; Diener & Mangelsdorf, 1999; Grolnick, Bridges, & Connell, 1996). Later in the toddler years, the use of cognitive reappraisal begins to emerge, though a study among three and four-year-old children showed that parents often initiated the reappraisal and then the child continued (Stansbury & Sigman, 2000). The function of reappraisals is to rethink or reinterpret the situation that elicited their negative affect in the first place.

Between the ages of five and six, children begin to independently generate cognitive regulation strategies (Stegge & Meerum Terwogt, 2007). This newly developed skill is thought to emerge from a basic understanding of the connection between cognition and emotion (e.g., thinking of something pleasant will help me feel pleasant). The ability to initiate cognitive reappraisals is an important milestone in the development of ER because research with adult populations shows that using cognitive appraisals in anger and anxiety-eliciting situations leads to reduced negative emotion (Gross, 1998). In addition to cognitive regulation strategies, young children also report using social interaction (e.g., talking to someone) and attempts to change the environment (e.g.,

buying a new toy to replace a broken one) in order to regulate sadness, anger, and fear (Endrerud & Vikan, 2007). Cognitive reappraisal, seeking social support, and problem-solving can be classified as active ER strategies. Past research has also identified passive ER strategies, such as self-soothing and waiting behavior (Feng et al., 2008). Some work has also identified disruptive ER strategies, in which the child responds in a physically or verbally aggressive manner (Calkins, Gill, Johnson, & Smith, 1999). These three types of ER strategies (i.e., active, passive, and disruptive strategies) were examined in the context of a laboratory-based sadness-eliciting task at age five in the current study.

Consistent with a functionalist framework of emotion, strategy effectiveness is often evaluated based on the goals of the individual experiencing an emotion in a given context (Thompson & Meyer, 2007). Temperamentally fearful children, for instance, may engage in passive ER strategies in order to avoid the experience of negative affect that might occur if they behaved proactively. Although passive strategies may seem adaptive in the short-term, repeated use of strategies that entail avoidance could lead to long-term negative effects on social development (Aldao, Nolen-Hoeksema, & Schweitzer, 2010). Active regulation strategies used in a frustration-eliciting task at preschool age, on the other hand, have been found to predict positive outcomes in adolescence, such as greater attentional cognitive control (Eigsti et al., 2006). To-date, however, no known studies have examined children's observed use of active ER strategies in a sadness-eliciting situation in relation to future social outcomes; this gap in the literature is an important question that was addressed in the current study.

Although a great deal of previous literature has examined regulation of negative affect broadly, recent work has elucidated the importance of considering the specific

affective context (e.g., sadness, frustration) in which ER is examined. The importance of context is illustrated by Grolnick and colleagues (1996), who found that among two year-old children, consistency in strategy usage was more likely within a specific affective context than across contexts. Furthermore, later in the toddler years, age differences emerge in the understanding of how to manage anger versus sadness-eliciting situations. Specifically, three and four year-olds appear to have a similar understanding regarding regulatory strategies for sadness, whereas four year-olds showed a better understanding than three year-olds of strategies for anger regulation (Cole, Dennis, Smith-Simon, & Cohen, 2008). These differences may reflect the different functions of these emotions; whereas anger requires readiness to act in order to approach a blocked goal, sadness involves readiness to cease effort following the relinquishment of a goal (Barrett & Campos, 1987). Behaviorally inhibited children, who are predisposed toward withdrawal and less likely to approach novel situations, may experience particular difficulty with ER strategies in sadness-eliciting situations.

Temperament and the development of emotion regulation. Research has shown that temperamental characteristics influence the development of ER strategies (Rothbart & Sheese, 2007). This work has been primarily conducted among infant samples, and findings show that fear reactivity and wariness in infancy predict higher levels of passive forms of regulation, such as self-soothing behaviors and withdrawal in toddlerhood (Buss & Goldsmith, 1998; Mangelsdorf, Shapiro & Marzolf, 1995). However, tendencies toward high levels of reactivity may have a long-lasting impact on the development and implementation of ER strategies.

Influence of negative reactivity. For some children, the experience of intense negative affect interrupts the cognitive processes thought to be important for regulation, making the regulation of distress difficult (Marshall, Fox, & Henderson, 2000). For example, a child who experiences high negative reactivity when confronted with a novel situation, such as approaching a peer at the playground, may feel “frozen” and therefore have difficulty recalling previously learned ER strategies. If recalled, heightened reactivity may hinder the child’s ability to successfully implement the strategy. For example, the child may stumble on his or her words when asking the peer to play. Lastly, research has shown that a key aspect of successful ER is flexibility (Buss & Goldsmith, 1998), which can also be negatively affected by heightened emotional reactivity. If the peer does not respond to an initial request, the child must have the flexibility to alter their original strategy. In summary, reactivity can impact ER skills in various ways and at different points in time throughout the course of a social interaction.

Research has shown that higher levels of maternal-reported negative affect are concurrently (Santucci et al., 2008) and longitudinally related to the use of maladaptive ER strategies, such as focusing on the source of distress (Rodriguez et al., 2005). These studies, however, have examined negative affect as a broad factor (i.e., combination of sadness, fear, and frustration), making it difficult to discern how predispositions toward particular kinds of negative affect relate to specific regulation difficulties. Because negative reactivity is a developmental antecedent of behavior inhibition, highly behaviorally inhibited children may also experience difficulty with emotion regulation.

Influence of behavior inhibition. According to a conceptual model proposed by Eisenberg and colleagues, highly inhibited children have difficulty generating

constructive and problem-focused strategies. They further propose that although these children may be viewed as appropriately behaviorally regulated by others, their inhibited behavior is usually involuntary (Eisenberg, Fabes, Guthrie & Reiser, 2002). Few studies have examined the relation between behavior inhibition and the regulation of fear or sadness. Feng and colleagues (2008) longitudinally examined maternal and child factors as a predictor of the use of regulatory strategies during a sadness-eliciting situation. Overall, results showed that children with high levels of behavior inhibition did not show consistent difficulty with ER strategies; an interaction effect, however, showed that children of depressed mothers who were high on behavior inhibition used more passive ER strategies compared to behaviorally inhibited children of non-depressed mothers. Thus, some behaviorally inhibited children were found to be at-risk for the development of maladaptive ER strategies.

The study conducted by Feng and colleagues (2008) assessed behavior inhibition at either age two or three using behavior observations during novel tasks. The current study, in contrast, incorporated maternal and observational measures at both time points in toddlerhood. As shown by Chronis and colleagues (2009), maternal-report of behavior inhibition may be an important assessment to incorporate when predicting future socio-emotional outcomes. It was hypothesized that behavior inhibition in toddlerhood would modestly predict regulation strategy usage at age five. Specifically, it was expected to predict a higher proportion passive strategies and lower proportion of active strategies during a sadness-eliciting situation.

Regulation of sadness and social outcomes. The use of maladaptive ER strategies has been found to relate to various poor socio-emotional outcomes. However,

most studies in early childhood have focused on the influence of ER during frustration tasks, and findings show that disruptive ER strategies in these situations are related to observed conflict behavior with peers and maternal-reported externalizing difficulties (Calkins et al., 1999; Rubin, Burgess, Dwyer, & Hastings, 2003). Conversely, it has been posited that impairments in the ability to regulate sadness in childhood, rather than frustration, is likely a clinically significant risk factor for the development of internalizing disorders (Kovacs, Joorman, & Gotlib, 2008). Furthermore, among highly inhibited children who are at-risk for the development of internalizing problems (Chronis et al., 2009; Kagan & Snidman, 1999), emotion regulation difficulties may be particularly salient during sadness-eliciting tasks. Thus, in the current study, ER strategies during a sadness-eliciting task were examined in relation to future social competence with peers, as these may be the particular skills that influence an inhibited child's social outcomes. Additionally, research with adult populations indicates that effective regulation of sadness is associated with self-reported positive social outcomes, such as the presence of fulfilling friendships, whereas effective regulation of anger is related conflict resolution styles (Rivers, Brackett, Katulak, & Salovey, 2007).

ER seems particularly important to examine at the age of five, as children are in Kindergarten at this time, which is a critical setting for the development of early peer relationships (Kochenderfer & Ladd, 1996). Various past investigations have examined the relation of ER strategies in sadness-eliciting situations to negative social outcomes. Longitudinal studies have found that in early to middle childhood, ER strategy usage predicted future depressive symptoms (Bowie, 2010; Feng et al., 2009). However, these studies combined sadness and anger regulation, and examined a broad regulation factor,

rather than specific types of regulation (e.g., active versus passive strategies). Furthermore, these studies did not use observational methods to assess either the predictor or outcome constructs. The use of teacher and parent-report provide an initial understanding of the relations between these constructs; however, observational measurement is necessary in order to gain a thorough understanding of the types of ER strategies used, and their influence on variations in social development.

Additionally, it is important to examine how the use of ER strategies influences positive social outcomes, such as social competence, as this information can inform the development of prevention programs that may strengthen social-emotional skills (Fraser et al., 2005). To date, however, no known studies have investigated the use of ER strategies during sadness-eliciting situations in relation to positive social outcomes. Thus, the current study extends the existing literature by longitudinally examining the influence of ER strategies in sadness-eliciting situations on social competence with peers using observational measures. It was hypothesized that more competent ER strategy usage (i.e., higher proportion of active strategies, lower proportions of passive and disruptive strategies) during a sadness eliciting task at kindergarten age would predict higher levels of social competence in middle childhood.

Emotion Regulation as a Moderator between Temperament and Social Functioning

Past research has examined how behavior inhibition and ER independently influence social functioning in early childhood. Because not all young children who are highly behaviorally inhibited go on to develop social difficulties, it is important to consider how these constructs jointly predict risk and resilience. Eisenberg and colleagues have conducted many investigations using a model that examines the

combined influence of emotionality and ER, and importantly, consider how high levels of regulation can change children's emotional expressions, (Eisenberg et al., 1993; Eisenberg et al., 2000; Fabes et al., 1999). Rather than examining behavior inhibition, they have focused on emotionality, a related but distinct construct. Emotionality has been defined as the general intensity and frequency of negative emotion, whereas behavior inhibition specifically refers to apprehension and displays of fear when confronted with novelty. Thus, behaviorally inhibited children may be at particular risk for social difficulties, whereas children experiencing high levels of emotionality may be at risk for both internalizing and externalizing difficulties.

Predicting negative social outcomes. In previous investigations examining the joint influence of emotionality and regulation, Eisenberg and colleagues have focused largely on the prediction of externalizing problems (Eisenberg et al., 1996; Eisenberg et al., 2000; Eisenberg, Fabes, Nyman, Bernzweig, & Pinuelas, 1994). Overall, their findings reveal that high levels of emotionality paired with poor regulation (e.g., acting out coping styles) are related to non-constructive anger reactions (e.g., venting, aggression). Regulation, however, has been found to buffer the negative effects of negative emotionality to predict fewer problem behaviors. Importantly, regulation in the aforementioned studies was measured using maternal and teacher-report questionnaires, as well as the amount of persistence during difficult tasks. In contrast, the current study utilized observations of emotion regulation strategies used during a sadness-eliciting situation to measure regulation.

Another study conducted among young toddlers examined the joint influence of observed distress to a frustrating situation and regulatory behaviors during a frustration-

eliciting task on children's social and reticent behaviors with a peer (Calkins et al., 1999). No significant interactions were identified in the prediction of reticent behavior. With regard to the cooperative social behavior outcome, however, one significant interaction revealed that fewer mother-child interactions, paired with high levels of distress was related to less cooperative behavior, suggesting that failure to use a purportedly effective ER strategy (i.e., interacting with and talking to mother) is problematic among children who are easily frustrated (Calkins et al., 1999). Perhaps measuring distress and regulatory behaviors in a different affective context (e.g., sadness or fear) may have been more relevant to the prediction of the quality of reticence during peer interactions. In the current study it was hypothesized that competent regulatory strategies (i.e., higher proportion of active strategies, lower proportion of passive and disruptive strategies) during a sadness-eliciting situation would provide a buffering effect toward greater social competence among children showing high levels of behavior inhibition.

Predicting positive social outcomes. Other studies have examined the joint influence of emotionality and regulation in relation to positive aspects of social functioning (Eisenberg et al., 1995; Eisenberg et al., 2000; Rydell, Berlin, & Bohlin, 2003). Overall, these studies have demonstrated that among children between the ages of five and eight years-old, high levels of maternal-reported emotionality paired with optimal levels of behavioral regulation, predict maternal and teacher-reported socially appropriate behavior. These have been primarily cross-sectional studies conducted in middle childhood, however, which does not provide insight into the early temperamental influences on later social functioning. Rydell and colleagues (2003), for example, found that maternal-reported fear emotionality was positively associated with teacher-reported

prosocial behavior among five to eight year-old children. The authors proposed that the mechanism for this association may be that highly fearful children are more inclined to be sympathetic toward peers. Additionally, poor maternal-reported fear regulation was related to teacher-reported internalizing problems. Jointly, these findings suggest that although a certain level of fear may be adaptive for social situations, poorly regulated fear can lead to maladaptive outcomes. However, this investigation did not examine the effects of the regulation of sadness, which is likely an important precursor to the development of internalizing disorders (Kovacs et al., 2008)

A handful of previous investigations have also examined these constructs at preschool age, but the conclusions that can be drawn from these study findings are limited due to various methodological concerns. For example, one study examined the joint influence of various aspects of temperament (i.e., effortful control, negative affectivity, and extraversion/surgency) and ER strategy usage on social competence among three and four year-old children (Blair, Denham, Kochanoff, & Whipple, 2004). All constructs, however, were measured at the same timepoint using maternal and/or teacher report. Results showed various significant interaction effects in the prediction of problem behavior, but none with regard to the prediction of social competence. Furthermore, passive regulation strategies were found to play a significant role in the prediction of externalizing problems, but only among boys with a sad/fearful and irritable temperament. The lack of findings for predictions of social competence may be related to the lack of specificity in the measurement of temperament and the lack of observational data; both parent and teacher-report measures of social competence are likely influenced by reporters' views of the child's overall temperamental disposition (e.g., generally shy

versus outgoing), rather than specific approach and withdrawal behaviors in novel situations.

Another study used a longitudinal design spanning one year—with the first timepoint during the first semester of preschool and the second timepoint during the second semester of preschool (Eisenberg, et al., 1993). Results showed that high levels of broad negative emotional intensity paired with low levels of constructive coping predicted low teacher-reported social skills and poor sociometric status reported by peers. Lastly, a study conducted in a sample of preschool-aged children used behavioral observational coding to assess negative emotional arousal during a social interaction (Fabes et al., 1999). Results showed that among children who showed low emotional intensity, higher levels of teacher-reported regulation (i.e., effortful control) was significantly related higher levels of observed positive social responding and not significantly related to negative emotional responding. Furthermore, at moderate and high levels of observed emotional intensity during the social interaction, effortful control was inversely related to negative emotional responding, but not significantly related to social competence.

This study shows that when children experience high emotional intensity during a social interaction, higher levels of teacher-reported regulation predict positive social responding in that specific situation, but the study did not examine whether regulation predicted socially competent responding overall. An important distinction from the latter study, however, is that rather than examining how emotional intensity in the moment of a social interaction influences social competence in that same situation, the current study examined how temperamental inhibition at age two predicted social interactions in

middle childhood. It was hypothesized that children utilized competent sadness regulation strategies at age five (i.e., higher proportion of active strategies, lower proportion of passive and disruptive strategies) would engage in more socially competent behaviors at age seven, compared to children who engaged in passive and disruptive regulation strategies, presumably because they are able to use these regulation strategies to reduce and better manage their negative emotions in future social situations.

To summarize, previous studies conducted in early and middle childhood show that children who are predisposed to the experience of negative affect and therefore at risk for social-emotional problems appear to benefit from the use of appropriate regulation strategies. Past studies, however, lack specificity in affective context when examining children's use of emotion regulation strategies. Among behaviorally inhibited children who are at risk for future internalizing problems, it seems particularly important to examine the use of ER strategies in sadness-eliciting contexts. Additionally, the lack of longitudinal data across early and middle childhood, as well as the dearth of observational data, limits the conclusions that can be drawn from these studies regarding the early influence of inhibition and regulation on future social competence—an important gap in the literature that the current study aims to fulfill.

Current Proposal

The aim of the current study was to examine the contributions of behavioral inhibition and ER skills to social competence with peers. First, it was hypothesized that behavior inhibition (age 2) would be related to the use of regulation strategies (age 5) in a sadness-eliciting situation; specifically, behavior inhibition was expected to be modestly positively related to passive strategies, negatively related to active strategies, and

unrelated to disruptive strategies. Second, the unique and joint influences of behavioral inhibition and regulation strategies in the prediction of social competence were investigated in a moderation model (see Figure 1). Specifically, it was hypothesized that behavior inhibition (age 2) would negatively predict social competence with an unfamiliar peer (age 7), and that competent emotion regulation strategy usage (i.e., higher proportion of active strategies, lower proportions of passive and disruptive strategies) in a sadness-eliciting context (age 5) would positively predict social competence.

Finally, the use of competent regulation strategies was expected to moderate the relation between behavior inhibition and social competence. Specifically, it was hypothesized that high levels of behavior inhibition would predict lower levels of social competence (e.g., greater proportion of inappropriate initiations, lower proportion of successfully responded to play initiations, lower proportion of time in social play), particularly among children who demonstrated low levels of competent regulation strategy usage. Highly behaviorally inhibited children who engaged in higher levels of competent regulation strategies, however, were hypothesized to demonstrate moderate to high levels of social competence (e.g., greater proportion of appropriate and successfully responded to play initiations, greater proportion of time spent in social play with peer). Thus, among behaviorally inhibited children, competent ER strategy usage may provide a buffer, such that those who engage in more competent strategy usage may engage in more socially competent behaviors, compared to inhibited children who engage in less competent ER strategy usage.

CHAPTER 2: METHOD

Participants

An a priori power analysis was conducted using the R2 program (Steiger & Fouladi, 1992) in order to determine an appropriate sample size for the current study and to conduct analyses for the proposed model. Approximately 112 participants are necessary for detecting significant differences with a medium effect size (ρ^2) equal to .13, $\alpha = .05$, and power = .80. Furthermore, it is suggested that a medium-sized sample is between 100 and 200, and 100 participants are considered sufficient to conduct SEM (Kline, 2005).

The current study included 257 children (135 girls). Children were primarily Caucasian (67% Caucasian, 13% African-American, 3% Hispanic, 2% Asian-American, 15% mixed race). Participants were recruited for participation in a larger, longitudinal study of temperament and social development using commercially available mailing lists, which targeted households with very young infants. Using telephone interviews, infants of interested families were screened for developmental delays and serious medical problems. Developmentally healthy infants were scheduled for a 4-month laboratory visit at the University of Maryland. During this initial visit, 779 infants were screened for emotional and motor reactivity to auditory and visual stimuli. This screening process ensured a wide range of variability in reactions to novelty in the study sample and allowed the temperament data to be used as a continuous variable rather than discrete group variables. Negative reactivity was assessed using the Negative Affect Scale, positive reactivity was rated with the Positive Affect Scale, and motor movement was measured by intensity and duration of arm and leg movements (Calkins et al., 1996;

Kagan & Snidman, 1991). See Hane, Fox, Henderson, and Marshall (2008) for a full description of screening procedures. Within the larger study, home and university laboratory visits were conducted at regular intervals between 4-months and 9-years of age.

Based on infants' reactions to novel sensory stimuli at the 4-month laboratory visit, 291 children and their mothers were selected to participate in the larger study. Of these, 34 children were missing data at all ages on constructs of interest to the current study, and therefore were not included in the study sample. Children with complete or partial data ($N = 257$) were included in all analyses. *Mplus* 6.0 uses full information maximum likelihood (FIML) to estimate parameters (Muthén & Muthén, 1998-2010). Table 1 shows the number of children with data at each time point based on data collection from 2 to 7 years. Children with missing data on all variables ($n = 34$) were compared to children with partial data ($n = 257$). No differences were found between the groups on gender, $\chi^2(1, N = 291) = 1.03, p = .310$ or child ethnicity, $\chi^2(1, N = 291) = 14.46, p = .209$. There was a difference between groups on maternal education, $\chi^2(1, N = 291) = 10.84, p = .013$. Follow-up pairwise comparisons revealed that mothers of children who reported an "other" education level were more likely to drop out than mothers who reported completion of high school, college, or graduate-level education.

Procedure

The current study used behavioral observational data from laboratory visits at ages 2 and 3 (behavior inhibition), age 5 (ER strategy usage), and age 7 (social interaction with peer). Additionally, maternal-report questionnaires were included to assess behavior inhibition in toddlerhood. All observational measures were videotaped

and coded in the laboratory by trained coders. The University of Maryland research team previously coded the behavior inhibition and ER strategy usage tasks. Social competence at age seven was coded by the author and trained undergraduate research assistants at the University of Miami.

Measures

Temperament. Behavior inhibition was assessed at ages 2 and 3 using behavioral observations identical to those used in previous studies (see Calkins et al., 1996). The unfamiliar stimuli presented to the children included an adult stranger, a robot, and an inflatable tunnel. The adult stranger sat quietly for one minute, played with a truck for one minute, and then (if the child had not yet approached) invited the child to join her for play for one minute. The 18-inch tall battery-operated robot made loud noises, emitted smoke, had flashing lights, and moved around the room. Finally, an inflatable tunnel was presented to the child and a Research Assistant encouraged the child to crawl through it. For each task, children received a score for: (1) latency to vocalize, (2) latency to approach/touch the stimuli, and (3) proportion of time spent in proximity to mother. A composite measure of inhibition was then computed by summing standardized scores for each task. The composite measure at ages 2 and 3 were used as indicators of the behavior inhibition latent variable in the proposed model. A research team at the University of Maryland previously completed this observational behavioral coding and these codes were used in the current study. Observers overlapped on 20% of cases and the average Intraclass Correlation (ICC) across the measures used in the composite was .87 (ranging from .72 to .98) at age 2, and .98 (ranging from .96 to .99) at age 3.

The Toddler Behavior Assessment Questionnaire (TBAQ; Goldsmith, 1996) was also used to measure behavior inhibition at ages 2 and 3. Using 7-point Likert scales, mothers rated their child on six dimensions of temperament: activity level, pleasure, social fearfulness, interest, anger proneness, and social desirability. Scores on the social fearfulness subscale, which measures inhibition, distress, and shyness in novel situations, were used as indicators of the BI latent variable in the proposed model. This measure shows good convergent validity with other commonly used temperament questionnaires (Goldsmith, 1996). The internal consistency estimate in the current sample was .78 at age 2 and .85 at age 3.

The Colorado Temperament Inventory (CCTI; Buss & Plomin, 1984; Rowe & Plomin, 1977) is a maternal-report measure of behavior inhibition at age three. The CCTI contains 30 items, which provide scores on six dimensions of temperament: sociability, emotionality, activity, attention-span/persistence, soothability, and shyness. Mothers answer questions using a 5-point Likert scale. This scale is validated for use with children 1- to 6-years of age and has good internal consistency and discriminant validity (Rowe & Plomin, 1977). Scores on the shyness dimension were intended to be used as an indicator of the BI latent variable in the current study. The internal consistency estimate in the current sample for this dimension was .86.

Emotion Regulation. Emotion regulation (ER) strategy usage was measured at age 5 using behavioral observations during the Disappointment Paradigm, a task designed to elicit negative affect in young children (Cole, Zahn-Waxler & Smith, 1994). During this task, the Research Assistant presented eight toys to the child. Four toys were flawed and were described as such to the child (e.g., “This is a pair of sunglasses, but they are

broken and cannot be fixed.”). The remaining four toys were in good condition and were described as such (e.g., “This is a bouncy ball with different colors on it.”). Children were asked to rank order these eight prizes on a tray. Following a separate 15-minute task regarding perceived self-concept, the experimenter placed the child’s least-ranked toy on the table, and said, “Here is your prize. Thanks for all your hard work.” The experimenter stayed in the room with child for one minute, and repeated back to the child any statements that he/she made (i.e., social context). The child was then left alone in the room for one minute (i.e., non-social context). Afterward, the Research Assistant explained to the child that he/she accidentally picked up the incorrect toy, and the child was given the prize he/she initially selected.

Children’s use of ER strategies was coded in 10-second epochs, beginning when the toy was placed on the table, for a total of 12 epochs throughout the two-minute segment. ER strategies were coded as one of three types: (1) Active self-regulation (e.g., trying to fix broken toy, emotion labeling), (2) Passive toleration (e.g., staring at toy), and (3) Disruptive behavior (e.g., breaking or throwing toy). The presence or absence of each strategy was coded in each epoch, and multiple strategies could be coded within one epoch if the child used different strategies. A composite proportion score was created that reflected the proportion of epochs in which a particular strategy was used in the social and non-social context, thus creating six composite scores that represented children’s use of each strategy (e.g., proportion of epochs in social context when active regulation was used). These composite scores were intended to be used as indicators of the competent emotion regulation moderator variable in the proposed model. Observers overlapped on 25% of cases and the Intraclass Correlation (ICC) for the number of active, passive, and

disruptive ER strategies used in the social context was .82, .87, and .79, respectively; ICCs were .82, .88, and .62, respectively, in the non-social context.

Social Competence. Social competence was assessed at age 7 during a six-minute unstructured free play session with an unfamiliar, same-sex peer. The kinds of children's play initiations, types of responses received to their initiations, and level of play sophistication were coded. Therefore, this construct captured individual differences in the implementation of social skills, as well as how peers responded. Coders were trained on each coding scheme. Observers overlapped on 38% of cases and all ICCs for all variables were above .70.

Social initiations. The initiation and response coding scheme was based on an observational measure used in past research (Hauck, Fein, Waterhouse & Feinstein, 1995). Children's play initiations were classified into one of the following categories: (1) positive initiation, (2) low-level initiation, and (3) inappropriate initiation. Initiations were defined as the originating observable social behavior that attempts to begin an interaction. Appropriate attempts designed to initiate or prolong social interaction with the peer (e.g., greeting peer, calling peer's attention to an activity) were coded as positive initiations. Passive attempts to engage the peer (e.g., looking at the peer for an extended period of time, imitating the peer without verbal initiation) were coded as low-level initiations. Finally, improper attempts to engage the peer (e.g., commanding peer to play, physical aggression toward peer or peer's toy) were coded as inappropriate initiations.

Frequency scores were created for each initiation type. Proportion scores were then calculated to reflect use of each type of initiation (e.g., number of positive initiations divided by total number of initiations). Of the 187 participants who completed the free

play task at age 7, five children did not make any initiations. Because it is not possible to divide by a zero score, these children's proportion scores for each initiation type were manually changed to zero. ICCs for the proportion of positive, low-level, and inappropriate initiations were .86, .85, and .79, respectively. The proportion of positive initiations was used as an indicator of the social competence latent variable in the proposed model.

Response to initiations. Additionally, the peer's response to each initiation was coded as successful, ignored, rejected, or non-codeable due to quality of video recording. Response coding reflected observable behaviors of the peer immediately following the target child's initiation, with regard to the goal of the initiation. Frequency scores were created for each response type. Proportion scores were then calculated to reflect use of each response type (e.g., number of successful responses divided by total number of initiations). Again, because five children in the sample did not make any initiations and it is not possible to divide by a zero score, these children's proportion scores for each response type were manually changed to zero. ICCs for the proportion of successful, ignored, rejected, and non-codeable responses received were .71, .75, .81, and .73, respectively. The proportion of successfully responded to initiations was used as an indicator of the social competence latent variable in the proposed model.

Level of play. Lastly, target children's play behavior during the free play task was coded using a modified version of Rubin's (2001) Play Observation Scale. There were three levels of play sophistication: (1) non-play, (2) independent play, and (3) social play. The amount of time each child spent in each type of play was coded in seconds. The non-play category included unoccupied behavior (i.e., lack of focus) and hovering/on-looker

behavior (i.e., focus on the peer without talking) without attempts to engage the peer. The independent play category included solitary play and parallel play (i.e., focus on one's play, but with regular acknowledgment of the peer). The social play category included cooperative play (i.e., reciprocal social interaction with a shared goal) and turn-taking conversation. Time spent making active social initiations, regardless of peer's response, was also included in the social play category. ICCs for the proportion of time spent in non-play, independent play, and social play were .89, .82, and .84, respectively. The proportion of time spent in social play was used as an indicator of the social competence latent variable in the proposed model.

Analytic Strategy

Prior to statistical analyses, associations between demographic variables (e.g., sex, ethnicity) and variables of interest in the current study were examined. Hypothesized associations between behavior inhibition, emotion regulation strategies, and social competence were analyzed using structural equation modeling (SEM) using *Mplus* version 6 (Muthén & Muthén, 1998-2010). By using SEM, multiple indicators were used to create latent variables, which reduce measurement error. SEM also has the ability to examine all associations among variables simultaneously, which cannot be conducted using multiple regression analyses. Overall model fit was examined by reviewing fit indices for good model fit (e.g., χ^2 , RMSEA < .06, SRMR < .08, and CFI > .95; Bentler, 1990; Steiger, 1990).

CHAPTER 3: RESULTS

Descriptive Statistics and Preliminary Analyses

Descriptive statistics for all study variables are displayed in Table 1. Age at each visit was correlated with all variables measured at the same time point. Results showed non-significant associations for most correlations (e.g., p s all $> .05$), indicating that age at assessment was unrelated to children's scores. The only exception was that the child's age (in months) at the age 7 dyad visit was positively correlated with the proportion of successful responses received, $r(175) = .20, p = .008$, indicating that older children were more likely to make initiations that were successfully responded to by their peer during the free play task. Therefore, this variable was added as a covariate in analyses where social competence was examined as an outcome variable. Additionally, multivariate analyses of variance were used to examine differences on study variables related to ethnicity and maternal education. Due to limited variability of ethnicity, this variable was recoded to identify participants as either Caucasian or non-Caucasian. Results revealed no significant differences on study variables with regard to ethnicity or maternal education (p 's all $> .05$). Study variables were also examined for skewness and sex differences; results of these analyses are discussed below.

Behavior inhibition. Variables used to index behavior inhibition (BI) included observation composite scores of behavior inhibition at 24 and 36 months, maternal ratings on the social fearfulness subscale from the TBAQ at 24 and 36 months, and maternal ratings on the CCTI shyness dimension at 36 months. Skewness and kurtosis values were examined, and all variables were found to be normally distributed. Furthermore, paired samples t -tests were conducted to examine sex differences on these

variables, and results showed that sex was not related to scores on these measures (p 's all $> .05$). Correlations among observational and questionnaire measures indexing behavior inhibition are shown in Table 2. These results indicate moderate stability in behavior inhibition between 24 and 36 months and consistency across measurement sources.

Emotion regulation. Proportion scores indexing how often children used active, passive, and disruptive ER strategies during a sadness-eliciting situation were used to measure children's ER competency at age 5. ER strategies were coded in two contexts: social (i.e., Research Assistant present) and non-social context (i.e., child alone).

Analyses examining the normality of the distribution of these variables revealed that the proportion of disruptive strategies in the social and non-social situation were positively skewed (i.e., 5.05 and 3.21 skewness values, respectively). All other ER variables were found to be normally distributed. Correlation analyses were conducted to examine how specific strategy types were related between the social and non-social context. Results revealed small to moderate correlations for strategies within and between both contexts (see Table 3). Sex differences were also examined and results showed significant differences for several ER strategy variables (see Table 4). Therefore, sex was included as a covariate in all analyses.

Social competence. Variables indexing social competence included the proportion of positive initiations made, proportion of successful responses received from the peer, and the proportion of time spent in social play. The distributions of these variables were examined, and results showed normal levels of skewness. T -tests were conducted to examine sex differences on these variables, and results revealed no significant differences. Correlations among these variables were conducted and results

showed that they were moderately correlated. Specifically, positive initiations were positively correlated with successful responses received, $r(175) = .34, p < .001$, as well as time spent in social play, $r(175) = .49, p < .001$. Additionally, successful responses received were positively correlated with proportion of time engaged in social play, $r(175) = .34, p < .001$.

Structural Equation Modeling

Measurement Model. Three latent variables were created using questionnaire and behavior observation data across ages 2, 3, 5, and 7. The first latent variable, indexing BI in early childhood, included composite scores of BI observations at ages 2 and 3 and scores on the TBAQ social fearfulness subscale at ages 2 and 3. When CCTI was initially included in the latent variable, maternal-reported indicators showed higher loadings compared to observational indicators. Additionally, the CCTI measure was only collected at age 3, not age 2. Therefore, scores on the shyness dimension from the CCTI at 36 months were dropped from the latent variable in order to achieve approximately equal loadings across age, as well as across observational and maternal-reported indicators. Because the BI observation paradigm data were collected at two time points and thus contained shared method variance, the correlated measurement error for these indicators was included in the model, $r = -.07, p = .837$. Similarly, the correlated measurement error of the TBAQ social fearfulness subscale at ages 2 and 3 was also included, $r = .42, p < .001$. Unstandardized loadings for the indicators of the BI latent variable were 1.00 for BI observations at age 2, .997 for BI observations at age 3, 1.051 for TBAQ social fearfulness at age 2, and 1.556 for TBAQ social fearfulness at age 3. See Figure 2 for standardized estimates of the BI latent variable.

The moderating latent variable, which indexed competent use of ER strategies during a sadness-eliciting situation at age 5, included proportion of active and passive strategies used in the presence of an adult stranger (i.e., social context). Proportion of disruptive strategies in both the social and non-social context were dropped from the measurement model due to extremely skewed distributions. Additionally, when active and passive ER strategies in the non-social context were included as indicators of the latent variable, results showed poor model fit (i.e., CFI = .71, RMSEA = .41).

Theoretically, ER strategies used by children in the social context, rather than the non-social context, seem most relevant to predicting social outcomes, particularly among children who are highly behaviorally inhibited. Thus, active and passive sadness regulation strategies used in the non-social context were dropped from the measurement model. Additionally, in order to have all positive loadings on the ER competency latent variable, proportion of passive strategies in the social context was reverse-scored, such that higher scores reflected lower levels of passive regulation. Lastly, to improve model fit, and because the active and passive ER social context variables were measured using the same metric, residual variances for these indicators were constrained to be equal. Unstandardized loadings for the indicators of the competent ER latent variable were 1.00 for active ER in the social context and 1.33 for passive ER in the social context. See Figure 3 for standardized estimates of the competent ER latent variable.

The dependent latent variable was created to index social competence with an unfamiliar peer at age seven. The indicators of this variable included proportion of positive initiations made, proportion of successful responses received, and proportion of time engaged in social play. Unstandardized loadings for the indicators of the social

competence latent variable were 1.00 for time engaged in social play, 1.01 for positive initiations made, and .64 for positive responses received. See Figure 4 for standardized estimates of the social competence latent variable.

Structural Model.

Before examining study hypotheses, zero-order correlations were conducted to examine the associations among all latent variables. Results showed a non-significant relation between BI and social competence, $r = -.09, p = .498$. A positive association between competent sadness regulation and social competence was identified, $r = .35, p = .008$, indicating that higher levels of competent ER at age 5 were related to higher levels of social competence at age 7. Additionally, an inverse correlation was detected between BI and competent ER, $r = -.30, p = .005$, showing that higher levels of BI at ages 2 and 3 were related to lower levels of competent sadness regulation at age 5.

The first aim of this study was to examine the influence of BI in toddlerhood on ER strategies used during a sadness-eliciting situation. As expected, observations and maternal ratings of BI at ages 2 and 3 inversely predicted observed competent ER at age 5 ($b = -.27, SE = .10, p = .008$), after controlling for differences related to sex. The following fit indices provide evidence for good model fit: $\chi^2(254) = 9.59, p = .568$, CFI: 1.00, RMSEA = 0.00 with CI_{90%} from .00 to .06, and SRMR = 0.03. These results indicate that higher levels of BI predict lower levels of competent sadness regulation. Furthermore, to better understand this relation, post-hoc analyses were conducted. Consistent with study hypotheses, results showed that children demonstrating high levels of BI in toddlerhood were more likely to use passive strategies ($b = .27, SE = .10, p =$

.007), and less likely to use active strategies ($b = -.27, SE = .10, p = .008$) at age 5, after controlling for differences related to sex.

Next, the moderation model was examined (see Figure 5). First, direct effects were tested by regressing the social competence latent variable on the two latent predictor variables: BI at ages 2 and 3, and competent ER at age 5. Sex and child's age at the age 7 visit were entered as covariates in the model. Contrary to hypotheses, results showed a non-significant association between BI in toddlerhood and social competence at age 7 ($b = .07, SE = .08, p = .394$). As expected, however, competent sadness regulation at age 5 positively predicted social competence at age 5 at a trend level ($b = .16, SE = .09, p = .064$). Thus, although behavior inhibition in toddlerhood does not appear to have an effect on future social competence, competent sadness regulation at age 5 has a marginally significant impact. Specifically, children showing higher levels of competent ER in a sadness-eliciting situation at age 5 showed higher levels of social competence at age 7, compared to children showing lower levels of competent ER.

Finally, the moderation effect of competent ER on the relation between BI and social competence was examined. To perform this analysis, an interaction term was created by multiplying the predictor and moderator latent variables. Then, the social competence latent variable was regressed on this interaction term (Muthén & Muthén, 1998-2010). Model fit values were as follows: Akaike (AIC) = 1632.01, Bayesian (BIC) = 1770.43. As expected, results showed a significant interaction effect ($b = .72, SE = .37, p = .050$), indicating that regulatory strategy usage in a sadness-eliciting situation at age 5 moderated the association between early behavior inhibition and social competence at age 7. A graph of this interaction (Figure 6) shows that the relationship between behavior

inhibition and social competence changed depending on children's level of ER competency.

To better understand the nature of this significant interaction effect, post-hoc analyses were conducted. Specifically, the moderator latent variable, competent ER, was separated into its two observed variables. Then, new interaction terms were created: (1) BI latent variable multiplied by proportion of active ER strategies, and (2) BI latent variable multiplied by proportion of passive ER strategies. These interaction terms were used in separate moderation analyses, and results supported study hypotheses. Specifically, BI and active ER jointly predicted social competence ($b = .61, SE = .27, p = .026$), indicating that among children who showed high levels of early behavior inhibition, those who engaged in greater use of active ER strategies in a sadness-eliciting situation, demonstrated the highest levels of social competence at age 7. Furthermore, BI and passive ER jointly predicted social competence ($b = .54, SE = .28, p = .054$), indicating that high levels of behavior inhibition were related to low levels of social competence, but only at high levels of passive regulation.

CHAPTER 4: DISCUSSION

Research has shown that social competence in childhood influences various aspects of future development, including socio-emotional and academic adjustment (Rubin, Bukowski, & Laursen, 2009), as well as work competence in adulthood (Masten, Desjardins, McCormick, Kuo & Long, 2010). Thus, identifying early predictors of social competence is a research topic of utmost importance. The purpose of the current study was to gain a better understanding of how early temperament and emotion regulation contribute to the development of social competence. Past research has documented great variability in social-emotional outcomes among highly behaviorally inhibited children. Specifically, although some highly behaviorally inhibited children later demonstrate clinically significant difficulties, others appear quite well-adjusted (Caspi et al., 1996; Chronis-Tuscano et al., 2009). Previous studies provide evidence for within-child (e.g., right frontal EEG asymmetry; Fox, Henderson, Rubin, Calkins, & Schmidt, 2001) and environmental characteristics (e.g., maternal caregiving behavior; Penela, Henderson, Hane, Ghera & Fox, in press) that influence the association between early behavior inhibition and future social outcomes. Current study findings contribute to the existing literature by demonstrating that regulation of sadness is an important within-child characteristic that is important for the development of social competence, particularly among highly behaviorally inhibited children.

Specifically, results of the current study show that early behavior inhibition predicts future regulatory strategy usage at age five. Results further demonstrate that emotion regulatory strategy usage in a sadness-eliciting context predicts children's future social competence with an unfamiliar peer, but do not provide support for the effect of

early behavior inhibition on social competence. Finally, results supported an interaction effect, such that highly behaviorally inhibited toddlers who used competent emotion regulation strategies in a sadness-eliciting situation at age 5 showed the highest levels of social competence. Overall, study findings highlight the nature of the longitudinal relations among behavior inhibition, emotion regulation and social competence across time. Most importantly, these results demonstrate that the longitudinal effects of behavior inhibition on social competence differ depending on a child's level of competency in emotion regulation.

The longitudinal, multi-method approach used in the current study is a notable strength, as many previous investigations utilized a cross-sectional design and/or a single method of measurement to examine associations among the variables of interest. Although observational data provides rich, objective data on behavior inhibition that is relatively bias-free, maternal-reports yield additional information based on real-world situations and over an extended period of time, rather than only a laboratory setting. Additionally, research shows that maternal-reports specifically are predictive future clinical diagnoses (Chronis-Tuscano et al., 2009). Therefore, the current study utilized a combination of observation and maternal-report data at ages 2 and 3 to form a single behavior inhibition latent variable. Furthermore, observations of active and passive regulatory strategies during a sadness-eliciting situation in the presence of an adult stranger formed a latent variable indexing competent emotion regulation at age 5. Finally, observations of children's social initiations, peers' responses, and quality of play with an unfamiliar peer at age 7 formed a latent variable indexing social competence. The tasks at ages 5 and 7 were likely perceived of as socially threatening. Therefore, because

maternal-report is often based on general impressions across multiple settings, the use of observations is necessary to capture the specific behaviors elicited by socially threatening situations.

Finally, a longitudinal study design is particularly important for the current research question, given the developmental time course of behavior inhibition and emotion regulation. Research has shown that behavior inhibition can be assessed in early toddlerhood using observational measures and these behavioral characteristics demonstrate stability throughout the first six years of life (Kagan, Reznick, & Snidman, 1987; Rubin, Hastings, Stewart, Henderson, & Chen, 1997). In contrast, the ability to independently manage the expression of emotion emerges at later ages and continues to develop over a longer period of time. The development of emotion regulation is initially highly contingent on interactions with the caregiver (Crockenberg & Leerkes, 2004), but later in the toddler years, children develop the ability to independently execute strategies to regulate their emotions (Stansbury & Sigman, 2000; Stegge & Meerum Terwogt, 2007). Thus, a longitudinal design, such as the one used in the current study, is critically important to accurately assess each construct and to understand the developmental process of how early behavior inhibition and children's autonomous use of regulatory strategies independently and jointly contribute to the development of social competence.

Behavior Inhibition and Emotion Regulation

Study findings indicate that behavior inhibition in toddlerhood predicts emotion regulation strategy usage in a sadness-eliciting social context (i.e., in the presence of an adult stranger) at age 5. Specifically, toddlers displaying high levels of behavior inhibition tended to use a greater proportion of passive regulatory strategies (e.g., staring

at broken toy), and a lower proportion of active regulatory strategies (e.g., trying to fix broken toy). These findings are consistent with and extend past literature in two important ways. First, research in infancy has shown that reactivity in a fear-eliciting situation is concurrently related to higher levels of passive regulation and lower levels of attention regulation during a social interaction with a stranger (Braungart-Reiker, Hill-Soderlund, & Karrass, 2010; Mangelsdorf et al., 1995). The current study shows that after infancy, behavior inhibition in toddlerhood longitudinally predicts the types of regulatory strategies used in a sadness-eliciting situation in a social context. Second, past studies show that maternal-reported negative affect as a broad factor is related to the use of passive regulatory strategies in frustration-eliciting situations, such as delay of gratification tasks (Rodriguez et al., 2005; Santucci et al., 2008). The current study is unique in that it extends past work to show that behavior inhibition in toddlerhood predicts future regulatory strategies used in a sadness-eliciting situation.

The context in which regulatory strategies were measured is particularly important for several reasons. First, the presence of an adult during the sadness-eliciting situation may have led children to perceive a certain level of social threat. Past research shows that highly behaviorally inhibited children show an attention bias to threat which negatively affects their ability to flexibly and competently engage their attention in tasks where threat is perceived (Bar-Haim, Lamy, Pergamin, Bakermans-Kranenburg, & van IJzendoorn, 2007). Furthermore, another area of research has found that the processing of potentially dangerous events occurs in the amygdala (LeDoux, 1995). Past study findings indicate that behaviorally inhibited children show heightened amygdala activity in the face of novelty (Schwartz, Wright, Shin, Kagan, & Rauch, 2003), which leads to

difficulties with attention allocation (Britton, Lissek, Grillon, Norcross, & Pine, 2011). Specifically, Britton and colleagues report that activity in the amygdala can lead to a rapid and rigid focus on threat-related stimuli. Thus, in the current study, highly behaviorally inhibited children may have been more likely to fixate their attention on the object of distress (i.e., passive strategy), and less likely to think flexibly about ways to fix the toy (i.e., active strategy). These behaviors might be explained by hyper-activation of the amygdala due to the perception of a socially threatening situation, which in turn influenced children's allocation of attention.

Furthermore, the regulation of sadness specifically, rather than frustration, might be particularly difficult for highly inhibited children. This is an important context to examine, however, because researchers have posited that deficits in sadness regulation specifically, rather than frustration or negative affect generally, is likely a clinically significant risk factor for the development of internalizing disorders (Kovacs et al., 2008). Examining risk and protective factors for internalizing disorders is especially important for highly behaviorally inhibited children given that research shows that they are at moderate risk for difficulties in this area (Biederman et al., 2001; Hirshfeld-Becker et al., 2007).

To understand the nature of the association between early behavior inhibition and later regulatory strategy usage, it is also helpful to recall that behavior inhibition has been described as a child's tendency to approach or withdraw from novel and challenging situations (Garcia-Coll et al., 1984). Thus, highly inhibited toddlers may be more likely to withdraw from sadness-eliciting situations rather than engage in active problem solving because this has become a comfortable mode of interacting with the environment.

However, future studies should more closely examine the precise mechanisms linking early behavior inhibition to regulatory strategy usage at age 5. A variety of mechanisms should be investigated, such as the child's lack of knowledge or familiarity with active regulation strategies, as well as physiological arousal hindering the recollection and/or implementation of effective regulatory strategies. A better understanding of the nature of the relationship between early behavior inhibition and the development of regulatory strategies could help inform the development of prevention and early intervention programs targeted toward highly behaviorally inhibited children.

Moderation Hypothesis

The final set of analyses examined the independent and combined effects of behavior inhibition and emotion regulation on social competence. Past research has shown a small, but significant, association between early behavior inhibition and future internalizing problems in childhood and adolescence (for a review, see Degnan, Almas, & Fox, 2010). Collectively, studies suggest that various factors affect the stability of socially withdrawn behavior over time, including within-child and environmental characteristics, such as inhibitory control and sensitive parenting (e.g., Booth-LaForce & Oxford, 2006).

Behavior inhibition predicting social competence. Studies examining the relations between early behavior inhibition and future social competence, however, reveal mixed findings. One study showed that higher levels of teacher-reported inhibited temperament was concurrently related to lower levels of observed social competence with peers at preschool age (Corapci, 2008). Another study showed that maternal-reported shyness at age four was positively related to higher levels of teacher-reported

cooperation and self-control, but lower levels of assertion at elementary school age (Rudasill & Konold, 2008). These mixed results within the social competence literature may be due to lack of observational measures across time points, as well as temperament measures that are too broadly defined (e.g., shyness). Temperament is a broad construct that encompasses both reactivity and self-regulation (Rothbart & Bates, 2006). When examining the effects of early temperament, however, it is necessary to longitudinally examine a specific component of temperament because these aspects relate differently to future social outcomes (Calkins et al., 1999; Eisenberg, Fabes, Guthrie & Reiser, 2002).

Study results did not support the hypothesis that high levels of early behavior inhibition would predict lower levels of social competence at age 7. The current study extends past literature by using a multi-method, longitudinal approach to examine the relationship between early behavior inhibition and future social competence. Results show a non-significant association, indicating that although highly behaviorally inhibited children have an increased risk for internalizing problems as a group, they display average levels of social competence in middle childhood. An explanation for these relations may lie in the fact that highly behaviorally inhibited children have tendencies toward hypervigilance (Fox et al., 2005). Elevated hypervigilance in early childhood has been found to relate to social anxiety, but also to greater ability to adeptly label facial affect (Ale, Chorney, Brice, & Morris, 2010). Thus, whereas behavior inhibition at extreme levels can serve as a risk factor for future psychopathology, a moderate level of behavior inhibition may promote adaptive social behavior. Additionally, social competence in the current study was measured with an unfamiliar peer in the laboratory, which was likely perceived as a socially-threatening situation. Highly behaviorally

inhibited children may have demonstrated higher levels of social competence in a less threatening situation (e.g., interacting with a familiar peer in the school setting).

Finally, it is important to note that social competence refers to effectiveness in social interaction (Rose-Krasnor, 1997), and in the current study, coding of social competence included peers' responses, in addition to the target child's social skills. In contrast, internalizing problems entail prolonged and intense expressions of sadness and anxiety, as well as efforts to manage these emotions (Zahn-Waxler, Klimes-Dougan, & Slattery, 2000). These key differences between social competence and internalizing problems help to explain the discrepant findings regarding how behavior inhibition longitudinally relates to each outcome. Specifically, highly behaviorally inhibited children may experience persistent difficulty with affective expression, which can lead to the development of internalizing problems, but if these affective difficulties are well-managed, they may not impact their ability to interact effectively with peers.

Sadness regulation predicting social competence. Although an association between early behavior inhibition and later social competence was not identified, results show a marginally significant relationship between competent emotion regulation in a sadness-eliciting situation and future social competence. Specifically, higher levels of active regulation and lower levels of passive regulation at age 5 were related to higher levels of social competence with an unfamiliar peer two years later. Post-hoc analyses further reveal that this association is primarily driven by the robust inverse relationship between the use of passive regulatory strategies and social competence. These findings are consistent with past findings in the adult literature showing that expert effectiveness ratings of self-reported regulation during a past sadness-eliciting event is concurrently

associated with self-reported positive social relations with others (Rivers et al., 2007). The child literature in this area has focused primarily on frustration-eliciting situations and findings show that poor anger regulation predicts increased externalizing symptoms (Rubin, Burgess, Dwyer, & Hastings, 2003), as well as child-reported depressive symptoms (Bowie, 2010). The current study, however, extended these findings and sought to understand the impact of competent regulation of sadness on social development, given that it may be a precursor to future internalizing problems (Kovacs et al., 2008)—outcomes that are particularly relevant for behaviorally inhibited children.

Findings of this study extend the literature by showing that greater use of passive regulatory strategies in a sadness-eliciting situation at age 5 predicts lower levels of social competence with an unfamiliar peer two years later. Children's repeated use of passive regulatory strategies, such as avoidant strategies that do not deal with the problem directly, may lead to negative beliefs about their ability to actively cope with distressing situations. Over time, lack of practice with active regulation strategies paired with self-defeating beliefs about one's ability to cope can lead children to develop a generally avoidant style when confronted with challenges. This pattern might include the tendency to demonstrate passivity in social situations with peers, such that children engage in fewer initiations and have a preference for solitary play in order to avoid the risk of peer rejection. Identification of longitudinal relations between sadness regulation and future social competence has important implications, given that past research shows that deficits in self-reported social competence are related to higher levels of self-reported depression and anxiety in adolescence (Smari, Petursdottir, & Porsteinsdottir, 2001; Uhrlass,

Schofield, Coles, & Gibb, 2009). Thus, impaired social competence in middle childhood may have a critical influence on the development of future psychopathology.

Though it is informative to understand the longitudinal relationship between passive regulatory strategies and future social competence, it is important to note that post-hoc analyses did not support an association between active regulatory strategies and future social competence with an unfamiliar peer. The field would benefit from future studies investigating other predictors of increased levels of social competence in early childhood. The infant literature shows that initiating and responding to joint attention at 12 months positively predicts maternal-reported social competence at 30-months (Van Hecke et al., 2007). Furthermore, joint attention during a mother-child interaction positively predicted concurrent use of active coping (e.g., initiated self-distraction) during a delay of gratification procedure at age two (Raver, 1996). Thus, abilities to engage in joint attention with social partners in infancy may contribute to the early development of flexibility in the allocation of attention, which can positively impact the development of effective regulatory strategies, as well as social competence. Future research should attempt to identify within-child and/or environmental characteristics (e.g., emotion understanding, parenting behaviors) later in childhood that help continue to foster the development of social competence.

Behavior inhibition and sadness regulation jointly predict social competence.

As expected, results supported the hypothesis that early inhibition would interact with competent emotion regulation to predict greater social competence with an unfamiliar peer. Figure 6 illustrates that high levels of early behavioral inhibition are related to lower levels of social competence, but only at low levels of competent regulation.

Furthermore, at average levels of competent regulation, there is no relationship between early behavior inhibition and future social competence. Thus, although it is widely known that early behavior inhibition is a risk factor for future socio-emotional problems, such as social anxiety (Chronis-Tuscano et al., 2009), study results indicate that risk for poor social competence can be mitigated by competent regulation of sadness. These findings are consistent with a theoretical model proposed by Rothbart and Bates (2006), in which it is posited that adjustment outcomes for children of temperament extremes can be substantially altered by regulatory abilities. As an example, they propose that children with tendencies toward high negative emotionality might become overly anxious if their attention control abilities are low. A child with the same proclivity toward negative emotionality, however, may not experience any maladjustment if their attention control is high.

Interestingly, the current study shows that at high levels of competent emotion regulation, higher levels of early behavior inhibition predicted higher levels of social competence. In other words, highly inhibited children benefitted most from the use of competent emotion regulation strategies. These findings suggest that general apprehension to interacting with unfamiliarity, which characterizes behaviorally inhibited toddlers (Garcia-Coll et al., 1984), may initially interfere with their ability to interact competently with peers in early childhood (Rubi, Burgess & Hastings, 2002). When paired with competent emotion regulation skills over time, however, this apprehension can be used in a positive manner to facilitate the development of social competence with peers in middle childhood. Specifically, equipped with competent regulatory strategies, highly inhibited children may approach unfamiliar social situations particularly carefully,

such that they notice and effectively respond to nuances that an unfamiliar peer may present.

These findings are consistent with past literature showing that high emotionality combined with optimal behavioral regulation interact to predict higher levels of teacher-reported socially appropriate behavior (Eisenberg et al., 2000), and lower levels of parent and teacher-reported problem behavior in early elementary school (Eisenberg et al., 1996). Importantly, the current study extends previous findings by showing specificity in the effect of behavior inhibition, rather than generalized negative emotionality. This study also elucidates the longitudinal relations of these constructs, as well as the specific gains in socially appropriate behavior seen in interactions with unfamiliar peers (e.g., more social initiations, more positive responses received from peer, and greater time spent in social play with peer). A study by Rydell and colleagues (2003) showed main effects, such that maternal-reported high fear emotionality and high fear regulation at age five positively predicted teacher-reported social competence one year later, but did not identify interaction effects. These discrepant findings may be due to the limited time span between predictor and outcome, as well as a lack of observational measures. Importantly, no known previous studies have examined the relations among these constructs in a longitudinal design beginning in early childhood and using observational measures across all time points.

Clinical Implications

Collectively, study findings suggest that the development of competent regulation has an important influence on the trajectory of social development, particularly among highly inhibited children. Results show that highly inhibited children are at risk for the

development of maladaptive emotion regulation strategies, and yet, it is precisely the use of *competent* regulation strategies that helped highly behaviorally inhibited children achieve higher levels of social competence. The implications of these findings are significant. Specifically, early interventions programs should be developed to target highly inhibited children and/or children with poor regulation strategies, given that study findings show that these children are at-risk for low levels of social competence. These programs can provide practice in identifying and using alternatives to passive regulatory strategies when faced with challenging situations, such as using active regulatory strategies (e.g., problem-solving, cognitive restructuring). Furthermore, training in the shifting of attention may also be helpful to children's development of flexible and competent use of emotion regulation strategies. Future research should be conducted, however, to better understand the role of attention in the relationship between early behavior inhibition and future social competence.

Past intervention studies have examined the effects of training of executive functioning on academic and social outcomes in young children. Overall, previous study results demonstrate that children show improvements in executive functioning following different kinds of interventions, such as classroom curriculum that emphasizes the practice of inhibitory skills and flexible attention to peers in a play-based setting (Diamond & Lee, 2011). Importantly, these improvements in executive functioning have been found to predict greater academic performance, as well as lower levels of internalizing and externalizing behavior (Diamond, Barnett, Thomas, & Munro, 2007; Riggs, Greenberg, Kusche, & Pentz, 2006). Interestingly, children whose initial executive functioning skills are poor seem to benefit most from these targeted interventions

(Diamond & Lee, 2011). The core of these interventions seems to lie in increasing children's flexibility with attention allocation. Blair and Diamond (2008) propose that if children learn to persevere on tasks at-hand, hold information in mind and relate it to other pieces of information, and build skills to help sustain and focus attention, they can more competently acquire academic content.

Taking these findings into consideration, it seems likely that interventions focused on the development of active regulation strategies might also be successful in promoting social competence in young children, particularly among highly behaviorally inhibited children. The goal of these interventions would essentially be to transform regulatory strategies from a risk factor into a protective factor. Specifically, children can learn to engage in cognitive restructuring, as well as practice problem solving skills, when presented with challenging situations. These interventions should also provide psycho-education to children and parents regarding the short and long-term consequences of the use of passive regulatory strategies. Specifically, whereas passive strategies may feel safer and easier in the moment, repeated use of these strategies over time can lead to maladaptive outcomes.

Interventions focusing on the development of adaptive emotion regulation strategies may be particularly beneficial to girls for several reasons. First, although results did not show sex differences on behavior inhibition or social competence, there were significant differences regarding the types of regulatory strategies used by boys and girls. Specifically, girls were more likely to use passive strategies and less likely to use active strategies in the social context. In addition to providing support for the development of social competence, decreased use of passive strategies may also serve as a protective

factor against the development of depression among girls. Epidemiologic studies show no sex differences in rates of depression among children, but after the age of 15, females are approximately twice more likely to be depressed than males (Nolen-Hoeksema & Girgus, 1994). Low levels of sadness regulation at age nine have been identified as a risk factor for increased depressive symptoms among pre-adolescent girls (Feng et al., 2009). Thus, fostering the development of adaptive regulation strategies among girls in early childhood may not only enhance social competence, but also protect against the development of future depression.

Limitations and Future Directions

The current study revealed important findings about early temperamental and regulatory contributions to social competence in middle childhood, but contained several limitations that should be addressed in future research. First, although construct measurement was a strength of the current study given the multi-method approach used over a five-year time span, the emotion regulation strategy data could have improved by including coding of specific affective states experienced by children. Furthermore, time sequential analysis of affect and regulation strategy data is complex and laborious, but would elucidate whether specific regulatory strategies diminished the expression of negative affect in the disappointment task at age 5. Studies involving the measurement of emotion regulation are inherently difficult to conduct, but future studies would benefit from heeding specific recommendations previously outlined (Cole, Martin, & Dennis, 2004). Finally, because findings supported the first aim regarding the relationship between behavior inhibition and regulatory strategies, future research should consider

alternate ways in which the constructs of interest might be related (e.g., a mediation model).

The current study would have also benefitted from the inclusion of socialization measures in the model. Specifically, past research has shown that specific parenting behaviors contribute to aspects of children's social development (for a review, see Davidov & Grusec, 2006), and some evidence indicates that parenting can also influence the development of emotion regulation (Morris, Silk, Steinberg, Myers, & Robinson, 2007). Thus, future studies should include measures of parent socialization practices and examine how they affect the relations observed among behavior inhibition, emotion regulation, and social competence. In addition, the current study examines social competence at age 7 as the main outcome variable. Prior research shows that impaired social functioning at this time is a risk factor for depression in adolescence (Pederson et al., 2007). Therefore, examining outcomes in later childhood and adolescence, particularly clinical diagnoses, will be informative. Understanding how early behavior inhibition and regulatory strategies relate to such outcomes may provide further support for the need for early prevention and intervention programs targeting the development of competent emotion regulation strategies among young children.

Lastly, the current study was conducted with a sample of participants composed mostly of Caucasian children (i.e., 67%) with highly educated mothers (i.e., 74% graduated from college or graduate school). Past studies have shown that many environmental factors are associated with poverty, placing low-income children at risk for poor language skills, as well as difficulties with social and school adjustment (Stipek

& Ryan, 1997). Thus, it will be important for future studies to examine whether findings of the current study generalize to more diverse samples.

Conclusion

To summarize, highly behaviorally inhibited children show a predisposition toward utilizing less competent emotion regulation strategies in a sadness-eliciting situation. Furthermore, individual differences in children's emotion regulation competency at age 5 influence the strength of the association between early behavior inhibition and future social competence with an unfamiliar peer. Though past literature has widely documented risk for internalizing disorders associated with high levels of behavior inhibition, results provide evidence for competent emotion regulation as a protective factor in the association between early behavior inhibition and poor social competence. Study findings have significant clinical implications for the prevention of social difficulties in middle childhood. Specifically, results provide support for the importance of intervention programs in early childhood targeting the development of competent emotion regulation strategies.

Table 1.

Descriptive statistics and N per measure

	Age	N	Min	Max	M	SD	α
BI: Observations	2	238					
BI Composite			-.74	1.31	0	0.41	.65
BI: Observations	3	210					
BI Composite			-.96	1.63	0	0.48	.67
BI: TBAQ	2	261					
Social Fearfulness			1.89	6.42	3.81	0.83	.78
BI: TBAQ	3	243					
Social Fearfulness			1.30	6.42	3.44	0.96	.85
ER: Social Context	5	206					
Proportion of active strategies			0	1	0.85	0.28	--
Proportion of passive strategies			0	1	0.30	0.36	--
Proportion of disruptive strategies			0	0.67	0.02	0.08	--
ER: Non-social Context	5	202					
Proportion of active strategies			0	1	0.86	0.24	--
Proportion of passive strategies			0	1	0.28	0.32	--
Proportion of disruptive strategies			0	1	0.07	0.16	--
Social Competence	7	175					
Proportion of time in Social Play			0	1	0.36	0.27	--
Proportion of Positive Initiations			0	1	0.64	0.28	--
Proportion of Successful Responses			0	1	0.57	0.26	--
Children enrolled	291						
Missing on all variables	34						
Children included in analyses	257						

Table 2.

Correlation between indicators of behavior inhibition (BI) latent variable.

	1.	2.	3.	4.	5.
1. BI observations age 2		.32*	.29*	.35*	.35*
2. BI observations age 3			.20*	.33*	.47*
3. TBAQ Social Fearfulness Age 2				.56*	.42*
4. TBAQ Social Fearfulness Age 3					.60*
5. CCTI Shyness Age 3					

* $p < .01$

Table 3.

Correlation between emotion regulation (ER) strategies across contexts.

	1.	2.	3.	4.	5.	6.
1. Active ER (non-social)		-.77*	.06	.50*	-.46*	.08
2. Passive ER (non-social)			-.23*	-.48*	.50*	-.07
3. Disruptive ER (non-social)				.15*	-.18*	.17*
4. Active ER (social)					-.83*	.09
5. Passive ER (social)						-.13*
6. Disruptive ER (social)						

* $p < .05$

Table 4.

Sex differences in ER strategies.

	Boys		Girls		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>t</i>
Social Context (N = 204)					
Active ER	.92	.21	.80	.32	3.22**
Passive ER	.21	.31	.38	.38	-3.33**
Disruptive ER	.02	.06	.02	.10	-.52
Non-Social Context (N = 200)					
Active ER	.87	.22	.85	.26	.43
Passive ER	.22	.30	.33	.33	-2.29*
Disruptive ER	.10	.18	.05	.15	2.03*

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

Figure 1. Proposed model

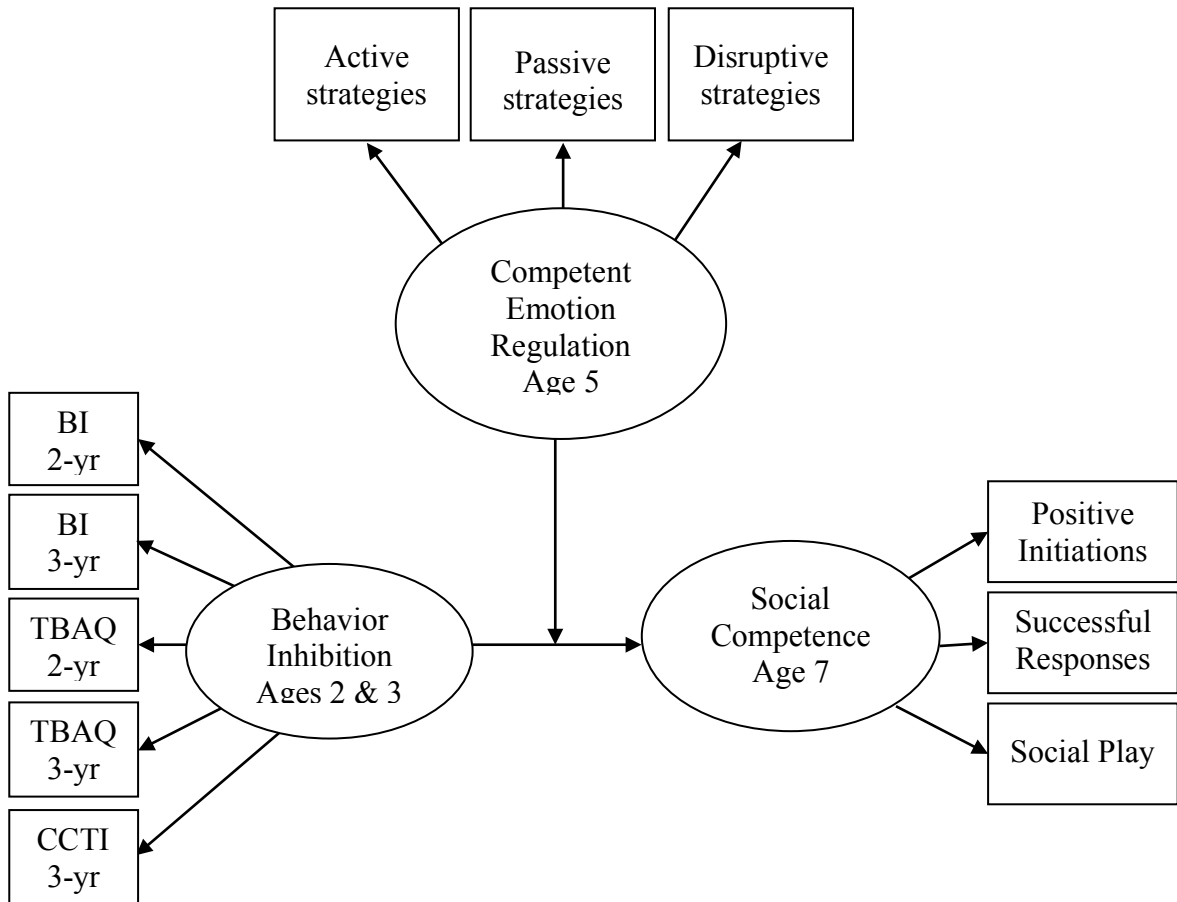


Figure 2. Behavior inhibition latent variable with standardized estimates

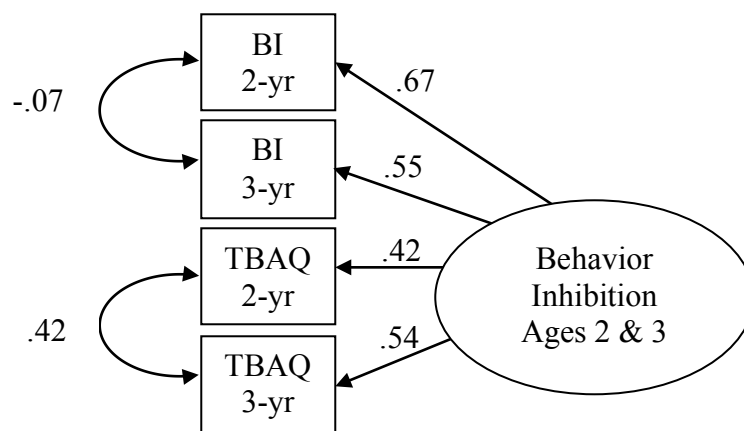


Figure 3. Competent emotion regulation latent variable with standardized estimates

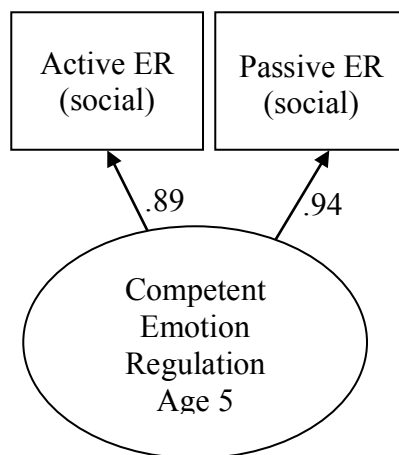


Figure 4. Social competence latent variable with standardized estimates

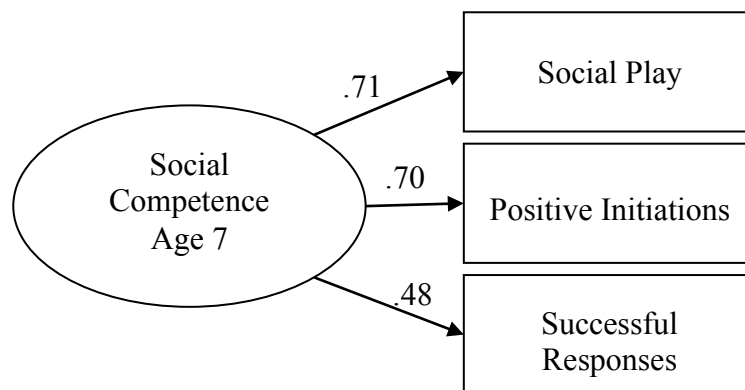


Figure 5. SEM model with unstandardized estimates

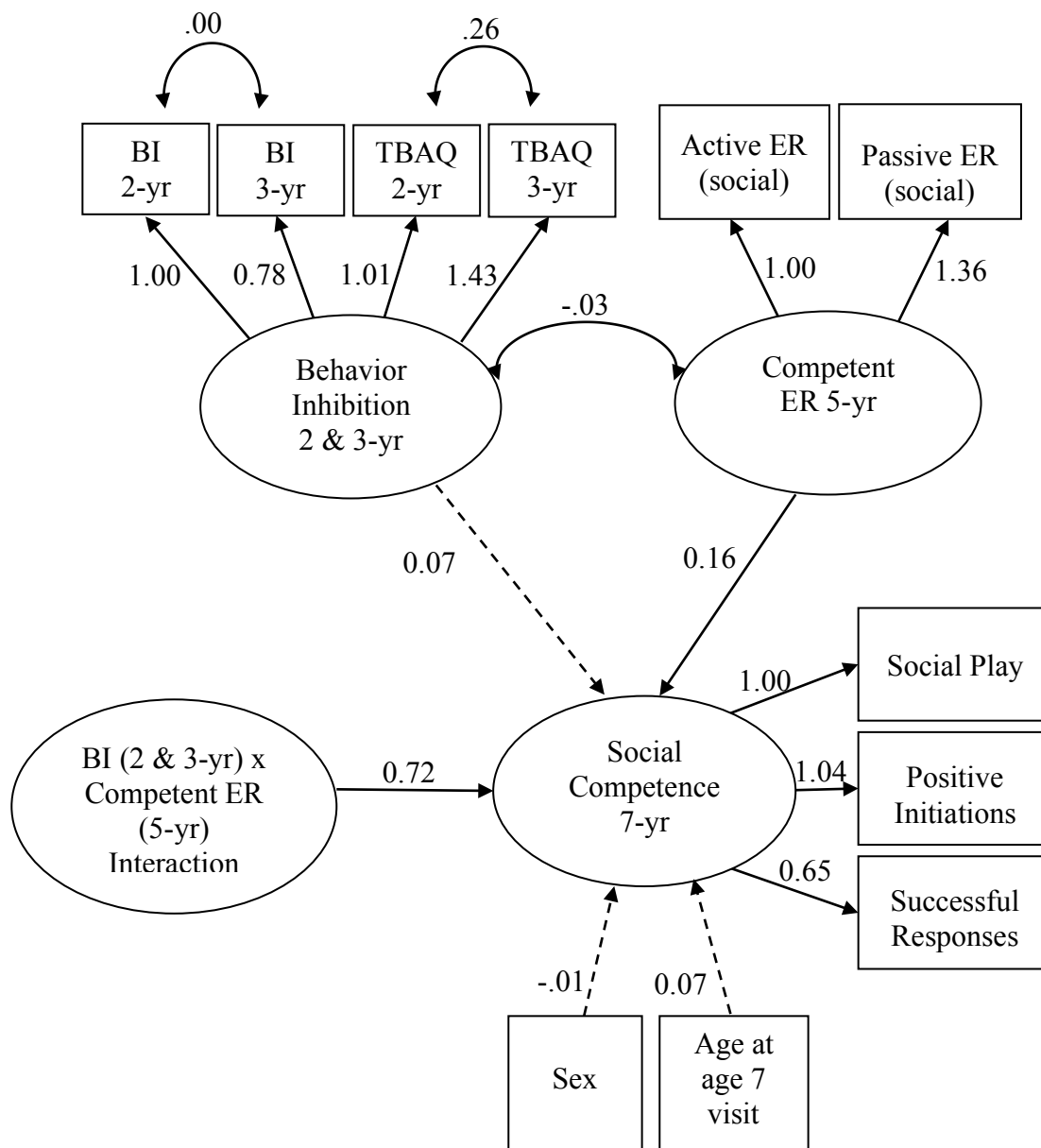
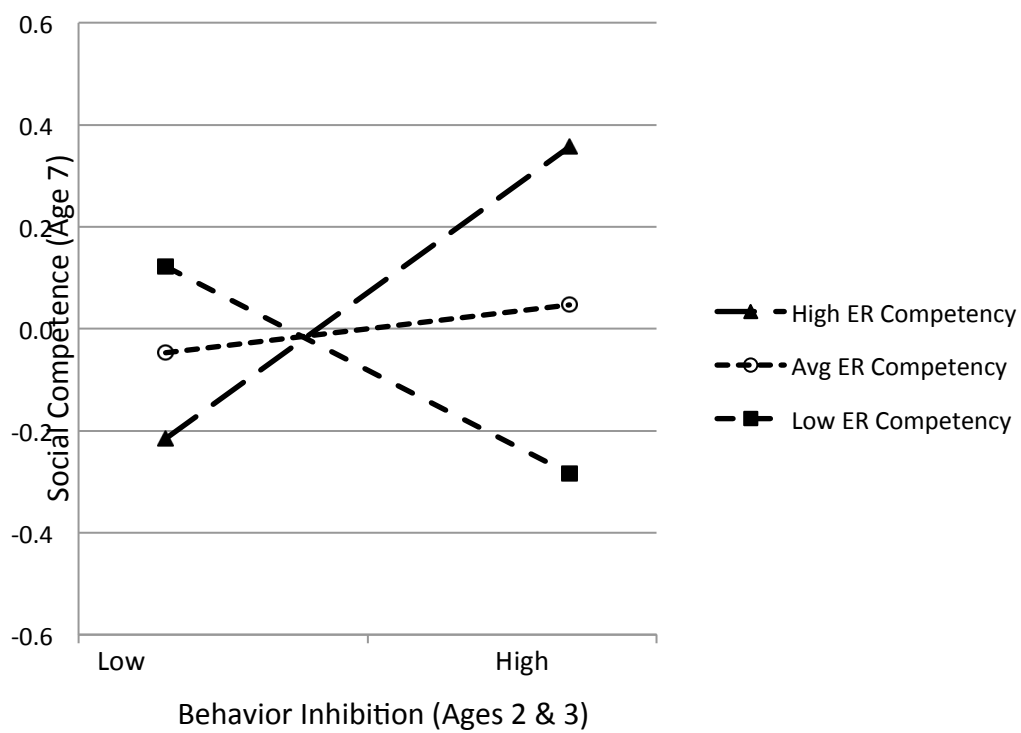


Figure 6. Competent ER at age 5 moderates the relation between behavior inhibition (ages 2 and 3) and social competence (age 7).



References

- Aldao, A., Nolen-Hoeksema, S., & Schweizer, S. (2010). Emotion regulation strategies across psychopathology: A meta-analytic review. *Clinical Psychology Review, 30*(2), 217-237.
- Ale, C. M., Chorney, D. B., Brice, C. S., & Morris, T. L. (2010). Facial affect recognition and social anxiety in preschool children. *Early Child Development and Care, 180*(10), 1349-1359.
- Bar-Haim, Y., Lamy, D., Pergamin, L., Bakermans-Kranenburg, M. J., & van IJzendoorn, M. H. (2007). Threat-related attentional bias in anxious and nonanxious individuals: A meta-analytic study. *Psychological Bulletin, 133*, 1–24.
- Barrett, K. C., & Campos, J. J. (1987). Perspectives on emotional development II: A functionalist approach to emotions. In J. D. Osofsky (Ed.), *Handbook of infant development* (pp. 555-578). Oxford, England: John Wiley & Sons.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin, 107*, 238-246.
- Biederman, J., Hirshfeld-Becker, D. R., Rosenbaum, J. F., Herot, C., Friedman, D., Snidman, N., . . . Faraone, S. V. (2001). Further evidence of an association between behavior inhibition and social anxiety in children. *American Journal of Psychiatry, 158*, 1673-1679.
- Biederman, J., Rosenbaum, J. F., Hirshfeld, D. R., Faraone, S. V., Bolduc, E. A., Gersten, M., . . . Reznick, S. (1990). Psychiatric correlates of behavior inhibition in young children of parents with and without psychiatric disorders. *Archives of General Psychiatry, 47*, 21-26.
- Blair, K. A., Denham, S. A., Kochanoff, A., & Whipple, B. (2004). Playing it cool: Temperament, emotion regulation, and social behavior in preschoolers. *Journal of School Psychology, 42*, 419-443.
- Blair, C., & Diamond, A. (2008). Biological processes in prevention and intervention: The promotion of self-regulation as a means of preventing school failure. *Development and Psychopathology, 20*, 899-911.
- Booth-LaForce, C., & Oxford, M. L. (2008). Trajectories of social withdrawal from grades 1 to 6: Prediction from early parenting, attachment, and temperament. *Developmental Psychology, 44*(5), 1298-1313.
- Bowie, B. H. (2010). Emotion regulation related to children's future externalizing and internalizing behaviors. *Journal of Child and Adolescent Psychiatric Nursing, 23*(2), 74-83.

- Braungart-Rieker, J. M., Hill-Soderlund, A. L., & Karrass, J. (2010). Fear and anger reactivity trajectories from 4 to 16 months: The roles of temperament, regulation, and maternal sensitivity. *Developmental Psychology, 46*(4), 791-804.
- Britton, J. C., Lissek, S., Grillon, C., Norcross, M. A., & Pine, D. S. (2011). Development of anxiety: The role of threat appraisal and fear learning. *Depression and Anxiety, 28*, 5-17.
- Brown, W. H., Odom, S. L., & Holcombe, A. (1996). Observational assessment of young children's social behavior with peers. *Early Childhood Research Quarterly, 11*, 19-40.
- Burt, K. B. & Roisman, G. L. (2010). Competence and psychopathology: Cascade effects in the NICHD Study of Early Child Care and Youth Development. *Development and Psychopathology, 22*, 557-567.
- Buss, K. A., & Goldsmith, H. H. (1998). Fear and anger regulation in infancy: Effects on the temporal dynamics of affective expression. *Child Development, 69*(2), 359-374.
- Buss, A. H. & Plomin, R. (1984). *Temperament: Early developing personality traits*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.
- Calkins, S. D., & Degnan, K. A. (2006). Temperament in early development. In R. T. Ammerman (Ed.), *Comprehensive handbook of personality and psychopathology* (pp. 64-84). Hoboken, NJ: John Wiley & Sons Inc.
- Calkins, S. D., Fox, N. A., & Marshall, T. R. (1996). Behavioral and physiological antecedents of inhibited and uninhibited behavior. *Child Development, 67*(2), 523-540.
- Calkins, S. D. Gill, K. L., Johnson, M. C., & Smith, L. C. (1999). Emotional reactivity and emotional regulation strategies as predictors of social behavior with peers during toddlerhood. *Social Development, 8*(3), 310-334.
- Calkins, S. D., & Johnson, M. C. (1998). Toddler regulation of distress to frustrating events: Temperamental and maternal correlates. *Infant Behavior and Development, 21*(3), 379-395.
- Caspi, A., Moffitt, T., Newman, D., & Silva, P. (1996). Behavioral observations at age 3 years predict adult psychiatric disorders. *Archives of General Psychiatry, 51*, 1033-1039.

- Caspi, A., & Silva, P. A. (1995). Temperamental qualities at age three predict personality traits in young adulthood: Longitudinal evidence from a birth cohort. *Child Development, 66*, 486-498.
- Cavell, T. (1990). Social adjustment, social performance, and social skills: A tri-component model of social competence. *Journal of Clinical Child Psychology, 19*, 111-122.
- Chronis-Tuscano, A., Degnan, K. A., Pine, D. S., Perez-Edgar, K., Henderson, H. A., Diaz, Y., . . . Fox, N. A. (2009). Stable early maternal report of behavioral inhibition predicts lifetime social anxiety disorder in adolescence. *Journal of the American Academy of Child and Adolescent Psychiatry, 48*(9), 928-935.
- Cole, P. M., Dennis, T. A., Smith-Simon, K. E., & Cohen, L. H. (2008). Preschoolers' emotion regulation strategy understanding: Relations with emotion socialization and child self-regulation. *Social Development, 18*(2), 324-352.
- Cole, P. M., Martin, S. E., & Dennis, T. A. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75*(2), 317-333.
- Cole, P. M., Zahn-Waxler, C., & Smith, K. D. (1994). Expressive control during a disappointment: Variations related to preschooler's behavior problems. *Developmental Psychology, 30*(6), 835-846.
- Coplan, R. J., Wilson, J., Frohlick, S. L., & Zelenski, J. (2006). A person-oriented analysis of behavioral inhibition and behavioral activation in children. *Personality and Individual Differences, 41*(5), 917-927.
- Corapci, F. (2008). The role of child temperament on Head Start preschoolers' social competence in the context of cumulative risk. *Journal of Applied Developmental Psychology, 29*, 1-16.
- Crockenberg, S. C., & Leerkes, E.M. (2004). Infant and maternal behaviors regulate infant reactivity to novelty at six months. *Developmental Psychology, 40*(6), 1123-1132.
- Davidov, M., & Grusec, J. E. (2006). Untangling the links of parental responsiveness to distress and warmth to child outcomes. *Child Development, 77*, 44-58.
- Degnan, K. A., Almas, A. N., & Fox, N. A. (2010). Temperament and the environment in the etiology of childhood anxiety. *Journal of Child Psychology and Psychiatry, 51*(4), 497-517.

- Degnan, K. A., & Fox, N. A. (2007). Behavioral inhibition and anxiety disorders: Multiple levels of a resilience process. *Development and Psychopathology, 19*(3), 729-746.
- Diamond, A., Barnett, W. S., Thomas, J., & Munro, S. (2007). Preschool program improves cognitive control. *Science, 318*, 1387-1388.
- Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science, 333*, 959-964.
- Diener, M. L., & Kim, D. (2004). Maternal and child predictors of preschool children's social competence. *Journal of Applied Developmental Psychology, 25*, 3-24.
- Diener, M. L., & Mangelsdorf, S. C. (1999). Behavioral strategies for emotion regulation in toddlers: Associations with maternal involvement and emotional expressions. *Infant Behavior and Development, 22*(4), 569-583.
- Eigsti, I., Zayas, V., Mischel, W., Shoda, Y., Ayduk, O., Dadlani, M. B., . . . Casey, B. J. (2006). Predicting cognitive control from preschool to late adolescence and young adulthood. *Psychological Science, 17*(6), 478-484.
- Eisenberg, N., Fabes, R. A., Bernzweig, J., Karbon, M., Poulin, R., & Hanish, L. (1993). The relations of emotionality and regulation to preschoolers' social skills and sociometric status. *Child Development, 64*(5), 1418-1438.
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., Murphy, B. C., Maszk, P., Holmgren, R., Suh, K. (1996). The relations of regulation and emotionality to problem behavior in elementary school children. *Development and Psychopathology, 8*, 141-162.
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2000). Dispositional emotionality and regulation: Their role in predicting quality of social functioning. *Journal of Personality and Social Psychology, 78*, 136-157.
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., & Reiser, M. (2002). The role of emotionality and regulation in children's social competence and adjustment. In L. Pulkkinen, & C. Avshalom (Eds.), *Paths to successful development: Personality in the lifecourse* (pp. 46-70). New York: Cambridge University Press.
- Eisenberg, N., Fabes, R. A., Murphy, B., Maszk, P., Smith, M., & Karbon, M. (1995). The role of emotionality and regulation in children's social functioning: A longitudinal study. *Child Development, 66*(5), 1360-1384.
- Eisenberg, N., Fabes, R. A., Nyman, M., Bernzweig, & Pinuelas, A. (1994). The relations of emotionality and regulation to children's anger-related reactions. *Child Development, 65*, 109-128.

- Endrerud, M. S., & Vikan, A. (2007). Five to seven year old children's strategies for regulating anger, sadness, and fear. *Nordic Psychology*, *59*(2), 127-134.
- Fabes, R. A., Eisenberg, N., Jones, S., Smith, M., Guthrie, I, Poulin, R., . . . Friedman, J. (1999). Regulation, emotionality, and preschoolers' socially competent peer interactions. *Child Development*, *70*(2), 432-442.
- Fabes, R. A., Gaertner, B. M., & Popp, T. K. (2006). Getting along with others: Social Competence in early childhood. In K. McCartney & D. Phillips (Eds.), *Blackwell handbook of early childhood development* (pp. 297-316). Malden: Blackwell Publishing.
- Fabes, R. A., Martin, C. L., & Hanish, L. D. (2009). Children's behaviors and interactions with peers. In K. H. Rubin, W. M. Bukowski, & B. Laursen (Eds.), *Handbook of peer interactions, relationships, and groups* (pp. 45-62). New York: The Guilford Press.
- Feng, X., Keenan, K., Hipwell, A. E., Henneberger, A. K., Rischall, M. S., Butch, J., . . . Babinski, D. E. (2009). Longitudinal associations between emotion regulation and depression in preadolescent girls: Moderation by the caregiving environment. *Developmental Psychology*, *45*(3), 798-808.
- Feng, X., Shaw, D. S., Kovacs, M., Lane, T., O'Rourke, F. E., & Alarcon, J. H. (2008). Emotion regulation in preschoolers: The roles of behavioral inhibition, maternal affective behavior, and maternal depression. *The Journal of Child Psychology and Psychiatry*, *49*(2), 132-141.
- Fox, N. A., Henderson, H. A., Marshall, P. J., Nichols, K. E., & Ghera, M. M. (2005). Behavioral inhibition: Linking behavior within a developmental framework. *Annual Review of Psychology*, *56*, 235-262.
- Fox, N. A., Henderson, H. A., Rubin, K. H., Calkins, S. D., Schmidt, L. A. (2001). Continuity and discontinuity of behavioral inhibition and exuberance: Psychophysiological and behavioral influences across the first four years of life. *Child Development*, *72*, 1-21.
- Fox, N. A., Schmidt, L. A., Calkins, S. D., Rubin, K. H., & Coplan, R. J. (1996). The role of frontal activation in the regulation and dysregulation of social behavior during the preschool years. *Development and Psychopathology*, *8*(1), 89-102.
- Fraser, M. W., Galinsky, M. J., Smokowski, P. R., Day, S. H., Terzian, M. A., Rose, R. A. & Guo, S. (2005). Social information-processing skills training to promote social competence and prevent aggressive behavior in the third grade. *Journal of Consulting and Clinical Psychology*, *73*(6), 1045-1055.

- Garcia-Coll, C., Kagan, J., & Reznick, J. S. (1984). Behavioral inhibition in young children. *Child Development, 55*, 1005-1019.
- Goldsmith, H. H. (1996). Studying temperament via construction of the Toddler Behavior Assessment Questionnaire. *Child Development, 67*, 218-235.
- Grolnick, W. S., Bridges, L. J., & Connell, J. P. (1996). Strategies and emotional expression in four contexts. *Child Development, 67*(3), 928-941.
- Gross, J. J. (1998). Antecedent- and response-focused emotion regulation: Divergent consequences for experience, expression, and physiology. *Journal of Personality and Social Psychology, 74*, 224-237.
- Hartup, W. W. (1989). Social relationships and their developmental significance. *American Psychologist, 44*, 120-126.
- Hane, A. A., Fox, N.A., Henderson, H.A., & Marshall, P. J. (2008). Behavioral reactivity and approach-withdrawal bias in infancy. *Developmental Psychology, 44*(5), 1491-1496.
- Hauck, M., Fein, D., Waterhouse, L., & Feinstein, C. (1995). Social initiations by autistic children to adults and other children. *Journal of Autism and Developmental Disorders, 25*(6), 579-595.
- Henderson, H. A. & Wachs, T. D. (2007). Temperament theory and the study of cognition-emotion interactions across development. *Developmental review, 27*, 396-427.
- Hirshfeld-Becker, D. R., Biederman, J., Henin, A., Faraone, S. V., Davis, S., Harrington, K. & Rosenbaum, J. F. (2007). Behavioral inhibition in preschool children at risk is a specific predictor of middle childhood social anxiety: A five-year follow-up. *Journal of Developmental and Behavioral Pediatrics, 28*(3), 225-233.
- Hirshfeld, D. R., Rosenbaum, J. F., Biederman, J., Bolduc, E. A., Faraone, S. V., Snidman, N., . . . Kagan, J. (1992). Stable behavioural inhibition and its association with Anxiety Disorder. *Journal of American Academy of Child and Adolescent Psychiatry, 31*, 103-111.
- Johnson, M. H., Posner, M. I., & Rothbart, M. K. (1991). Components of visual orienting in early infancy: Contingency learning, anticipatory looking, and disengaging. *Journal of Cognitive Neuroscience. Special Issue: The University of Oregon Center for Cognitive Neuroscience of Attention, 3*, 335-344.
- Kagan, J., Reznick, J. Z., & Snidman, N. (1987). The physiology and psychology of behavioral inhibition in children. *Child Development, 58*, 1459-1473.

- Kagan, J., & Snidman, N. (1991). Temperamental factors in human development. *American Psychologist, 46*, 856-862.
- Kagan, J., & Snidman, N. (1999). Early childhood predictors of adult anxiety disorders. *Biological Psychiatry, 46*(11), 1536-1541.
- Kagan, J., Snidman, N., & Arcus, D. (1998). Childhood derivatives of high and low reactivity in infancy. *Child Development, 69*(6), 1483-1493.
- Kline, R. (2005). *Principles and practice of structural equation modeling*. New York, NY: Guilford.
- Kochenderfer, B. J., & Ladd, G. W. (1996). Peer victimization: Manifestations and relations to school adjustment in Kindergarten. *Journal of School Psychology, 34*(3), 267-283.
- Kopp, C. B. (1989). Regulation of distress and negative emotions: A developmental view. *Developmental Psychology, 25*(3), 343-354.
- Kovacs, M., Joorman, J., & Gotlib, I. H. (2008). Emotion (Dys)regulation and links to depressive disorders. *Child Development Perspectives, 2*(3), 149-155.
- Ladd, G. W. (1990). Having friends, keeping friends, making friends, and being liked by peers in the classroom: Predictors of children's early school adjustment? *Child Development, 61*, 1081-1100.
- Ladd, G. W. (2005). Contributions of peer relationships to children's development and adjustment. In G. W. Ladd (Ed.), *Children's peer relationships and social competence* (pp. 145-158). New Haven and London: University Press.
- LeDoux, J. E. (1995). Emotion: Clues from the brain. *Annual Review of Psychology, 46*, 209-235.
- Mangelsdorf, S. C., Shapiro, J. R., Marzolf, D. (1995). Developmental and temperamental differences in emotional regulation in infancy. *Child Development, 66*(6), 1817-1828.
- Marshall, P. J., Fox, N. A., & Henderson, H. A. (2000). Temperament as an organizer of development. *Infancy, 1*(2), 239-244.
- Masten, A. S., Desjardins, C. D., McCormick, C. M., I-Chun Kuo, S., & Long, J. D. (2010). The significance of childhood competence and problems for adult success in work: A developmental cascade analysis. *Development and Psychopathology, 22*, 679-694.

- Moas, O. L., Henderson, H. A., & Degnan, K. A. (2011, April). *Shy Children's Reactions to Social Exclusion: A Comparison Between Hypothetical-Reflective Responses and Actual Behavior*. Poster presented at the Biennial Meeting of the Society for Research in Child Development, Montreal, Canada.
- Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of family context in the development of emotion regulation. *Social Development, 16*(2), 361-388.
- Muthén, L. K. and Muthén, B. O. (1998-2010). *Mplus User's Guide*. Sixth Edition. Los Angeles, CA: Muthén & Muthén.
- Newcomb, A. F., Bukowski, W. M., & Pattee, L. (1993). Children's peer relations: A meta-analytic review of popular, rejected, neglected, controversial and average sociometric status. *Psychological Bulletin, 117*, 99-128.
- Nolen-Hoeksema, S., & Girgus, J. S. (1994). The emergence of gender differences in depression during adolescence. *Psychological Bulletin, 115*(3), 424-443.
- Odom, S. L., & Ogawa, I. (1992). Direct observation of young children's social interaction with peers: A review of methodology. *Behavioral Assessment, 14*, 407-441.
- Parker, J. G., & Asher, S. R. (1987). Peer relations and later personal adjustment: Are low-accepted children at risk? *Psychological Bulletin, 102*(3), 357-389.
- Pedersen, S., Vitaro, F., Barker, E. D., & Borge, A. I. H. (2007). The timing of middle-childhood peer rejection and friendship: Linking behavior to early-adolescent adjustment. *Child Development, 78*(4), 1037-1051.
- Penela, E. C., Henderson, H. A., Hane, A. A., Ghera, M. M., Fox, N. A. (In Press). Maternal caregiving moderates the relation between temperamental fear and social behavior with peers. *Infancy*.
- Perez-Edgar, K., & Fox, N. A. (2005). Temperament and anxiety disorders. *Child and Adolescent Psychiatric Clinics of North America, 14*(4), 681-706.
- Pine, D. S., Cohen, P., Gurley, D., Brook, J., Ma, Y. (1998). The risk for early-adulthood anxiety and depressive disorders in adolescents with anxiety and depressive disorders. *American Psychiatry, 55*, 56-64.
- Ramani, G., Brownell, C. A., Campbell, S. B. (2010). Positive and negative peer interaction in 3- and 4-year-olds in relation to regulation and dysregulation. *The Journal of Genetic Psychology, 171*(3), 218-250.

- Rapee, R. M. (2010). Temperament and the etiology of social phobia. In K. H. Rubin, & R. J. Coplan (Eds.), *The development of shyness and social withdrawal*. New York, NY: The Guilford Press.
- Raver, C. C. (1996). Relations between social contingency in mother-child interaction and 2-year-olds' social competence. *Developmental Psychology, 32*(5), 850-859.
- Riggs, N. R., Greenberg, M. T., Kusche, C. A., & Pentz, M. A. (2006). The mediational role of neurocognition in the behavioral outcomes of a social-emotional prevention program in elementary school students: Effects of the PATHS curriculum. *Prevention Science, 7*, 92-102.
- Rivers, S. E., Brackett, M. A., Katulak, N. E., & Salovey, P. (2007). Regulating anger and sadness: An exploration of discrete emotions in emotion regulation. *Journal of Happiness Studies, 8*, 393-427.
- Rodriguez, M. L., Ayduk, O., Aber, J. L., Mischel, W., Sethi, A. & Shoda, Y. (2005). A contextual approach to the development of self-regulatory competencies: The role of maternal unresponsivity and toddlers' negative affect in stressful situations. *Social Development, 14*, 136-157.
- Rose-Krasnor, L. (1997). The nature of social competence: A theoretical review. *Social Development, 6*, 111-135.
- Rothbart, M. K., & Bates, J. E. (2006). Temperament. In R.M. Lerner, Eisenberg, N., & W. Damon (Eds.), *Handbook of Child Psychology: Vol. 3. Social, emotional, and personality development*, (6th ed., pp. 99-166). Hoboken, NJ: Wiley.
- Rothbart, M. K., & Sheese, B. E. (2007). Temperament and emotion regulation. In Gross, J.J. (Ed.), *Handbook of emotion regulation* (pp. 331-350). New York: The Guilford Press.
- Rowe, D. C. & Plomin, R. (1977). Temperament in early childhood. *Journal of Personality Assessment, 41*, 150-156.
- Rubin, K. (2001). *The play observation scale (POS)*. Unpublished manuscript, Center for Children, Relationships, and Culture, University of Maryland, College Park, Maryland.
- Rubin, K., Bukowski, W., & Laursen, B. (Eds). (2009). *Handbook of peer interactions, relationships, and groups*. New York: The Guilford Press.
- Rubin, K., Bukowski, W., & Parker, J. G. (2006). Peer interactions, relationships, and groups. In W. Damon, R. M. Lerner, & N. Eisenberg (Eds.), *Handbook of child psychology: Vol. 3. Social, emotional, and personality development* (6th ed., pp. 571-645). Hoboken, NJ: Wiley.

- Rubin, K. H., Burgess, K. B., Dwyer, K. B., & Hastings, P. D. (2003). Predicting preschoolers' externalizing behaviors from toddler temperament, conflict, and maternal negativity. *Developmental Psychology, 39*, 164-176.
- Rubin, K. H., Burgess, K. B., & Hastings, P. D. (2002). Stability and social-behavioral consequences of toddlers' inhibited temperament and parenting behaviors. *Child Development, 73*(2), 483-495.
- Rubin, K. H., Hastings, P. D., Stewart, S. L., Henderson, H. A., & Chen, X. (1997). The consistency and concomitants of inhibition: some of the children, all of the time. *Child Development, 68*(3), 467-483.
- Rudasill, K. M., & Konold, T. R. (2008). Contributions of children's temperament to teachers' judgments of social competence from kindergarten through second grade. *Early Education and Development, 19*(4), 643-666.
- Rydell, A., Berlin, L., & Bohlin, G. (2003). Emotionality, emotion regulation, and adaptation among 5- to 8-year-old children. *Emotion, 3*, 30-47
- Sanson, A., Hemphill, S. A., & Smart, D. (2004). Connections between temperament and social development: A review. *Social Development, 13*, 142-170.
- Santucci, A. K., Silk, J. S., Shaw, D. S., Gentzler, A., Fox, N. A., & Kovacs, M. (2008). Vagal tone temperament as predictors of emotional regulation strategies in young children. *Developmental Psychobiology, 50*(3), 205-216.
- Schmidt, L. A., Fox, N. A., Schulkin, J., & Gold, P. W. (1999). Behavioral and psychophysiological correlates of self-presentation in temperamentally shy children. *Developmental Psychobiology, 35*, 119-135.
- Schwartz, C. E., Wright, C. I., Shin, L. M., Kagan, J., & Rauch, S. L. (2003). Inhibited and uninhibited infants "grown up": Adult amygdalar response to novelty. *Science, 300*, 1952-1953.
- Smari, J., Petursdottir, G., & Porsteindottir, V. (2001). Social anxiety and depression in adolescents in relation to perceived competence and situational appraisal. *Journal of Adolescence, 24*, 199-207.
- Stansbury, K., & Sigman, M. (2000). Responses of preschoolers in two frustrating episodes: Emergence of complex strategies for emotion regulation. *The Journal of Genetic Psychology, 161*(2), 182-202.
- Stegge, H., & Meerum Terwogt, M. (2007). Awareness and regulation of emotion in typical and atypical development. In Gross, J.J. (Ed.), *Handbook of emotion regulation* (pp. 269-286). New York: Guilford Press.

- Steiger, J. H. (1990). Structural model evaluation and modification: An interval estimation approach. *Multivariate Behavioral Research, 25*, 173-180.
- Steiger, J. H., & Fouladi, R.T. (1992). *R2: A Computer Program for Interval Estimation, Power Calculation, and Hypothesis Testing for the Squared Multiple Correlation. Behavior Research Methods, Instruments, and Computers, 4*, 581-582.
- Stifter, C. A., Putnam, S., & Jahromi (2008). Exuberant and inhibited toddlers: Stability of temperament and risk for problem behavior. *Development and Psychopathology, 20*(2), 401-421.
- Stipek, D. J., & Ryan, R. (1997). Economically disadvantaged preschoolers: Ready to learn but further to go. *Developmental Psychology, 33*, 711-723.
- Thompson, R. A. (1994). Emotion regulation: A theme in search of definition. In N. A. Fox (Ed.), *The development of emotion regulation: Biological and behavioral considerations. Monographs of the Society for Research in Child Development, 59* (2-3, Serial No. 240), 25-52.
- Thompson, R. A. & Meyer, S. (2007). Socialization of emotion regulation in the family. In Gross, J.J. (Ed.), *Handbook of emotion regulation* (pp. 249-268). New York: Guilford Press.
- Uhrlass, D. J., Schofield, C. A., Coles, M. E., & Gibb, B. E. (2009). Self-perceived competence and prospective changes in symptoms of depression and social anxiety. *Journal of Behavior Therapy and Experimental Psychiatry, 40*, 329-337.
- Van Hecke, A. V., Mundy, P. C., Acra, C.F., Block, J.J, Delgado, C. E. F., Parlade, M. V., . . . Pomares, Y. B. (2007). Infant joint attention, temperament, and social competence in preschool children. *Child Development, 78*, 53-69.
- Williams, L. R., Degnan, K. A., Perez-Edgar, K. E., Henderson, H. A., Rubin, K. H., Pine, D. S. (2009). Impact of behavioral inhibition and parenting style on internalizing and externalizing problems from early childhood through adolescence. *Journal of Abnormal Child Psychology, 37*(8), 1063-1075.
- Zahn-Waxler, C., Klimes-Dougan, B., & Slattery, M. J. (2000). Internalizing problems of childhood and adolescence: Prospects, pitfalls, and progress in understanding the development of anxiety and depression. *Development and Psychopathology, 12*, 443-466.