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**CHILDREN'S POSITIVE AFFECT AND BEHAVIOR PROBLEMS: THE ROLE  
OF TEMPERAMENTAL STYLES, PARENTAL BEHAVIORS, AND THE  
REGULATION OF POSITIVE AFFECT**

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by  
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## **ABSTRACT**

Recent developmental research from varying perspectives underscores the importance of positive affect as a promising avenue toward a greater understanding of children's development of psychopathology and social adjustment. However, given that existing research has linked positive affect to both beneficial and maladaptive childhood behaviors, the current dissertation sought to advance the literature on the role of positive affect in the development of children's social and psychological adjustment. The goal of this dissertation was to investigate if the importance of children's intensity of positive affect and related behaviors, as well as children's ability to regulate positive affect, varied according to the temperamental style of the child in predicting later social and behavioral adjustment. In addition, maternal parenting behaviors were examined as a mechanism by which children learned to regulate positive affect. Data for both studies was drawn from a longitudinal study of 125 children and their families. Latent profile analysis was used to identify 3 separate subgroups of children (exuberant, inhibited, and average), which were used as the measure of children's temperamental styles in both studies.

The goals of the first study were to examine the role of the intensity of positive affect that 42-month old children displayed in different contexts in predicting social and problem behaviors at 48-months, and to investigate the moderating role of intensity of positive affect and vigor of activity on the relation between temperament and behavior problems/social behaviors longitudinally. Support was found for the adaptive role of positive affect in that regardless of children's temperamental profile, children who displayed high intensity positive affect in a low-intensity game were less likely to be rated by their mothers as high in internalizing and externalizing behavior problems.

Evidence for the constructive role of positive affect was also revealed for children of specific temperamental profiles. Exuberant children who showed higher intensity of positive affect were rated as more successful in peer relations and lower in oppositional defiant behaviors than exuberant children who displayed lower intensity of positive affect. Evidence was also provided for the importance of considering the behavior that accompanies exuberant children's intense positive affect. As hypothesized, exuberant children who displayed both high intensity of positive affect and vigor of activity were rated as higher in conduct problems by their mothers. Collectively, these findings substantiate the protective role of positive affect when not coupled with intense vigor of activity in lowering children's risk of developing maladaptive behaviors. However, exuberant children's inability to restrain their intense, vigorous activity when excited might represent a liability to the child.

Study 2 investigated if 42-month old children's temperamental styles were directly related to their ability to regulate positive affect, as well as examining if children's ability to up- and down-regulate positive affect was related to the socialization behaviors that parents employed. Further, this study examined the role of children's temperament and ability to regulate positive affect, as moderated by maternal parenting behaviors, in predicting children's later behavior problems and social behaviors. This investigation provided support for the significance of maternal parenting behaviors as a mechanism by which children of varying temperamental styles learn to up- and down-regulate positive affect. In particular, exuberant children were better able to down-regulate positive affect when mothers employed high levels of attention-grabbing behaviors and positive commands. In addition, a mediated moderation analysis revealed

preliminary evidence for the role of up-regulation of positive affect as a mechanism by which inhibited children's risk of developing poor peer relations was lowered. However, maternal overprotective behaviors were found to lower the likelihood that inhibited children would show up-regulation of positive affect, which in turn, heightened their risk of having poor peer relations.

In conclusion, the results from these studies add to the existing literature by showing that the role of positive affect in children's social and behavioral adjustment largely depends on children's vigor of activity, as well as their temperamental style. Further, evidence was provided that one mechanism by which children learn to up- and down-regulate positive affect is through the socialization behaviors that mothers employ and children's ability to regulate positive affect may affect later behavioral and social adjustment.

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## INTRODUCTION

Temperament theory and research frequently have been emphasized as a promising avenue for understanding pathways toward children's behavioral and psychological adjustment, or alternatively, to behavioral and psychological dysfunction. Temperament is commonly conceptualized as reflecting constitutionally-based, relatively stable individual differences in reactivity and regulation within the realms of affect, activity, and attention (Goldsmith et al., 1987; Rothbart & Derryberry, 1981; Rothbart & Bates, 2006). Multiple temperament traits have been investigated for their relation with childhood outcomes; however, due to the prominence of negative emotions in psychopathology, a large majority of this research broadly has focused on temperamental negative affect, and more specifically on inhibited and difficult temperament styles.

Despite the focus on negative emotions historically, interest in temperamental positive affect has grown and has been shown to be a promising link toward a greater understanding of children's trajectories toward mental health outcomes. However, recent research has established that positive affect is associated with both beneficial (e.g., Denham, McKinley, Couchoud, & Holt, 1990; Eisenberg et al., 1996; Isen & Reeve, 2005) and maladaptive (e.g., Putnam, Garstein, & Rothbart, 2006; Rothbart, Ahadi, Hershey, & Fisher, 2001; Stifter, Putnam, & Jahromi, 2008) childhood skills and outcomes and additional research is needed to illuminate the conditions in which positive affect is associated with risk or well-being. Although not tested directly, the role of positive affect in promoting or hindering children's adaptive developmental trajectories could depend on the intensity of positive affect, the context that the positive affect is expressed, and the temperamental disposition (e.g., exuberant, inhibited) of the child.

Further, although research has repeatedly shown that the development of emotion regulation is a critical milestone for children's adaptive outcomes, the sum of past research has focused on the regulation of negative affect and very little is known about the importance of up- or down-regulating positive affect. There has been some speculation that children learning to up- and down-regulate positive affect could lower their risk for later behavior and psychological difficulties and the importance of children successfully learning to up- or down-regulate positive affect might depend on the temperamental style of the child. Moreover, very little is known regarding how parents socialize positive emotions and more specifically, how they teach their children to up- and down-regulate positive affect depending on the child's temperamental disposition. Thus, additional research is warranted since these topics appear to be promising lines of research toward a greater understanding of childhood mental health and seldom have been addressed in research.

The following sections provide a background for the dissertation project, which will take the form of two empirical papers. First, a) the guiding framework of temperament theory will be presented. Second, the role of b) temperament in children's developmental trajectories will be reviewed, including a discussion of the research on negative affect, behavioral inhibition and exuberance, and positive affect. Next, c) the importance and development of emotion regulation will be presented, including a discussion addressing the significance of internal (e.g., temperament) and external (e.g., parental emotion socialization) sources in the development of children's emotion regulation abilities. Following this, d) the importance of the predominant emotions associated with temperamental dispositions in the development of emotion self-

regulatory abilities will be presented, as well as a discussion acknowledging that emotions might need to be regulated differently (e.g., up-regulated or down-regulated) depending on the child's temperament. Finally, to lead into the empirical papers, the e) general aims of each paper will be presented, f) the Tikes/HAPPY project will be briefly described, and g) the creation of the temperament groups used throughout each empirical paper will be presented.

### **Temperament Theory**

While there are multiple theories of temperament, it is generally agreed upon that temperament is not a trait, but rather a rubric for a set of associated traits that underlie individuals' behavior (Goldsmith et al., 1987). There is divergence between the various theoretical frameworks of temperament; however, most of these theories converge on a few central concepts. One point of consensus is that temperament is constitutionally-based. Secondly, although it is commonly believed that temperament is biologically-based and shows relative stability across development, temperament is also thought to be modifiable through experience. This more recent perspective emphasizes developmental change in temperament, as opposed to being stable and static. A third point of consensus is that temperament reflects individual differences in behavioral tendencies. Given these points of convergence, temperament theorists tend to diverge on setting criteria for various boundaries and dimensions of temperament (Goldsmith et al., 1987).

As an example, Rothbart and colleagues (Rothbart & Derryberry, 1981; Rothbart & Bates, 2006) have defined temperament as biologically based individual differences in reactivity and regulation that are proposed to be within the realm of attention, affect, and activity (Rothbart, 1986; Rothbart & Bates, 2006; Rothbart & Derryberry, 1981).

Reactivity refers to the arousability, excitability, and responsivity of affect, motor activity, and related responses. Regulation includes processes that modulate reactivity, such as attention, approach/withdrawal, and self-soothing, which serve to facilitate or inhibit the behavioral and affective response (Rothbart & Bates, 2006; Rothbart & Derryberry, 1981).

While there is some convergence among the various theoretical frameworks of temperament, Rothbart's theory has several advantages. For example, Rothbart's perspective provides a broader, more encompassing view of temperament by including not only individual differences in children's propensity toward primary emotions, but also individual differences in regulation. Additionally, the perspective taken by Rothbart includes both positive emotionality as well as individual differences in specific emotions (e.g., fear, anger), whereas other theories focus solely on the more global concept of negative emotionality (Goldsmith et al., 1987). Rothbart's framework also acknowledges the interaction that occurs between the individual and the environment throughout development and behavioral manifestations of temperament can be modified by various environmental factors and is not fixed at birth. Finally, Rothbart's perspective recognizes that various aspects of temperament come on line at different points across development and that temperament continues to develop over time. Due to these advantages, Rothbart's theoretical framework will be used to guide the current investigation.

**Temperament and Behavioral Adjustment.** Within the developmental literature, considerable attention has been given to the ways in which particular temperament traits or styles can either enhance or buffer a child's risk for various forms of psychopathology and maladaptive behavioral and social outcomes (e.g., Frick &

Morris, 2004; Nigg, 2006; Rothbart & Bates, 2006; Rothbart, Posner, & Hershey, 1995).

Based on a theoretical model which proposes that temperament has a crucial role in the development of psychopathology (Clark, Watson, & Mineka, 1994; Frick & Morris, 2004; Nigg, 2006; Rothbart et al., 1995), much research has shown that important patterns exist between temperament traits and various types of adjustment, both positive and negative. Overall, there are four basic models proposed to explain the manner in which temperament may be related to psychopathology (Clark et al., 1994; Nigg, 2006; Rothbart et al., 1995).

The first of these models is referred to as a spectrum model or common cause model where temperamental extremes may be precursors of later psychopathology, such as when extremely shy, fearful children develop anxiety disorders. Another model by which temperament is related to later psychopathology is a vulnerability or resilience model. From this perspective, specific temperament traits or styles in combination with certain environmental events and contexts predispose or buffer later psychopathology. Stated differently, temperament can serve as a liability for psychopathology when either in combination with other traits or environmental factors. For instance, children low in positive affect may elicit fewer protective factors, such as warm, supportive parenting and positive peer relationships, which could promote maladjustment. On the other hand, high positive affect could buffer the negative effects of hostile, maltreating parents or living in poverty. This perspective is in line with stress-diathesis models and gene x environment interplay models.

A third perspective describing the manner in which temperament can be involved in the development of behavior problems is the pathoplasty model. This model, similar



to the vulnerability model, suggests that temperament can shape the course of a disorder. In other words, once a disorder occurs temperament can alter, either positively or negatively, the course of the disorder. Finally, the scar effects model suggests that a disorder can cause enduring changes in the individual's temperament, or more commonly personality. As can be seen, temperament theory has provided a useful method of examining the pathways toward adaptive or maladaptive adjustment in childhood. Guided by a temperament framework, the current dissertation project aims to investigate the role of positive emotionality within the context of exuberant and inhibited temperament styles as a risk or protective factor in the development of internalizing and externalizing behavior problems.

Temperament theory and research has proven important in illuminating the bases of childhood psychopathology and various types and dimensions of temperament have been linked to psychopathology across development. Although large bodies of literature have connected a range of temperament traits to adjustment outcomes, individual differences in emotionality and related temperament styles have received considerable attention as promising predictors of childhood behavior problems and adjustment. Historically, temperamental emotionality has been most frequently studied in terms of negative emotionality, which has been shown repeatedly as an important predictor of various aspects of children's development (Rothbart & Bates, 2006). Parallel to distress proneness, negative emotionality is believed to include the emotions of frustration/anger, fear, anticipatory anxiety, sadness, guilt, and discomfort. Overall, children high in negative emotionality tend to behave more impulsively, negatively, and less constructively than children who experience fewer negative emotions (Rothbart, Ahadi,

& Hershey, 1994). In addition, negative emotionality has been shown to be a risk factor for children, as it is related to internalizing and externalizing behavior problems, and peer rejection (Bates, Bayles, Bennett, Ridge, & Brown, 1991; Eisenberg, Fabes, Guthrie, & Reiser, 2000).

***Temperamental Profiles of Behavioral Inhibition.*** One prominent area of temperament research, highly related to the study of children's proclivity toward expressing negative affect, has examined individual differences in children's reactions when faced with unfamiliar or novel situations and stimuli as predictors of later childhood psychological and social adjustment. The degree to which an infant or child exhibits wariness or distress when confronted with novel situations, objects, or people and how the infant modulates this reactivity, commonly referred to as approach/withdrawal behaviors, are frequently discussed as aspects of temperament. Kagan (e.g., Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, Clarke, Snidman & Garcia-Coll, 1984; Kagan, Reznick, & Snidman, 1987) has coined the term "behavioral inhibition" to describe children that tend to withdraw and show negative affect in response to novelty. From this research investigating approach and withdrawal behaviors in infants and children, two distinct behavioral profiles were identified. When presented with unfamiliarity, children who are behaviorally inhibited are biologically predisposed to display high negative affect, distress, wariness, and anxiety (Garcia-Coll et al., 1984; Kagan, 1997), whereas children showing low levels of inhibition, or uninhibited children, are biologically predisposed to approach novel situations, people, and things and exhibit low levels of negative affect (Garcia-Coll et al., 1984; Kagan, 1997; Kagan, Snidman, & Arcus, 1998).

The results of multiple longitudinal studies have demonstrated moderate stability of behavioral inhibition across childhood (Kagan et al., 1984; Kagan, Reznick, Snidman, Gibbons, & Johnson, 1988; Pfiefer, Goldsmith, Davidson, & Rickman, 2002; Reznick et al., 1986; Rimm-Kaufman & Kagan, 2005) and its role as a predictor of later social behaviors and behavior problems (Kagan, 1994; Kagan et al., 1987; Rubin, Burgess, & Hastings, 2002; Schwartz, Snidman, & Kagan, 1996). More specifically, children who were consistently labeled as inhibited were more likely to develop social anxiety disorders (Biederman et al., 1990; 2001; Hirshfeld et al., 1992; Schwartz, Snidman, & Kagan, 1999). Although the effect was modest in size, the risk of developing anxiety symptoms doubled for the inhibited children as compared to the other children (Kagan, Snidman, Zentner, & Peterson; 1999; Kagan & Snidman, 1999) and almost tripled when compared to uninhibited children. On the other hand, whereas many inhibited children become less fearful across development, multiple studies have demonstrated considerable stability for uninhibited children. Further, these outgoing, uninhibited children are at risk for developing externalizing behavior problems later in childhood (e.g., Schwartz et al., 1996).

As can be seen, due to the prominence of negative affect in psychopathology, much research has highlighted the role of negative affect and behavioral inhibition in predicting children's mental health risk. More recent temperament research has emphasized that positive affect should be investigated as a separate construct from negative affect. In addition, there is some research from varying perspectives in the adult and child literatures that has suggested that positive affect and exuberance, a related

temperamental style, is a promising avenue toward a greater understanding of the development of psychopathology or a lack thereof.

One such prominent area of research expanded Kagan's findings on inhibited and uninhibited children (Kagan et al., 1998; Kagan, 1997) to include positive affect. Calkins, Fox, & Marshall (1996) found that infants high in negative affect and motor activity were more likely to show later inhibited behavior, whereas infants displaying high levels of positivity, not just low levels of negativity, and high motor activity were related to later uninhibited behavior, which they called "exuberant". Although this research greatly added to our understanding of exuberant and inhibited children, this study and those of Kagan and colleagues, did not measure affect as a component of being either inhibited or uninhibited. More recently, temperament groups have been formed based upon toddlers' level of positive and negative affect in addition to approach/withdrawal behavior concurrently (Putnam & Stifter, 2005). Using a person-centered approach, three temperament groups were created: a group high in positive affect and approach were labeled exuberant, a group high in negative affect and low in approach represented inhibited children, and a group low on both positive and negative affect and moderate on approach were labeled low reactive. From this study, exuberant children were most likely to exhibit externalizing problems at age 2 (Putnam & Stifter, 2005) and at 4 years of age the exuberant children were more likely to be rated as higher in externalizing and total problem behaviors than other children (Stifter et al., 2008). Overall, these studies and others investigating uninhibited/exuberant children has indicated that although these children display high levels of positive affect, which is typically thought to be an adaptive quality, they may be at risk for developing later

behavior problems, within the realms of both externalizing and internalizing behaviors (Putnam & Stifter, 2005; Rubin, Coplan, Fox, & Calkins, 1995; Schwartz et al., 1996; Stifter et al., 2008).

***Positive Affect.*** Although positive affect has been largely considered as part of the temperamental style of exuberant children, there is also research examining it as an independent construct. Overall, a predisposition towards childhood positive emotions, generally measured in terms of happy, cheerful mood, is thought to be adaptive and is related to peer competence and prosocial behavior (Denham et al., 1990; Eisenberg et al., 1996). Additionally, various studies have suggested that positive affect promotes and is related to higher levels of self-regulation (e.g., Isen & Reeve, 2005; Kochanska, Aksan, Penney, & Doobay, 2007); this seems to be especially true for low-intensity pleasure, which typically loads with self-regulation on parent-rated temperament measures (Putnam et al., 2006; Rothbart et al., 2001).

Further evidence for the adaptive quality of positive affect comes from work examining this construct as a protective factor for internalizing behavior problems. Clark and Watson (1991) proposed within the tripartite model, and existing research with adults has supported, that negative affect is the common component of both anxiety and depression, but that depression and anxiety can be differentiated by the levels of positive affect that the individual shows (Brown, Chorpita, & Barlow, 1998; Clark & Watson, 1991; Nitschke, Heller, Imig, McDonald, & Miller, 2001). In research conducted with children, Klein and colleagues (Durbin, Klein, Hayden, Buckley, & Moerk, 2005; Shankman et al., 2005) found that low levels of positive emotionality in children were

related to a history of maternal depressive disorders and children's EEG asymmetries believed to characterize depressed adolescents and adults.

The aforementioned research provides support for the perspective valuing the protective qualities of positive affect. Additional evidence to substantiate this position comes from Fredrickson (e.g., Fredrickson, 1998; 2001; Fredrickson & Levenson, 1998; Fredrickson, Mancuso, Branigan, & Tugade, 1998) who proposed a theoretical model that positive emotions are worth fostering as a means of building enduring personal resources, such as physical and intellectual well-being, and social and psychological resources. More specifically, this Broaden-and-Build Theory suggests that positive emotions broaden an individual's scope of cognition, attention, and action, as well as building physical, intellectual, and social resources. Whereas negative emotions restrict and limit individuals' thought-action tendencies, the Broaden-And-Build Theory proposes that positive emotions expand individuals' thought-action tendencies by motivating them to pursue a wider range of thoughts and actions, such as playing, exploring, savoring. Thus far, research has supported this theory by showing that positive emotions expanded young adults' attention and thought-action patterns (Fredrickson & Branigan, 2005). Furthermore, when compared to neutral emotions, negative emotions were found to narrow individuals' thought-action repertoires (Fredrickson & Branigan, 2005). Implications for the Broaden-and-Build Theory in promoting physical and psychological well-being are clear, including creating strategies that people can use to regulate their experiences of negative affect.

Indeed, multiple lines of research have shown the adaptive role of positive affect across the lifespan, including the development of self-regulation, lowering risk of

internalizing behavior problems, and broadening cognitive, physical, and social abilities; yet, the role of positive affect is not entirely clear as there is additional research linking this construct with maladaptive behaviors. For example, children who show less intense joy and are slower to show joy, score higher on effortful control measures, a type of self-regulation (Kochanska, Murray, & Harlan, 2000) and laboratory observations of smiling and laughter predict later impulsivity and lower inhibitory control (Rothbart, Derryberry, & Posner, 1994). Also, as previously discussed, positive affect is related to infant and children's approach behaviors (e.g., Putnam & Stifter, 2002; Rothbart, 1988) and high-intensity pleasure and approach are frequently correlated with impulsivity and low levels of self-regulation (Putnam et al., 2006; Rothbart et al., 2001).

It has been suggested that these seemingly contradictory findings are related to the heterogeneous nature of positive affect (Kochanska et al., 2007). For example, low/moderate levels of positive affect, such as low-intensity pleasure, could be an adaptive quality for children, whereas intense positive affect is a risk factor when coupled with high activity level, intense excitement, and high approach behaviors. Stated differently, the conflicting literature could be explained by whether researchers emphasize the high approach elements of exuberance or the lower intensity positive affect components in their measurement of the construct of positive affect or exuberance (Polak-Toste & Gunnar, 2006). In support of this position, Kochanska and colleagues found that there were differential links between children's effortful control and positive emotionality either measured in laboratory temperament (e.g., Lab-TAB) procedures pulling for high approach behaviors or positive emotionality in mother-child interactions. More specifically, high positive emotionality in mother-child interactions was positively

related to children's effortful control, whereas children high in positive emotionality in Lab-TAB procedures displayed lower levels of effortful control (Kochanska et al., 2007). Thus, although there is limited research to support this view, the conflicting research on the role of positive affect as an adaptive or maladaptive quality in childhood could depend on the context in which the positive affect is expressed (e.g., if they are elicited within a high-intensity, approach-oriented context) and the intensity of positive affect (e.g., high-intensity laughing/excitement, low-intensity pleasure).

Further complicating our understanding of the role of positive affect, very little is known about the developmental pathways by which some exuberant, positive children become socially outgoing and well-adjusted, whereas others develop aggression and conduct problems. Some have speculated that although exhibiting positive affect is typically thought to be an adaptive quality, for temperamentally exuberant children the ability to regulate emotions, including positive emotions, and excitable behavior is a crucial developmental task (e.g., Kochanska et al., 2007; Polak-Toste & Gunnar, 2006). Stated differently, while positive affect may serve as a protective factor for some children, problematic behaviors could develop for those who cannot regulate their intense levels of exuberance and excitement. Yet, this hypothesis has seldom been addressed in research. Therefore, a goal of the current dissertation project was to examine if the importance of children's ability to up- and down-regulate positive affect varied according to the child's temperamental style in predicting later behavior problems and social behaviors. As the role of emotion regulation is very important for children varying in their temperamental dispositions and is central to the current dissertation project, the



following section will review the literature on the development of emotion regulation in infancy and early childhood.

### **Development of Emotion Regulation**

The ability to appropriately monitor, evaluate, and modify emotional reactions to accomplish one's goals is an evolving skill that develops in the first years of life, and individual differences in emotion regulation is based on the intricate interaction of developmental processes occurring from internal and external factors (Thompson, 1994; Fox & Calkins, 2003). Interest in the study of children's emotion regulation has burgeoned in the last few decades, in large part due to the increase in research showing that the development of emotion regulation is a critical milestone for children's adaptive outcomes. For example, a child's ability to successfully regulate his or her emotions has been associated with positive outcomes such as social competence (e.g., Eisenberg et al., 2000; Eisenberg, Fabes, Murphy, Maszk, Smith, & Karbon, 1995; NICHD Early Child Care Research Network, 2004), whereas maladaptive patterns of emotion regulation, or emotion dysregulation, particularly the inability to regulate negative emotionality, has been associated with both externalizing (e.g., aggressive, antisocial behaviors) and internalizing (e.g., anxiety, depression, social withdrawal) behavior problems (Cicchetti, Akerman, & Izard, 1995; Eisenberg et al., 2001; Mullin & Hinshaw, 2007). Thus, children's ability to regulate emotional arousal, and in particular negative emotionality, has crucial consequences upon a child's ability to adaptively engage in his/her environment.

While infants' rudimentary ability to regulate their emotions begins to develop in the first year of life (Kopp, 1989; Rothbart, 1989), they are largely dependent on adults to

assist in the regulation of their emotions. It is important to note that from a temperament perspective there may be varying opportunities for external regulation depending on the infant's emotionality. Regardless, throughout infancy parental modeling and repeated interactions with parents in emotion-inducing situations are believed to lead to infants' increased abilities to use behavioral strategies, such as the infant shifting attention, using self-comforting behaviors, and/or avoidance, to modulate their own emotional arousal (Kopp & Neufeld, 2003; Fox & Calkins, 2003; Stifter & Braungart, 1995). Toward the end of the first year, social, emotional, motor, and cognitive advances assist in the expansion of emotion regulation competencies, such as attentional abilities and exploration, allowing emotion regulation to become more autonomous. During the second and third years of a child's life the development of self-awareness, recognition and understanding of causes of distress, and increasing verbal abilities greatly assist in the increasingly autonomous use of regulating emotional arousal (Kopp, 1989). In early childhood, more sophisticated emotion regulation strategies include inhibitory control, or the ability to suppress a dominant impulse, compliance to adult demands, and the ability to delay gratification (Kopp, 1982).

Numerous factors impact the development of emotion regulation. Many researchers have proposed the emergence and progression of emotion regulation abilities is based on the interaction of developmental processes occurring from internal and external sources of the child (Calkins, 1994; Fox & Calkins, 2003). For example, it is widely recognized that individual differences in emotionality and the executive attentional processes underlying effortful control play a central role in the development of emotion regulation (Derryberry & Rothbart, 1997; Rothbart & Derryberry, 1981).

Although a temperament perspective highlights that temperament characteristics affect children's emotion regulation abilities, it is also acknowledged that emotion regulation is further socialized by parenting. Indeed, throughout the toddler and early childhood years, parents play an important role in children's understanding of emotions and learning successful methods of regulating emotions.

**Socialization of Emotion Regulation.** Existing research has identified a number of important ways in which parents socialize emotion regulation in their children, including modeling appropriate emotional expressivity, parental contingent reactions to their children's emotions, and teaching about or discussing emotions (e.g., Denham, Bassett, & Wyatt, 2007; Eisenberg, Cumberland, & Spinrad, 1998; Morris, Silk, Steinberg, Myers, & Robinson, 2007). In general, this research has suggested that parents' nonsupportive, negative, and sometimes punitive reactions to children's negative emotions are related to many maladaptive outcomes for children, including low levels of constructive coping and high levels of inappropriate emotion self-regulation strategies (Eisenberg et al., 1996; Eisenberg et al., 1999; Gottman, Katz, & Hooven, 1996). On the other hand, parents who talk to and teach their children about emotions assist their children to appropriately express, understand, and regulate emotions (Denham, Zoller, & Couchoud, 1994; Gottman, Katz, & Hooven, 1997; Kopp, 1989). Parents may also teach their children strategies for regulating emotion, such as taking a deep breath, thinking of something positive, or redirecting their child's attention from the source of the negative emotion, through emotion conversations.

It is clear that parents have a key role in promoting or hindering children's understanding of emotions and development of successful emotion regulatory abilities.

Yet, from a temperament perspective, characteristics of the child affect both how parents socialize emotions in their children and moderates the effects of specific parenting behaviors on child outcomes. For example, research with inhibited and uninhibited children has shown that there are various trajectories to conscience development and self-regulated compliance depending on the behaviors parents use. For inhibited toddlers, gentle discipline is related to internalization of rules and standards, whereas warm, responsive parenting behaviors promoted higher levels of internalization for uninhibited toddlers (Kochanska, 1995; 1997; Kochanska et al., 2007). Additional support has been found for the important role of parental warmth in promoting exuberant children's self-regulatory abilities by showing that exuberant children whose mothers used commands and prohibitive statements coupled with a positive tone were more likely to show effortful control later in childhood (Cipriano & Stifter, 2010). Finally, research investigating the interaction between temperamental inhibition and parenting behaviors has shown that the stability of inhibition and socially reticent behaviors appear to be associated with parenting behaviors that include control, derisive comments, and oversolicitousness (Rubin et al., 2002; Rubin, Hastings, Stewart, Henderson, & Chen, 1997). Taken together, this research suggests that various parenting behaviors can affect children's development of emotion self-regulation differently depending on the temperament of the child and the development of children's emotion self-regulation may be determined by both the behaviors that parents employ and the emotional tone that they display while using a given behavior.

Although the research on parental socialization of emotion regulation has provided a wealth of knowledge, the sum of past research has focused almost solely on

parental socialization of negative emotions and not positive emotions. It has been suggested that socializing children to recognize, appreciate, and regulate positive emotions may also be an important factor in children's adjustment (Fredrickson, 1998). More specifically, Fredrickson (1998) has pointed out that emotion cultivation should also be incorporated into research on parental socialization of children's emotions. For example, most parents would like their children to experience and express positive affect and therefore, it is believed that many parents spend a great deal of time engaging in activities that will provide a positive experience for their child. As the child matures, socialization goals may shift from directly inducing positive affect in their children to instilling in their children the ability to self-generate positive affect.

In this manner, successful parental socialization of positive emotions teaches children to use positive affect to regulate negative affect (Fredrickson, 1998; Fredrickson & Levenson, 1998; Fredrickson et al., 1998), which may be particularly important for children who are temperamentally negative, such as inhibited children. On the flip side, it is possible that parents also need to teach their children to down-regulate positive affect and excitable behavior, as intense positive affect is not appropriate in all contexts and situations. This could be especially true for exuberant children who are very positive, impulsive, and outgoing. Yet, this has seldom been addressed in research and it is not known how parents discuss positive emotions with their children, if and how parents assist in up- and down-regulating positive affect, and if the importance of this socialization varies by the temperament of the child. Thus, another aim of the current dissertation project was to investigate the role of parental socialization of positive emotions in their children, and in particular how parents assisted in down- and up-

regulating positive affect and excitable behavior, in the development of behavior problems and social behaviors.

### **Temperament and Emotion Regulation**

As stated previously, children's ability to self-regulate emotional arousal is a vital developmental skill and the emergence and progression of emotion regulation abilities is based on the interaction of parental socialization of emotion regulation and the child's temperamental proclivities (Calkins, 1994; Fox & Calkins, 2003). One important aspect of the role of temperament in the development of emotion regulation involves the predominant emotions associated with children's temperamental dispositions. For example, children differing in their levels of temperamental approach and inhibition, such as inhibited and exuberant children, are prone to experience and express different emotions that may require regulating. Furthermore, the mechanism by which children varying in their temperamental dispositions develop problem behaviors could be the inability to regulate the predominate emotion associated with their temperament. In other words, the relation between emotion regulation and behavior problems is believed to vary as a function of the type of emotion being regulated, such that dysregulated anger predicts externalizing behavior problems, whereas dysregulated fear predicts internalizing behavior problems (Rothbart & Bates, 1998).

It has been suggested that one of the greatest challenges for inhibited children, those characterized by their proclivity to experience and express high levels of negativity and fearfulness especially in novel situations, is to learn to regulate their high levels of fear (Fox, 1994; Fox, Henderson, Marshall, Nichols, & Ghera, 2005). Fox (1994) proposed that individual differences in behavioral inhibition are not only due to

inclination to experience fear in novel situations, but are also due to difficulty regulating fear. While inhibited children face the challenge of learning to regulate fear, exuberant children are confronted with the challenge of regulating anger/frustration. It has been hypothesized that in addition to exuberant children showing high levels of approach, positive affect, and impulsivity, they are also predisposed to experience high levels of anger/frustration (Derryberry & Reed, 1994; Rothbart & Bates, 2006; Rothbart, Derryberry, & Hershey, 2000) as limits are frequently placed on their attempts to approach aspects of their environment. In other words, exuberant children's temperament leads them to experience intense reactions of anger when their goals are blocked. For example, using parent reports of temperament, Rothbart and colleagues (e.g., Rothbart et al., 2001) have consistently found that anger reactivity loads onto both the temperament constructs of negative affectivity and surgency (a construct similar to exuberance) and surgency is positively related to childhood aggression. Therefore, as exuberant children are predisposed to experience intense anger/frustration, early confrontations in which rules of behavior are implemented may prove as important opportunities for these children to learn to regulate their levels of anger/frustration. If they have not acquired the ability to regulate anger/frustration by childhood, exuberant children may be at risk for negative outcomes, such as externalizing behavior problems, as their inability to regulate emotions may cause them to act inappropriately in social situations, even though at other times they are highly positive (e.g., Polak-Toste & Gunnar, 2006; Stifter et al., 2008).

In support of this position, Stifter and colleagues (Stifter et al., 2008) found that during a disappointing situation, exuberant children that displayed higher levels of

negative emotion and lower levels of positive/neutral emotion were rated by their parents as having higher levels of externalizing and total problem behaviors than exuberant children who could regulate their emotional expression. In addition, children rated as high in surgency and low in self-regulation have been found to display higher levels of aggressive behaviors, which in turn was associated with peer rejection (Gunnar, Sebanc, Tout, Donzella, & van Dulmen, 2003). Therefore, this research indicates that the development of anger regulation is a critical developmental task for exuberant children.

Although exuberant children are predisposed to show anger/frustration, they are also highly positive and frequently display outgoing, impulsive behavior. Recent research has shown the importance of anger regulation in adaptive developmental trajectories for exuberant children, but the role of down-regulating positive affect and excitable, high activity behavior is not widely known. While there is little research to support this, it is possible that the pathway between exuberant children and behavior problems could also depend on how flexibly these children are able to regulate not only their high levels of anger/frustration, but also their high levels of positive affect. Rydell and colleagues (Rydell, Berlin, & Bohlin, 2003) were among the first to address the role of regulating positive affect in children. Supporting their hypotheses, children exhibiting high levels of positive affect and low levels of positive affect regulation were more likely to show externalizing behaviors. Thus, while positive affect may serve as a protective factor for some children, problematic behaviors could develop for exuberant children who cannot regulate their intense levels of excitement.

On the other hand, the ability to up-regulate positive affect could support more adaptive outcomes for inhibited children, who exhibit high levels of negative affect and



low levels of positive affect. Unfortunately, existing research on the development of emotion regulation has almost exclusively focused on the role of the down-regulation negative affect and the importance of up-regulating positive affect is largely unknown. An exception to this exists in adult research that has shown the adaptive influence of up-regulating positive affect (e.g., Davidson, 2000; Fredrickson, 1998; 2001). For example, in Fredrickson's undoing hypothesis, positive emotions can serve to reverse the effects of the negative emotion (Fredrickson & Levenson, 1998; Fredrickson et al., 1998) and therefore, serve as a valuable means of regulating negative affect. In this sense, the undoing hypothesis is considering positive affect as regulating, instead of being regulated, in that positive affect are helping the individual to down-regulate negative affect.

Although it has not been directly tested, parents often teach their children to up-regulate positive affect frequently by encouraging them to reframe negative situations, think of a positive thought when encountering a negative thought or experience, etc., and as such, this could be a very useful tool for children to employ when they are experiencing negative affect. As research with adults have shown the adaptive nature of up-regulating positive affect, additional research is needed to investigate the importance of positive affect as regulating, especially in children with a proclivity toward experiencing negative emotions, such as inhibited children.

### **Aims of the Dissertation Project**

Across the two empirical papers, the current dissertation project aimed to explore the role of the intensity of positive affect in different contexts as protective or risk factors for early mental health for children varying in their temperamental styles. Further, this

dissertation project investigated if the importance of children's ability to up- and down-regulate positive affect in predicting children's behavior problems varied according to the temperamental disposition of the child, as well as exploring if the manner in which parents teach children these abilities serves as a mechanism by which children learn to successfully up- and down-regulate positive affect. There has been some speculation that children learning to up- and down-regulate positive affect could lower their risk for later behavior and psychological difficulties and the importance of children successfully learning to up- or down-regulate positive affect might depend on the temperamental style of the child. Moreover, very little is known regarding how parents socialize positive emotions and more specifically, how they teach their children to up- and down-regulate positive affect depending on the child's temperamental disposition. Thus, additional research is warranted since these topics appear to be promising lines of research toward a greater understanding of childhood mental health and seldom have been addressed in research. Despite the focus on negative affect historically, recent research has established that positive affect is related to both beneficial (e.g., Denham et al., 1990; Eisenberg et al., 1996; Isen & Reeve, 2005) and harmful (e.g., Putnam et al., 2006; Rothbart et al., 2001; Stifter et al., 2008) developmental skills and outcomes.

It has been proposed that the role of positive affect in promoting or hindering children's adaptive developmental trajectories could depend on the intensity of positive affect, the context that the emotions are expressed, and the temperamental disposition of the child. Further, the importance of children successfully learning to up- or down-regulate positive affect and behavior (i.e., high vigor of activity, excitable behavior) in lowering their risk for later behavior problems might vary depending on the

temperamental style of the child. Yet, this has seldom been addressed in research and the role of children's positive affect in predicting later mental health is widely unknown.

Providing a greater understanding at what intensity, in which context(s), and for which children positive affect is a protective or risk factor for early mental health, as well as the importance of up- or down-regulating positive affect and how parents assist in teaching these abilities depending on the temperamental style of the child, will be unifying themes across the two papers. Broadly, the aims of each paper are:

**Paper 1: To explore the intensity of positive affect and vigor of activity that 42-month old children of varying temperamental styles (e.g., exuberant, inhibited) display in different contexts aiming to elicit positive affect, and to examine the moderating role of positive affect on the relation between temperament styles and behavior problems and social behaviors longitudinally.** Children's positive affect frequently has been measured in laboratory temperament procedures, parent-child free play interactions, or by parent-report questionnaires. However, existing research has not established the role of context, by comparing positive affect across multiple tasks or the intensity of positive affect as predictors of children's behavior problems and social behaviors. Further, there is no known research investigating how children's temperamental style is related to the intensity of children's expressed positive affect in varying contexts. The role of positive affect in three different tasks varying in their hypothesized level of intensity, in combination with children's vigor of activity and temperamental styles, in predicting later behavior problems was investigated.

**Paper 2: To examine the moderating role of maternal behaviors on the relation between children's temperament style and the ability to up- and down-regulate positive affect. In addition, this paper tested if moderation found in the previous aim affected how children's ability to up- and down-regulate positive affect mediated the longitudinal relation between children's temperament and later behavior problems and social behaviors.** The ability to flexibly regulate affect and behavior to match the demands of various situations has been repeatedly found as an important developmental skill for children. Although the sum of past research has focused on the regulation of negative affect, it is possible that children also need to learn to successfully regulate positive affect. Further, the importance of up- or down-regulating positive affect may vary according to the temperament of the child. As parents are an important avenue in which children learn to regulate their affect and behaviors, the manner in which parents socialize their children to up- and down-regulate positive affect and approach behavior in order to comply with situational demands through specific parenting behaviors could vary according to the temperamental style of the child. The moderating role of maternal parenting behaviors and affective tone on the relation between children's temperament styles and their ability to up- and down-regulate positive affect was examined.

Further, existing research has shown the importance of children's inability to regulate negative affect is associated with both externalizing and internalizing behavior problems (Cicchetti et al, 1995; Eisenberg et al., 2001; Mullin & Hinshaw, 2007) and one important way in which children learn to regulate emotional arousal is through parental socialization of emotions. However, past research has focused largely on the role of

regulating negative affect and the importance of children learning to regulate positive affect in the development of behavior problems and social behaviors is widely unknown. Further, the importance of up-regulating or down-regulating positive affect in protecting children from risk for behavior problems could vary according to the child's temperament. To test this hypothesis, moderated mediation models were used to test if the moderation found in the previous aim affected how children's regulation of positive affect mediated the longitudinal relation between children's temperament and later behavior problems and social behaviors.

### **The Health and Positivity in the Preschool Years Project (HAPPY)**

Data was drawn from the Health and Positivity in the Preschool Years Project (HAPPY), which is an extension of the Toddlers Into Kindergarteners: Emotion Study (TIKES). TIKES is a longitudinal study of 125 children designed to study toddler temperament and emotional development. The original sample was recruited from birth records published in local newspapers. The majority of the families are Caucasian (89.6%) and middle class ( $M = 49.72$ ,  $SD = 10.72$  on the Hollingshead index). Families were screened when the children were 18-20 months old in an effort to oversample for toddlers that were high in maternal reports of fear and wariness. The measures used to screen participants included the Infant Toddler Social Emotional Assessment (ITSEA; Carter, Briggs-Gowan, Jones, & Little, 2003) and a 6-item wariness screening questionnaire inquiring about the child's fearfulness in novel situations that most children find fun and engaging (e.g., meeting a team mascot). Children were classified as high in fear if they scored at least 1 SD above the published mean on the ITSEA internalizing composite or scored 1 SD above the published mean on two of the ITSEA subscales

(inhibition to novelty, general anxiety, and separation distress), in addition to scoring at least 1 SD above the mean (established on the first 100 cases) on the wariness screening questionnaire. This approach resulted in half of the participants in the original TIKES sample being identified as high in fear. This original TIKES sample participated in a laboratory visit after the child's second birthday ( $M = 24.46$  months,  $SD = 0.47$  months) where children participated in a series of tasks that assessed children's emotional development and self-regulation, in addition to maternal parenting behaviors. Mothers also completed a series of questionnaires assessing child temperament, child emotional expression, parenting behaviors, and marital quality.

When the children were 42-months of age ( $M = 42.78$  months,  $SD = 0.69$ ), the TIKES sample and an additional 81 children were invited to participate in another laboratory visit. Of this potential sample, 124 children participated in the visit. This visit included a variety of tasks measuring children's emotional expression during tasks aimed to elicit positive affect, disappointment, and inhibitory control. Additionally, mothers and fathers participated in parent-child compliance and teaching tasks with their children. Parents also completed a series of questionnaires about their children's temperament, emotional expression, and behavior problems. Finally, when the children were 48-months old, parents were mailed an additional packet of questionnaires to assess their child's temperament and behavior problems.

### **Temperament Groups in the Dissertation Project**

Although most temperament research has focused on the relation between continuous temperament variables, a person-centered approach aiming to categorize individuals using constellations of several temperament variables also provides valuable

information about variations in children's temperamental dispositions. In each of the empirical papers in the current dissertation project, person-centered temperament groups were used as predictor variables in the analyses. Latent profile analysis was used to identify separate subgroups of children with similar patterns of approach/withdrawal, positive affect, and negative affect in a frequently used episode measuring children's behavioral inhibition (*Risk Room*). Latent profile analysis is similar to latent class analysis (e.g., Collins, Graham, Long, & Hansen, 1994), but uses continuous, rather than discrete, variables to identify groups of individuals with distinct profiles.

A central premise of latent profile analysis is that it assumes that person-oriented subgroups can be created such that members of a specific subgroup are more similar to each other than to members of a different subgroup (Bergman & Magnusson, 1997). Latent profile analysis is superior to other variable-centered grouping techniques in that it utilizes continuous indicators to create the latent profile solutions within a proper statistical model, as opposed to using arbitrary cutoffs to distinguish between and define subgroups in the population (Berman & Magnusson, 1997). Therefore, use of latent profile analysis does not necessitate the investigator to make any classification decisions where individuals may be forced into incorrect groups (Muthen, 2001). Further, latent profile analysis tests the prediction of the probability of membership in a given profile by other variables specified, while also estimating the latent profile solution. Finally, latent profile analysis uses a maximum likelihood estimation procedure thereby avoiding listwise deletion and instead assumes that all missing data is at random (Little & Rubin, 1987). Based on existing research (e.g., Putnam & Stifter, 2005), it was hypothesized that a three-profile solution (inhibited, exuberant, and normal approach) would emerge.

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## **STUDY 1:**

### **The Role of Intensity of Positive Affect and Vigor of Activity in Predicting Longitudinal Behavior Problems**

The construct of temperament, commonly conceptualized as reflecting constitutionally-based, relatively stable individual differences in reactivity and regulation, frequently has been the focus of promising research on children's developmental pathways toward adaptive and maladaptive outcomes, including psychopathology and social behaviors (e.g., Calkins & Fox, 2002; Rothbart & Bates, 2006). Multiple temperament traits have been studied for their role in children's developmental trajectories; however, due to the prominence of negative emotions in psychopathology, a majority of this research has focused broadly on temperamental negative affect, and more specifically, on inhibited and difficult temperament styles.

Despite the focus on negative emotions historically, more recent research from varying perspectives in the adult and child literatures underscores the importance of positive affect as a promising avenue toward a greater understanding of the development of psychopathology and social adjustment. Existing research has found that positive affect is associated with both beneficial (e.g., Denham, McKinley, Couchoud, & Holt, 1990; Eisenberg et al., 1996) and maladaptive (e.g., Putnam, Garstein, & Rothbart, 2006; Rothbart, Ahadi, Hershey, & Fisher, 2001) childhood behaviors; therefore, additional research is needed to illuminate the contexts in which positive affect is associated with risk or well-being. The current study aimed to explore the intensity of positive affect that 42-month old children of varying temperamental styles (e.g., exuberant, inhibited) displayed in different contexts designed to elicit positive affect, and to examine the



moderating role of intensity of positive affect and vigor of activity on the relation between temperament and behavior problems/social behaviors longitudinally.

### **Intensity of Positive Affect, Vigor of Activity, and Behavioral Adjustment**

Existing research on positive affect has shown that a predisposition towards childhood positive emotions, generally measured in terms of happy, cheerful mood, is related to a range of beneficial childhood skills and outcomes (e.g., Denham et al., 1990; Eisenberg et al., 1996). Multiple lines of research have shown the adaptive role of positive emotions across the lifespan, including the development of self-regulation (Isen & Reeve, 2005; Kochanska, Aksan, Penney, & Doobay, 2007; Putnam et al., 2006; Rothbart et al., 2001), lowering risk of internalizing behavior problems (Durbin, Klein, Hayden, Buckley, & Moerk, 2005; Shankman et al., 2005), and broadening cognitive, physical, and social abilities (Fredrickson, 1998; 2001; Fredrickson & Branigan, 2005).

Yet, the role of positive affect in children's developmental trajectories is not entirely clear as there is additional research linking this construct with maladaptive behaviors. Specifically, children who show more intense joy and are faster to show joy score lower on effortful control measures, a type of self-regulation (Kochanska, Murray, & Harlan, 2000), and laboratory observations of greater smiling and laughter predict later impulsivity and lower inhibitory control (Rothbart, Ahadi, & Hershey, 1994). It can be argued that the intensity of positive affect expressed by the child could influence how positive affect contributes to the development of children's behavior problems, or a lack thereof. In support of this position, parent-rated temperament measures typically show that low-intensity pleasure, but not high-intensity pleasure, loads with self-regulation (Putnam et al., 2006; Rothbart et al., 2001).

Indeed, the heterogeneous nature of positive affect has been used to explain the seemingly conflicting literature regarding this construct (Kochanska et al., 2007) and empirical findings regarding positive affect might depend on whether researchers focus their measurement of positive affect on the high approach, impulsive, and excitement elements or the lower intensity positive affect components, such as contentment and affiliation (Polak-Toste & Gunnar, 2006). Kochanska and colleagues (Kochanska et al., 2007) found that there were differential links between children's effortful control and positive emotionality either measured in laboratory temperament (e.g., Lab-TAB) procedures pulling for high approach behaviors or positive emotionality in mother-child interactions which were assumed to pull for children's affiliative, social positive emotions. High positive emotionality in mother-child interactions was positively related to children's effortful control, whereas children high in positive emotionality in Lab-TAB procedures displayed lower levels of effortful control.

Since most studies, excluding that of Kochanska and colleagues (Kochanska et al., 2007), have measured children's positive affect in only one type of situation (e.g., a laboratory temperament procedure (Lab-TAB), a parent-child free play interaction, or via parent-report questionnaire), additional research is needed to establish in which contexts the intensity of positive affect is related to various psychological and social outcomes. Given that it is widely unknown in which contexts and at what intensity positive affect is related to adaptive or maladaptive developmental trajectories for children, a goal of the current study was to examine whether the intensity of positive affect in different contexts was related to children's development of adaptive or maladaptive social and behavioral outcomes. Specifically, the current investigation examined children's intensity of

positive affect in three different contexts (*Candyland*, *Air Hockey*, and *Hippity Hop*) designed to vary on their level of intensity and engagement. Further, this study aimed to investigate if the intensity of positive affect in each context differentially predicted children's behavior problems and social behaviors longitudinally.

Another possible explanation for the mixed and seemingly contradictory findings related to positive affect as a predictor of children's developmental outcomes are child attributes that are frequently coupled with positive affect. For example, intense positive affect is commonly related to high approach (Gagne, VanHulle, Aksan, Essex, & Goldsmith, 2011; Rothbart, 1988) and high activity level (Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Rothbart, 1981; Rothbart et al., 2001). Therefore, it could be the combination of intense positive affect, intense vigor of activity, and high approach behaviors that put some children at risk for poor adjustment, whereas, low/moderate levels of positive affect, such as low-intensity pleasure, could be an adaptive quality for children. In support of this perspective, high-intensity pleasure and approach are frequently correlated with impulsivity and low self-regulation (Putnam et al., 2006; Rothbart et al., 2001) and children who show the combination of these behaviors and affect are at an increased risk for developing externalizing behaviors (Eisenberg et al., 1996; Putnam & Stifter, 2005). However, this hypothesis has yet to be fully tested and it is still widely unknown if it is the affect or behavior associated with positive affect (e.g., vigor of activity) that is serving as a risk factor for the development of potentially maladaptive childhood behaviors. Thus, the role of positive affect in childhood could depend on the context in which positive affect is expressed, as well as the behavior (e.g., vigor of activity) that is associated with positive affect. In an effort to answer this

important developmental question, another aim of the current study was to examine the interaction between children's intensity of positive affect and vigor of activity in different contexts designed to vary on their level of intensity and engagement, in predicting children's behavior problems and social behaviors longitudinally.

### **Temperament Styles and Positive Affect**

Variations in children's temperamental approach and withdrawal generate different emotions that children experience and express. Therefore, the association between intensity of positive affect and later adjustment also could be related to the child's other temperamental proclivities, which have been frequently discussed in the developmental literature in terms of temperamental styles. Much research on children's temperamental styles has been conducted regarding inhibited and exuberant children, which is based on children's reactions when faced with unfamiliar or novel situations and stimuli (e.g., Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, Clarke, Snidman & Garcia-Coll, 1984; Kagan, Reznick, & Snidman, 1987). Inhibited children are biologically predisposed to display high negative affect, wariness, and anxiety when presented with unfamiliarity, and are at risk for developing internalizing behavior problems (Biederman, Rosenbaum, Bolduc-Murphy, & Faraone, 1993; Garcia-Coll et al., 1984; Kagan, 1997). On the other hand, exuberant children seek out unfamiliar, arousing stimuli, quickly approach situations that would cause tentativeness in most children, show high levels of positive affect and low fear, and have a greater risk of developing externalizing behaviors (Fox et al., 2001; Putnam & Stifter, 2005; Stifter, Dollar, & Cipriano, 2011; Stifter, Putnam, & Jahromi, 2008).

As can be seen, inhibited and exuberant children are inclined to express varying emotions and behaviors, especially when faced with novelty. Thus, the temperamental disposition of the child may interact with the intensity of positive affect in varying situations in predicting children's behavior problems and social behaviors. However, there is limited research directly examining this hypothesis. For example, it is still unclear why some exuberant, positive children become socially outgoing and well-adjusted, whereas others develop aggression and conduct problems. Some have speculated that although exhibiting positive affect is typically thought to be an adaptive quality, temperamentally exuberant children's display of intense excitement coupled with energetic, impulsive behaviors might put them at risk for developing maladaptive behaviors (Polak-Toste & Gunnar, 2006). On the other hand, inhibited children are observed to express low levels of positive affect and are frequently overwhelmed in situations with novel individuals and activities, which possibly put them at risk for developing internalizing behavior problems (e.g., Biederman et al., 1990; 2001; Hirshfeld et al., 1992; Schwartz, Snidman, & Kagan, 1999). Thus far, research has largely focused on the role of children's expression of negative affect as a risk factor for maladaptive outcomes, whereas little is understood about the role of positive affect as a protective or risk factor for children of varying temperaments. In an effort to address this gap, the current study examined the interaction between children's temperamental style and intensity of positive affect and vigor of activity in each context in predicting later behavior problems and social behaviors.

## The Current Study

The current study had 4 aims. The first aim was to confirm that certain tasks elicit different levels of intensity of positive affect. These tasks have not been consistently used in the developmental literature; but, in designing this study, it was hypothesized that children would show the most intense positive affect in the *Hippity Hop* task, and the lowest intensity of positive affect in the *Candyland* task. The second aim of the current investigation was to test if a child's intensity of positive affect and vigor of activity in each task varied according to his/her temperamental style. Existing literature shows that exuberant children display high levels of approach, excitement, and activity in novel and engaging situations (e.g., Putnam & Stifter, 2005) and therefore, it was hypothesized that exuberant children would show a higher intensity of positive affect and vigor of activity in the *Hippity Hop* and *Air Hockey* tasks than other children. Although exploratory, it was also hypothesized that inhibited children would show higher levels of positive affect in the *Candyland* task than other children based on the literature demonstrating that inhibited children prefer calm, controlled, non-novel situations than exuberant children (e.g., Garcia-Coll et al., 1984), as well as the potential for exuberant children to be bored in this calm, low-intensity context.

The third aim of the current study was to investigate if the intensity of positive affect and vigor of activity predicted children's behavior problems and social behaviors at 48 months. It was hypothesized that in tasks aiming to elicit positive affect, children who showed extremely low levels of positive affect, or no positive affect, and low vigor of activity would be at an increased risk for developing internalizing behaviors, social withdrawal, and difficulties with peers, given the extensive literature demonstrating that

children who developed internalizing behavior problems were predisposed to show high levels of negative affect and low positive affect (e.g., Biederman et al., 2001; Schwartz et al., 1999). On the other hand, although positive affect alone is hypothesized to be a protective factor, based on the existing literature (e.g., Rydell, Berlin, & Bohlin, 2003; Stifter et al., 2008), it was hypothesized that the combination of high intensity positive affect and high vigor of activity, particularly in the *Hippity Hop* task, would put children at risk for developing externalizing behavior problems.

Finally, the fourth aim of the current study was to test if the intensity of positive affect and vigor of activity moderated the relation between children's temperamental style and later behavior problems and social behaviors. Given exuberant children's inclination to display of intense excitement, energetic, impulsive behaviors, and risk for developing externalizing behaviors (e.g., Stifter et al., 2008), it was hypothesized that exuberant children who showed high intensity positive affect and vigor of activity in a high-intensity task (*Hippity Hop*) would be at an increased risk of developing externalizing behavior problems. On the other hand, for inhibited children who are predisposed to show low positive affect and are at risk for developing internalizing behavior problems (e.g., Hirshfeld et al., 1992; Schwartz et al., 1999), based on the literature showing the protective factors of positive emotions (e.g., Durbin et al., 2005; Fredrickson, 1998) it was hypothesized that inhibited children who were able to show positive affect in the *Candyland* and/or *Hippity Hop* tasks, would be at a lower risk for developing internalizing behavior problems. It was less likely that inhibited children would display positive affect in the *Hippity Hop* task due to their predisposed inclination to dislike high-intensity, high approach activities, but inhibited children who did not at

least show any positive affect in the *Candyland* task were hypothesized to be at a higher risk of developing internalizing behavior problems.

## **Methods**

### **Participants**

Participants were 124 children who were drawn from a larger study of toddler temperament and emotional development. Typically developing toddlers and their families were recruited from published birth announcements. The majority of the families were Caucasian (89.6%) and middle class ( $M = 49.72$ ,  $SD = 10.72$  on the Hollingshead index). When the children were 42-months old ( $M = 42.78$  months,  $SD = 0.69$ ), the child, mother, and father participated in an additional laboratory visit. In addition, at age 48 months, families completed questionnaires assessing temperament and behavior problem symptoms. The current study will use data from the 42-month and 48-month assessments.

Families were screened when the children were 18-20 months old in an effort to oversample for toddlers that were high in maternal reports of fear and wariness. The measures used to screen participants included the Infant Toddler Social Emotional Assessment (ITSEA; Carter, Briggs-Gowan, Jones, & Little, 2003) and a 6-item wariness screening questionnaire inquiring about the child's fearfulness in novel situations that most children find fun and engaging (e.g., meeting a team mascot). Children were classified as high in fear if they scored at least 1  $SD$  above the published mean on the ITSEA internalizing composite or scored 1  $SD$  above the published mean on two of the ITSEA subscales (inhibition to novelty, general anxiety, and separation distress), in addition to scoring at least 1  $SD$  above the mean (established on the first 100 cases) on



the wariness screening questionnaire. This approach resulted in half of the participants in the original sample being identified as high in fear. This sample participated in a laboratory visit after the child's second birthday ( $M = 24.46$  months,  $SD = 0.47$  months) where children participated in a series of tasks that assessed children's emotional development and self-regulation, in addition to maternal parenting behaviors.

When the children were 42-months old, the families participated in an additional laboratory visit. In addition to the original sample, the 18-month screening questionnaires were reexamined to assess measures of positive emotions (reverse score of depression items), inhibition to novelty (reverse scored), and activity level/impulsivity in order to expand the original sample to include temperamentally exuberant children. Children were identified as exuberant if they met two of the three following criteria: 1  $SD$  above the mean on the activity/impulsivity subscale ( $M = 0.82$ ,  $SD = 0.45$ ), 1  $SD$  below the mean on the inhibition to novelty subscale ( $M = 0.89$ ,  $SD = 0.45$ ), and scored a 2 on the depression subscale ( $M = 1.95$ ,  $SD = 0.11$ ). This resulted in 81 children being identified as exuberant from 18-month maternal reports. Drawing both from the original sample seen at 24-months and the potential 81 additional children identified as exuberant, 124 children were available at the 42-month visit: of these children, 43 were identified as fearful, 42 as exuberant, and 39 children who did not meet the criteria for the other two groups were identified as average.

## **Procedures**

**42-month Protocol.** When the children were 42-months of age, they came to the laboratory with their mothers and fathers. Prior to the visit, mothers and fathers were mailed a packet including a consent form and several questionnaires to be completed and

brought to the visit. This 42-month visit included a variety of tasks measuring children's emotional expression and behaviors during tasks aimed to elicit positive emotions, disappointment, and inhibitory control. Additionally, mothers and fathers participated in parent-child compliance and teaching tasks with their children. Parents also completed a series of questionnaires about their children's temperament, emotional expression, and behavior problems. Central to the aims of the current study, children participated in a task to measure behavioral inhibition and three tasks hypothesized to elicit positive affect and excitement from the children.

In *Risk Room*, a widely used task to assess behavioral inhibition (Garcia-Coll et al., 1984; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1994), children were allowed to play in the room as they would like, while the mother sat in a chair in the room and was asked to remain as uninvolved as possible. The room contained a tunnel, stairs with a mattress next to it, a balance beam, a large black box with painted eyes and a mouth opening, and a gorilla mask placed on a wooden stand. After 3 minutes, the experimenter returned to the room and asked the child to interact with each of the 5 objects in the room.

Children also participated in three games hypothesized to elicit positive affect, as well as to vary in their levels of activity and intensity. In *Candyland*, the experimenter and child played together with the game of Candyland that is set up to ensure that the child wins. Once the experimenter and the child entered the room, the experimenter briefly explained the rules of the game to the child and the experimenter and the child took turns moving their game pieces around the board until the child won. The experimenter monitored the time throughout the game to ensure that the game ended as

closely to 2.5 minutes as possible. The *Air Hockey* task followed a similar structure, where the child and the experimenter played a game of miniature sized Air Hockey for 2.5 minutes. After the child and experimenter were seated at the table, the experimenter explained the rules of the game. While playing, the experimenter attempted to move the game at a quick pace to ensure that the child became as excited and engaged in the game as possible. Additionally, the experimenter spoke enthusiastically to the child and encouraged the child each time they scored a point.

Children also participated in a *Hippity Hop* task. In this task, the experimenter and the child played with hippity hops while the mother sat in the corner of the room in a chair. Hippity hops are large plastic balls (18 inches and 66 inches) with durable handles to provide stability that the child and experimenter sat on and bounced around the room. The experimenter, child, and mother entered the room where there were two hippity hops on the floor. The experimenter explained to the child how to safely bounce on the hippity hop. The experimenter bounced around the room with the child for two minutes encouraging the child to enjoy the toy, traverse the room, and to hop as high as they could. This task aimed to elicit high positive affect and vigor of activity.

**48-month Protocol.** When the children were 48-months old, parents were mailed an additional packet of questionnaires to assess their child's temperament and behavior problems. Directly related to the current dissertation project, mothers completed the *MacArthur Health Behavior Questionnaire* (HBQ, Armstrong & Goldstein, 2003; Essex et al., 2002).

## Measures

**42-month Measures.** The *Risk Room* task was coded using the traditional scoring from the Lab-TAB manual (Buss & Goldsmith, 2000; Goldsmith et al., 1994). The following behaviors were coded in the first portion of the task when the child was free to play with the toys on their own: the total time spent playing with each object (reversed in composite), the latency to touch first, second, and third object, and total number of objects touched (reverse scored). Additionally, every 5 seconds the tentativeness of play (0 = no tentativeness; 1 = mild/brief hesitation to engage in play; 2 = moderate hesitation/tentativeness, not engaged a significant portion of time; 3 = maximum tentativeness, child is not engaged in play) was coded. These 6 behaviors were used to create a wariness composite by standardizing each variable and taking the average where higher scores represented more wariness. Finally, vigor of activity (1 = no/extremely low vigor of activity; 2 = low vigor of activity; 3 = moderate vigor of activity; 4 = high vigor of activity; 5 = extremely high vigor of activity) was coded every 5 seconds. Children's vigor of activity scores were averaged across the entire task to create a mean vigor of activity score. Approximately 15% of the sample was double coded. The kappas for tentativeness of play and vigor of activity were .76 and .79, respectively. The reliability for the timing variables was calculated as intraclass correlations (ICC; Snijders & Bosker, 1999). They ranged from .81 to .94.

In addition, children's affect was coded in order to identify the degree to which the children displayed positive, neutral, and negative affect during in the first portion of the *Risk Room* task. Children's peak vocal tone, display of facial affect, and bodily indices of emotion were coded in 5 second intervals throughout the task. The intensity of

positive and negative affect was scored on 0-2 scales (0 = neutral affect; 1 = low/moderate positive/negative affect; 2 = high positive/negative affect). Kappas ranged from .75 to .91. These four variables, wariness, vigor of activity, positive affect, and negative affect were used in the current investigation's latent profile analysis to create temperamental profiles for children.

The *Candyland*, *Air Hockey*, and *Hippity Hop* tasks were coded continuously for children's facial affect. The purpose of this coding scheme was to identify the degree to which children displayed positive, neutral, and negative affect during the *Candyland*, *Air Hockey*, and *Hippity Hop* tasks. The second-by-second computerized coding system was based on Cole's (1986) procedures and definitions of facial action units in Ekman and Friesen's (1978) *Facial Action Coding Systems* (FACS). The intensity of positive affect was scored on a 0-3 scale (0 = neutral affect; 1 = low/moderate positive affect; 2 = high positive affect; 3 = laughter with or without positive affect). Similarly, the intensity of negative affect was scored on a 0-2 scale (0 = neutral affect; 1 = low/moderate negative affect; 2 = high negative affect). Reliability was assessed on 15% of the sample. Kappas were .79 for *Candyland*, .79 for *Air Hockey*, and .83 for *Hippity Hop*. Intensity scores were created by multiplying the proportion of time for each score by the value of the actual score and then summing the values. Therefore, the range of positive affect intensity scores was 0-4 and the range of negative affect intensity scores was 0-3. Given the current study's specific hypotheses that children's intensity of positive affect was influenced by context, the measures of intensity of positive affect were kept separate for the *Candyland*, *Air Hockey*, and *Hippity Hop* tasks.

Finally, the *Candyland*, *Air Hockey*, and *Hippity Hop* tasks were coded for children's vigor of activity. More specifically, children's general level of body motion and degree of energy exhibited during each task were coded. The codes were created to measure not only children's fine or gross motor movements, but also the manner in which the children moved (e.g., level of energy, excitability, style in which they moved) throughout the task. Children's vigor of activity was coded every minute on a 5-point scale (1 = no/extremely low vigor of activity; 2 = low vigor of activity; 3 = moderate vigor of activity; 4 = high vigor of activity; 5 = extremely high vigor of activity) measuring children level and intensity of activity. An intraclass correlations coefficient (ICC; Snijders & Bosker, 1999) was computed for 15% of the sample. The intraclass correlation coefficient was .87 for *Candyland*, .95 for *Air Hockey*, and .94 for *Hippity Hop*. The vigor of activity score for each task was an average across the entire task and was used as a task specific measure of vigor of activity in the current study.

**48-month Measures.** Directly related to the current dissertation project, mothers completed the *MacArthur Health Behavior Questionnaire* (HBQ, Armstrong & Goldstein, 2003; Essex et al., 2002), which is a 172-item questionnaire designed to measure mental and physical health, and social and academic competence within the past six months. Items for the mental health scales are rated on a 3-point scale (0 = "rarely applies", 1 = "somewhat applies", or 2 = "certainly applies") and items for the social functioning scales are rated on a 4-point scale (1 = "not at all like", 2 = "very little like", 3 = "somewhat like", or 4 = "very much like"). Published reliability estimates for the HBQ scales range from .65 - .81, with test-retest reliabilities ranging from .68-.78. Scale scores were calculated as averages of scores on each scale item.

Due to the current study's specific hypotheses regarding behavior problems and social behaviors, the internalizing, externalizing, peer relations, and social withdrawal scales were examined. The internalizing scale consists of 29 items, including subscales of depression (7 items; e.g., "cries a lot"), overanxious (12 items; e.g., "worries about things in the future"), and separation anxiety (10 items; e.g., "worries about being separated from loved ones"). The externalizing scale consists of 46 items, including subscales of oppositional defiant (9 items; e.g., "defiant, talks back to adults"), conduct problems (12 items; e.g., "disobedient at school"), overt hostility (4 items; e.g., "taunts and teases other children"), and relational aggression (6 items; e.g., "tries to get others to dislike a peer"). The social withdrawal scale (9 items) consists of the subscales of asocial with peers (6 items; e.g., "prefers to play alone") and social inhibition (3 items; e.g., "is shy with other children"). Finally, the peer relations scale (11 items) consists of the peer acceptance/rejection subscale (8 items; e.g., "has lots of friends at school") and the bullied by peers subscale (3 items; e.g., "is picked on by other children"). For the current sample, the internalizing alpha was  $\alpha = .78$ , the externalizing alpha was  $\alpha = .78$ , the social withdrawal alpha was  $\alpha = .86$ , and the peer relations alpha was  $\alpha = .70$ .

### **Person-oriented analytic approach: Latent profile analysis**

Although much temperament research has focused on the relation between continuous temperament variables, a person-centered approach aiming to categorize individuals using constellations of several temperament variables also provides valuable information about variations in children's temperamental dispositions. In the current investigation, person-centered temperament profiles were used as predictor variables in the analyses. Latent profile analysis was used to identify separate subgroups of children

with similar patterns of wariness, activity level, positive affect, and negative affect in a frequently used task measuring children's behavioral inhibition (*Risk Room*). Latent profile analysis is similar to latent class analysis (e.g., Collins, Graham, Long, & Hansen, 1994), but uses continuous, rather than discrete, variables to identify groups of individuals with distinct profiles. Based on existing research (e.g., Putnam & Stifter, 2005), it was hypothesized that a three-profile solution (inhibited, exuberant, and normal approach) would emerge.

To determine the optimal number of classes that best fit the data, a model with 2-5 profiles were fit in an effort to identify mutually exclusive and exhaustive subgroups of children with similar temperamental profiles. Determination of best model fit was evaluated with the following fit indices: Akaike information criterion (AIC), Bayesian information criterion (BIC), Sample-Size Adjusted BIC, and the *adjusted Lo-Mendell-Rubin likelihood ratio test (LMR-LRT)*. The model with the smallest BIC value and a significant LMR-LRT test, indicating that the addition of one more profile significantly improves model fit, was selected given its indication as the best model fit. However, in addition to the given fit indices, theoretical and empirical justification, interpretability, and model parsimony were taken into account in model selection (Bauer & Curran, 2003; Jung & Wickrama, 2008; Muthén, 2004). The model fit indices can be found in Table 1.1. Given that the lowest BIC value was combined with a significant LMR-LRT for the four-class model, this model was chosen as the best fitting model.

As can be seen in Figure 1.1, the first profile, labeled Inhibited, characterized the children ( $n = 37$ ) who showed low levels of activity (0.83 *SDs* lower than the sample mean) and positive affect (0.81 *SDs* lower than the sample mean) and high levels of



wariness (0.63 *SDs* higher than the sample mean) and negative affect (0.71 *SDs* higher than the sample mean). The second profile, labeled High Inhibited, characterized the children ( $n = 6$ ) who showed very low levels of activity (1.6 *SDs* lower than the sample mean) and positive affect (1.3 *SDs* lower than the sample mean) and very high levels of wariness (1.3 *SDs* higher than the sample mean) and negative affect (2.8 *SDs* higher than the sample mean). The third profile, labeled Exuberant, distinguished the children ( $n = 28$ ) who showed high levels of activity (1.0 *SDs* higher than the sample mean) and positive affect (1.5 *SDs* higher than the sample mean) and low levels of wariness (1.3 *SDs* lower than the sample mean) and negative affect (0.87 *SDs* lower than the sample mean). Finally, the fourth profile, labeled Average, characterized the children ( $n = 50$ ) who showed mean levels of activity, positive affect, wariness and slightly lower levels of negative affect (0.40 *SDs* lower than the sample mean). Although the four profile solution provided the best fit, due to the small number of children in the high inhibited profile ( $n = 6$ ), the similarity between the inhibited and high inhibited profiles, and the current studies specific hypotheses that three temperament groups would emerge, the inhibited and high inhibited profiles were combined. This left three distinct temperament profiles: Inhibited, Exuberant, and Average.

### **Analysis of Attrition and Missing Data**

It is increasingly acknowledged by developmental researchers that using listwise deletion to exclude participants who do not have complete longitudinal data may unnecessarily limit power and potentially bias parameter estimates (Howell, 2007; Widaman, 2006). Given that there was missing data at 48-months for 18 children, it was chosen to impute missing data for problem behavior and social behaviors at kindergarten.

Forty-two month study variables were compared with data from families who failed to complete the 48-month assessment and no significant differences on any variable were found. Additionally, to provide a more rigorous test the Missing Value Analysis in SPSS to measure the pattern of missing data was performed. This test revealed a non-significant Little's MCAR test,  $X^2 = 72.93$ ,  $df = 62$ ,  $p = .16$ , suggesting that missing data were likely missing at random. Therefore, following current recommendations in the literature for longitudinal data (Howell, 2007), multiple imputation for the missing data using the expectation/maximization likelihood treatment of missing data (i.e., the EM algorithm) was used. For the multiple imputations, ten data sets were generated and the results were combined using a mean composite for each variable.

## **Results**

### **Preliminary Analysis**

Sample means and standard deviations for the study variables are reported in Table 1.2. Intercorrelations were computed among all study variables prior to conducting our primary analyses. As shown in Table 1.3, a number of bivariate correlations were significant.

### **Context Effects of Positive Affect**

The first goal of the current investigation was to explore in which contexts children showed the highest and lowest intensities of positive affect. To address this aim, a repeated measures univariate Analysis of Variance model was conducted. As can be seen in Figure 1.2 and consistent with hypotheses, children showed the highest intensity of positive affect in the *Hippity Hop* task and the lowest intensity of positive affect in the *Candyland* task ( $F = 242.56$ ,  $p < .001$ ).

### **Temperament Variations in Positive Affect and Vigor of Activity by Task**

The second goal of the present study was to examine if a child's intensity of positive affect and vigor of activity in each task varied according to his/her temperamental style. Contrary to expectations, the repeated measures Analysis of Variance model showed that there were no significant differences in children's intensity of positive affect in each task according to their temperamental style,  $F = 0.48, p > .10$ , (See Figure 1.3). Likewise, there were no significant differences in children's vigor of activity in each task according to their temperamental style,  $F = 1.11, p > .10$ , (See Figure 1.4).

### **Predicting Social Behaviors and Behavior Problems**

The third and fourth aims of the current investigation were to examine if the intensity of positive affect and vigor of activity predicted children's social adjustment, as well as the moderating role of these variables on the relationship between children's temperamental styles and later behavior problems and social behaviors. To test the hypotheses associated with these aims, multiple regression analyses were conducted with children's 48-month internalizing and externalizing behavior problems, as well as the social behaviors of peer relations and social withdrawal, as the dependent variables. In each model, the predictor variables of temperament profiles, positive affect, and vigor of activity were entered into the first step. The interaction between children's temperament and positive affect, the interaction between temperament and vigor of activity, and the interaction between positive affect and vigor of activity were entered into the second step. In the final step, the three-way interaction between temperament, positive affect, and vigor of activity were added to address the fourth aim. Separate analyses were conducted

for data from the two tasks (*Candyland*, *Hippity Hop*), in which positive affect and vigor of activity from the same task were entered into the same model. Although three tasks (*Candyland*, *Air Hockey*, *Hippity Hop*) were examined in the first two aims of the study, only data from *Candyland* and *Hippity Hop* were considered in the remainder of analyses. As Aims 3 and 4 were to examine the interaction between temperament, positive affect, and vigor of activity in contexts where children's intensity of affect and behaviors varied the greatest, based on the above findings that children showed the lowest intensities of positive affect and vigor of activity in the *Candyland* task and the highest intensities of positive affect and vigor of activity in the *Hippity Hop* task, only these tasks were considered in the following analyses.

Dummy variables were created for the temperament profiles with the exuberant group as the reference. Interaction terms were created by centering the positive affect/vigor of activity variable and then multiplying them by the dummy variables. Following the procedures recommended by Aiken and West (1991), the simple effects of positive affect/vigor of activity were examined separately in the three temperament groups at 1 *SD* above and 1 *SD* below the mean of positive affect/vigor of activity. Follow-up tests of significant interactions between positive affect and vigor of activity were probed such that relations between positive affect and each dependent variable were examined at low (-1 *SD*), mean, and high (+1 *SD*) levels of vigor of activity, as set forth by Aiken and West (1991).

**Peer Relations.** The model examining children's temperament profiles and positive affect and vigor of activity in the *Candyland* task revealed a significant temperament x positive affect interaction,  $\beta = -0.38$ ,  $t = -2.36$ ,  $p < .05$ . Follow-up

analyses testing the simple effects of positive affect separately for the three temperament profiles indicated that this interaction was significant for both the exuberant,  $\beta = 0.48$ ,  $t = 2.34$ ,  $p < .05$ , and average children,  $\beta = 0.37$ ,  $t = 2.16$ ,  $p < .05$ . The higher the intensity of positive affect of exuberant and average children when playing Candyland, the more likely they were to be rated by their mothers as having better peer relations than children low in positive affect (See Figure 1.5). There were no other main or interaction effects.

The regression model testing the role of children's temperament and intensity of positive affect and vigor of activity in the *Hippity Hop* task revealed a significant main effect for vigor of activity,  $\beta = 0.54$ ,  $t = 2.20$ ,  $p < .05$ . Children high in *Hippity Hop* vigor of activity were more likely to be rated by their mothers as more successful in peer relations than children low in vigor of activity. There were no other main or significant interaction effects in this model.

**Social Withdrawal.** To test the relationship between children's temperament and intensity of positive affect and vigor of activity in the *Candyland* task in predicting social withdrawal, children's temperament profiles and *Candyland* positive affect and vigor of activity were modeled to predict maternal report of children's social withdrawal. A significant vigor of activity x positive affect interaction emerged in predicting children's social withdrawal,  $\beta = 0.27$ ,  $t = 2.70$ ,  $p < .01$ . Follow-up analyses of this interaction effect revealed that at low levels of vigor of activity, positive affect and social withdrawal were significantly related,  $\beta = -0.28$ ,  $t = -2.17$ ,  $p < .05$ . As can be seen in Figure 1.6, children low in vigor of activity who showed low intensity of positive affect when playing Candyland were more likely to be rated as high in social withdrawal by their mothers than children high in positive affect. At high levels of vigor of activity, positive

affect and social withdrawal were not significantly related. There were no other significant main or interaction effects.

In the model examining the relationship between temperament and *Hippity Hop* positive affect and vigor of activity in predicting social withdrawal, a significant temperament x vigor of activity was revealed,  $\beta = -0.25$ ,  $t = -1.80$ ,  $p < .05$ . Follow-up analyses for the simple slopes of this interaction showed that this relationship was significant for inhibited children,  $\beta = -0.76$ ,  $t = -3.12$ ,  $p < .01$ , but non-significant for exuberant and average children. As can be seen in Figure 1.7, inhibited children who were low in *Hippity Hop* vigor of activity were more likely to be rated as more socially withdrawn by their mothers than inhibited children high in vigor of activity. There were no other significant main or interaction effects in this model.

**Internalizing Behaviors.** To test the relationship between children's temperament and positive affect and vigor of activity in the *Candyland* task in predicting later internalizing behaviors, children's temperament profiles and *Candyland* positive affect and vigor of activity were modeled to predict maternal report of children's internalizing behavior problems. There was a significant main effect for intensity of positive affect in the *Candyland* task in predicting children's internalizing behavior problems,  $\beta = -0.40$ ,  $t = -1.85$ ,  $p < .05$ , suggesting that children who showed lower intensity of positive affect while playing *Candyland* with an experimenter were more likely to be rated as high in internalizing behavior problems six months later. There were no other significant main or interaction effects in this model.

There were no significant relations between *Hippity Hop* positive affect and vigor of activity, and children's temperament in the model predicting internalizing behavior problems.

**Externalizing Behaviors.** In the model testing children's temperament profiles and *Candyland* positive affect and vigor of activity as predicting children's later externalizing behaviors, a significant main effect emerged for positive affect,  $\beta = -0.34$ ,  $t = -2.17$ ,  $p < .05$ . This finding suggests that children who showed higher intensities of positive affect while playing *Candyland* with the experimenter were less likely to be rated by their mothers as high in externalizing behaviors. There were no significant interaction effects in this model.

The model that examined the role of children's temperament and *Hippity Hop* positive affect and vigor of activity in predicting children's externalizing behaviors revealed a significant 3-way interaction between temperament, positive affect, and vigor of activity,  $\beta = 0.30$ ,  $t = 1.93$ ,  $p < .05$ . Follow-up analyses for this interaction were conducted following Aiken and West's (1991) recommendations and showed that the relationship between positive affect and vigor of activity was marginally significant for exuberant children,  $\beta = 0.36$ ,  $t = 1.80$ ,  $p < .10$ . At low levels of vigor of activity ( $-1 SD$ ) there was a significant relation between *Hippity Hop* intensity of positive affect and externalizing behaviors for exuberant children,  $\beta = -0.90$ ,  $t = -2.61$ ,  $p < .05$ . This relationship was non-significant at high levels of *Hippity Hop* vigor of activity. Exuberant children who showed higher intensity of positive affect and low vigor of activity, were less likely to be rated as high in externalizing behaviors than exuberant children who were low in both positive affect and vigor of activity (Figure 1.8). This

relationship was non-significant for average and inhibited children. There were no other significant main or interaction effects.

**Post Hoc Analyses.** Given the marginally significant relationship between *Hippity Hop* intensity of positive affect and vigor of activity and children's externalizing behaviors and the fact that there were specific hypotheses regarding the role of exuberant children's positive affect and vigor of activity in this task, it was decided to further investigate which aspects of children's externalizing behaviors were related to their affect and behaviors in the *Hippity Hop* task. Therefore, four additional regression models were conducted to examine the externalizing subscales of conduct problems, oppositional defiant, relational aggression, and overt hostility.

**Conduct Problems.** A significant 3-way interaction between children's temperament, and *Hippity Hop* intensity of positive affect and vigor of activity emerged in the model examining conduct problems as a dependent variable,  $\beta = 0.35$ ,  $t = 2.22$ ,  $p < .05$ . Follow-up analyses of this interaction revealed that the relationship between positive affect and vigor of activity was significant for exuberant children,  $\beta = 0.57$ ,  $t = 3.02$ ,  $p < .01$ , marginally significant for average children,  $\beta = -0.30$ ,  $t = -1.75$ ,  $p < .10$ , and non-significant for inhibited children. At low levels of vigor of activity ( $-1 SD$ ) there was a significant relationship between *Hippity Hop* intensity of positive affect and conduct problems for exuberant children,  $\beta = -0.60$ ,  $t = -1.81$ ,  $p < .05$ . At high levels of vigor of activity ( $+1 SD$ ) there was also a significant relationship between *Hippity Hop* intensity of positive affect and conduct problems for exuberant children,  $\beta = 0.50$ ,  $t = 1.80$ ,  $p < .05$ . As can be seen in Figure 1.9, this interaction suggests that for exuberant children who are low in vigor of activity, increases in intensity of positive affect put them at a lower risk of



being rated high in conduct problems, whereas for exuberant children who were high in vigor of activity, increases in positive affect put them at a higher risk of developing conduct problems. There were no other significant main or interaction effects.

***Oppositional Defiant.*** A model was run to examine children's temperament and *Hippity Hop* positive affect and vigor of activity in predicting children's later oppositional defiant behaviors. A marginally significant temperament x positive affect interaction term was revealed,  $\beta = -0.31$ ,  $t = -1.80$ ,  $p < .10$ , and follow-up analyses indicated that this relationship was significant for exuberant children,  $\beta = -0.51$ ,  $t = -1.78$ ,  $p < .05$ . As can be seen in Figure 1.10, exuberant children who showed high intensity of positive affect were rated as lower in oppositional defiant behaviors than exuberant children who were low in positive affect. There were no other significant main or interaction effects in this model.

There were no significant main or interaction effects for the other externalizing behavior problem subscales (Overt Hostility, Relational Aggression).

## **Discussion**

Although positive affect has received attention recently as a promising avenue of research, it is still widely unknown how this construct serves as a protective or risk factor in the development of children's behavior problems and social adjustment. The role of positive affect in promoting or hindering children's adaptive developmental trajectories could depend on the intensity of positive affect, the context that positive affect is expressed, and the temperamental disposition (e.g., exuberant, inhibited) of the child. However, these hypotheses have not yet been tested fully and additional research is warranted since this topic appears to be important toward increasing our understanding of

childhood mental health. The central goals within the current investigation were (1) to explore the role of the intensity of positive affect that children of varying temperamental styles (e.g., exuberant, inhibited) display in different contexts in predicting later social and problem behaviors, and (2) to examine the moderating role of intensity of positive affect and vigor of activity on the relation between temperament and behavior problems and social behaviors longitudinally.

The first step in determining how the intensity of positive affect and vigor of activity that children of varying temperamental styles express influences the development of later social and problem behaviors was to create a valid series of tasks to capture variations in children's intensity of positive affect and vigor of activity. Consistent with hypotheses related to the first aim of the present study, results did show significant differences in children's intensity of positive affect across the three contexts, where children displayed the lowest intensity of positive affect in the *Candyland* task and the highest intensity of positive affect in the *Hippity Hop* task. However, counter to the current study's hypotheses, children's intensity of positive affect across the three tasks did not vary according to the child's temperamental style.

Consideration of the characteristics of exuberant and inhibited children may explain, in part, why this association did not exist. It has been shown repeatedly that on parental report questionnaires, the low pleasure scale does not load onto the surgency factor, which is very similar to high exuberance (e.g., Rothbart et al., 2001). Therefore, it is likely that while exuberant children revel in highly stimulating play, they find low- to moderate-intensity situations, like the *Candyland* and *Air Hockey* tasks, aversive and boring. On the other hand, inhibited children seem to prefer these calm, controlled, non-

novel situations (e.g., Garcia-Coll et al., 1984) and thus, showed similar levels of positive affect as exuberant children. Methodological issues may also provide insight into the lack of significant differences in exuberant and inhibited children's intensity of positive affect in the *Hippity Hop* task. Given exuberant children's inclination to engage in swift and impulsive movement, as evidenced in this investigation's results, it is likely that the current study's coding system was better able to capture inhibited children's pleasure while they calmly engaged in the task, whereas exuberant children were intensely moving around the room, making it was more difficult to capture their facial expressions. Thus, future research is warranted to examine if there are truly no significant temperamental differences in children's intensity of positive affect in highly engaging situations.

Corroborating the extant literature, the present study provides much support for the adaptive role of positive affect in predicting childhood adjustment. Regardless of children's temperamental profile, children who displayed high intensity positive affect in a low-intensity game were less likely to be rated by their mothers as high in internalizing *and* externalizing behavior problems. Support for the constructive role of positive affect was also revealed for children of specific temperamental profiles. Exuberant and average children who showed higher intensity of positive affect in the *Candyland* task were rated as more successful in peer relations than exuberant and average children that displayed lower intensity of positive affect. In addition, exuberant children who expressed higher positive affect in the *Hippity Hop* task, a task that involved greater intensity and engagement, were at a lower risk of developing oppositional defiant behaviors than exuberant children who showed lower positive affect.

These findings collectively speak to and substantiate the existing research demonstrating the adaptive nature of positive affect for children of varying temperamental styles (e.g., Durbin et al., 2005; Eisenberg et al., 1996). Importantly, these results also extend our understanding of positive affect for children of specific temperamental styles, especially exuberant children. Although exuberant children are socially outgoing (Rimm-Kaufman & Kagan, 2005; Rubin, Coplan, Fox, & Calkins, 1995), which is typically believed to be a positive quality, they are also at risk for developing aggressive behaviors (Gunnar, Sebanc, Tout, Donzella, van Dulmen, 2003), as well as externalizing behavior problems (Berdan, Keane, & Calkins, 2008; Stifter et al., 2008). Further, the importance of developmental research identifying the mechanism by which these different developmental pathways occur for exuberant children has been highlighted by many (e.g., Polak-Toste & Gunnar, 2006). The findings from the current investigation expand on the existing literature by highlighting the role of exuberant children's predisposition toward experiencing and expressing positive affect in lowering their risk of peer rejection and showing oppositional defiant behaviors.

Another premise of the current investigation was that children's vigor of activity would influence whether children's intensity of positive affect served as a protective or risk factor. More specifically, it was hypothesized that moderate to intense positive affect would be a protective factor for children low in vigor of activity, but when coupled with high vigor of activity, intense positive affect would represent a liability to the child. Multiple findings in the present study provide support for this position. First, children who showed low vigor of activity and low intensity of positive affect in the *Candyland* task were at the greatest risk of being rated as high in social withdrawal, whereas

increases in intensity of positive affect for children low in vigor of activity significantly reduced the likelihood of being socially withdrawn. This finding corresponds with much of the existing research showing that children who are low in approach and activity, but high in negative affect and withdrawal, are at risk for developing poor social behaviors, such as being socially withdrawn (Dollar & Buss, under review; Garcia-Coll et al., 1984). In addition, social withdrawal has been associated with depressed affect from early in childhood through adolescence (e.g., Coplan, Girardi, Findlay, & Frohlick, 2007; Eisenberg, Shepard, Fabes, Murphy, & Guthrie, 1998; Prior, Smart, Sanson, & Oberklaid, 2000).

This finding extends existing research by suggesting that if children high in negative affect and withdrawal are able to learn to express positive affect, even in low-intensity situations, their risk of being socially withdrawn and having significant social difficulties will be greatly lowered. As much attention has been given toward the importance of inhibited children learning to regulate their distress and fear in order to reduce their risk for developing internalizing behaviors and social withdrawal (e.g., Buss, 2011; Fox, 1994; Hill-Soderlund & Braungart-Rieker, 2008), it is noteworthy that this study suggests that it is not only the presence of negative affect, but also the absence of positive affect and vigor of activity that put children at risk for developing social withdrawal. On the other hand, increases in positive affect appear to serve as a protective factor for children who are low in vigor of activity. Given that negative affect was not directly assessed in the current study, additional research is needed to examine the role of both positive and negative affect in the development of children's socially withdrawn behaviors.

Further support for the adaptive quality of positive affect when coupled with low vigor of activity was provided for exuberant children. In particular, increases in intensity of positive affect for exuberant children who were low in vigor of activity in the *Hippity Hop* task significantly lowered their risk of externalizing behavior problems, specifically conduct problems. As previously discussed, recent research has aimed to understand the pathways toward exuberant children's social and psychological adjustment or difficulties (Dollar & Stifter, under review; Gunnar et al., 2003; Stifter et al., 2008). Although much of this research has focused on the importance of children's expression of negative emotions, particularly anger, the current findings speak to the importance of exuberant children's ability to use their inclination to find pleasure in novel, highly stimulating games, which may serve as a protective factor when not coupled with high levels of vigorous activity. On the other hand, although intense positive affect appears to be an adaptive quality for exuberant children low in vigor of activity, findings from this investigation indicate that the combination of intense positive affect and high vigor of activity is a risk factor for the development of exuberant children's conduct problems. This substantiates the argument that although exhibiting positive affect is frequently thought to be a beneficial quality, temperamentally exuberant children's inability to restrain their vigorous activity when excited might represent a liability to the child (Polak-Toste & Gunnar, 2006).

Existing research aimed at understanding the pathways by which exuberant children either develop socially appropriate behaviors or aggressive, externalizing behaviors has recently pointed to the importance of exuberant children's ability to regulate their predisposed high levels of anger (e.g., Dollar & Stifter, under review;

Stifter et al., 2008). However, the findings from the current study also suggest that in addition to their ability to regulate their inclination towards anger, it is important for exuberant children to acquire the capacity to regulate their impulsive, highly active behaviors, while preserving their intensity of positive affect. Research has demonstrated that high-intensity pleasure and approach are frequently related to low levels of self-regulation (Putnam et al., 2006; Rothbart et al., 2001) and children who are predisposed to display a combination of these behaviors and affect are at an increased risk of developing externalizing behavior problems (e.g., Eisenberg et al., 1996; Stifter et al., 2008). Consequently, based on existing research and the current study's findings it may be especially important for exuberant children to learn to regulate their intense, vigorous behavior due to their predisposition toward reward-seeking and high activity and approach.

This study greatly adds to the existing literature by showing that the role of positive affect in children's social and behavioral adjustment largely depends on children's vigor of activity, as well as their temperamental style. Yet, there are a few notable limitations worth mentioning. First, this sample was homogeneous and the generalizability of the current study's findings is limited to a low-risk, predominantly white sample. In addition, caution should be exercised in interpreting the parent-reported outcome measure used within the current investigation. Mothers might show bias in rating their children's characteristics (Kagan, 1998) and these measures are screening instruments, not clinical assessments, used to identify behaviors that may put children at risk for problem behaviors. Related to this issue, mothers' report of children's behavior problems in the current study were relatively low, likely due to both the low-risk nature

of the sample and the young age of the children. Also, although by definition this study is longitudinal, the primary research questions of this study should be examined across a longer period of time. This would address many of the limitations of the current investigation, including a question regarding the direction of effects and children's stability of and prevalence of reported behavior problems.

In conclusion, the current study adds to the growing literature regarding the adaptive role of positive affect in children's development. This investigation shows that the role of positive affect in predicting children's adjustment depends on the intensity of positive affect, the context that positive affect is expressed, and the temperamental disposition (e.g., exuberant, inhibited) of the child. In addition, there was evidence that children's vigor of activity, especially in high-intensity situations, provided important information regarding the role of positive affect in predicting children's developmental outcomes and should continue to be measured in combination with positive affect.



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*Table 1.1. 42-month latent profiles of Risk Room affect and behavior*

	AIC	BIC	Adj. BIC	Adj. <i>p</i> LMR LRT
2-class	512.94	549.29	503.45	0.04
3-class	446.07	496.39	439.48	0.03
4-class	406.40	470.01	397.98	0.04
5-class <sup>a</sup>				

Note. AIC = Akaike information criterion; BIC = Bayesian information criterion; Adj. BIC = Sample-Size Adjusted ; BIC; Adj. LMR LRT = Adjusted Lo-Mendell-Rubin likelihood-ratio test.

<sup>a</sup>Class 5 did not identify a fit.

Table 1.2. Descriptive statistics for study variables

	Mean	SD	Range
<b>Predictors</b>			
<i>Candyland</i> Positive Affect	0.30	0.24	0.00-0.96
<i>Air Hockey</i> Positive Affect	0.80	0.44	0.02-1.93
<i>Hippity Hop</i> Positive Affect	1.40	0.60	0.00-2.78
<i>Candyland</i> Vigor of Activity	2.23	0.81	0.00-4.00
<i>Air Hockey</i> Vigor of Activity	2.50	1.01	0.00-4.00
<i>Hippity Hop</i> Vigor of Activity	2.32	0.96	0.00-4.00
<b>Outcomes</b>			
Internalizing Behaviors	0.25	0.16	0.00-0.83
Externalizing Behaviors	0.28	0.20	0.00-1.04
Social Withdrawal	0.64	0.39	0.00-1.92
Peer Relations	3.26	0.30	2.31-3.50

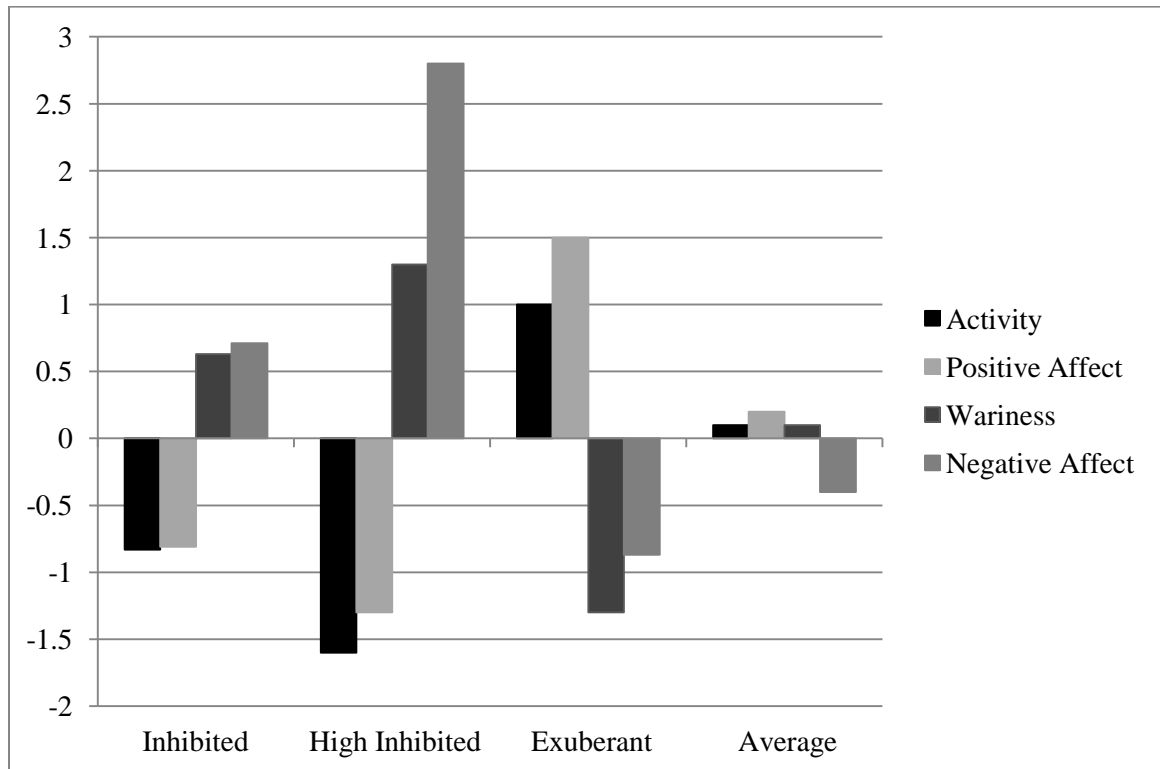
Table 1.3. Bivariate correlations among study variables

	1	2	3	4	5	6	7	8	9	10
1. <i>Candyland</i> Positive Affect	--									
2. <i>Air Hockey</i> Positive Affect	.48***	--								
3. <i>Hippity Hop</i> Positive Affect	.23**	.41***	--							
4. <i>Candyland</i> Vigor of Activity	-.01	-.06	.15	--						
5. <i>Air Hockey</i> Vigor of Activity	.16 <sup>+</sup>	.35***	.27**	.20*	--					
6. <i>Hippity Hop</i> Vigor of Activity	.02	-.01	.44***	.38***	.27**	--				
7. Internalizing Behaviors	-.10	.11	.12	.09	-.02	-.09	--			
8. Externalizing Behaviors	-.15	.04	.03	.01	.08	-.07	.49***	--		
9. Social Withdrawal	-.05	.07	.02	-.05	-.09	-.25**	.47***	.19*	--	
10. Peer Relations	.10	.00	.16	.12	.16	.36**	-.38***	-.32***	-.44***	--

Note. \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; <sup>+</sup> $p < .10$



Figure 1.1. 42-month profiles of temperament.



*Figure 1.2.* Mean differences in intensity of positive affect by task.

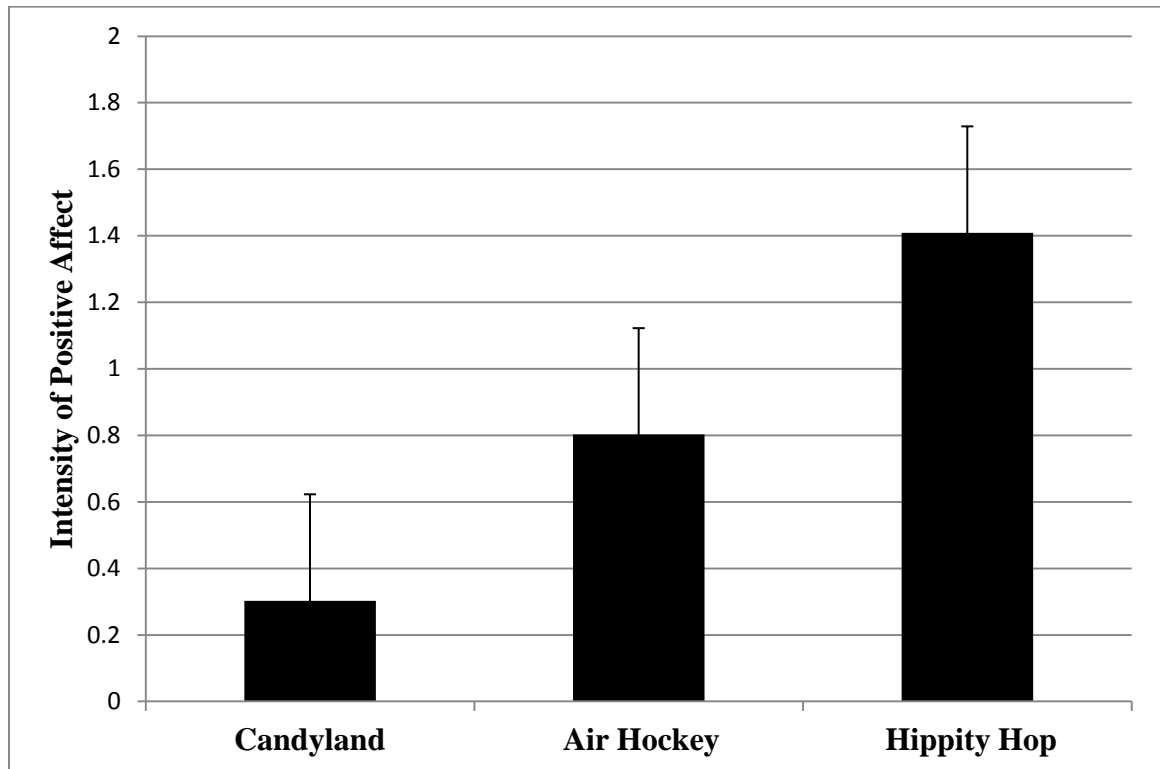


Figure 1.3. Mean differences in positive affect by task and temperament style.

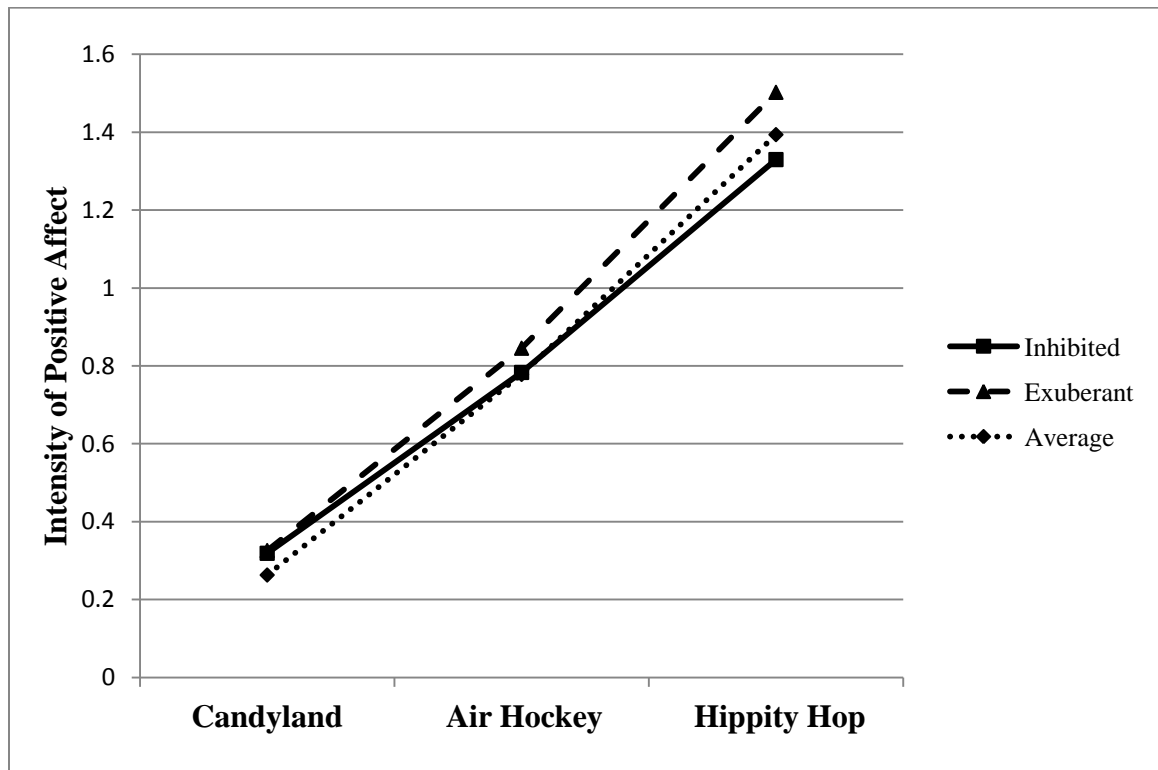


Figure 1.4. Mean differences in vigor of activity by task and temperament style.

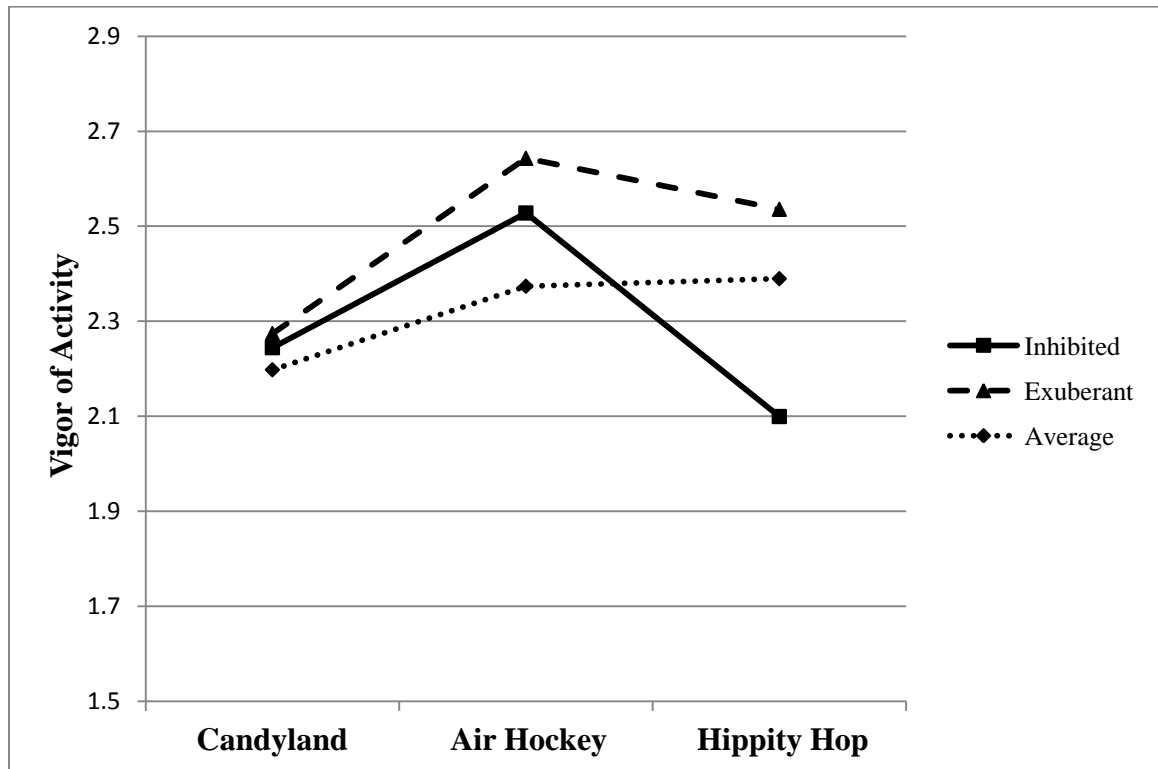


Figure 1.5. Interaction of temperament and *Candyland* positive affect predicting parent-reported peer relations.

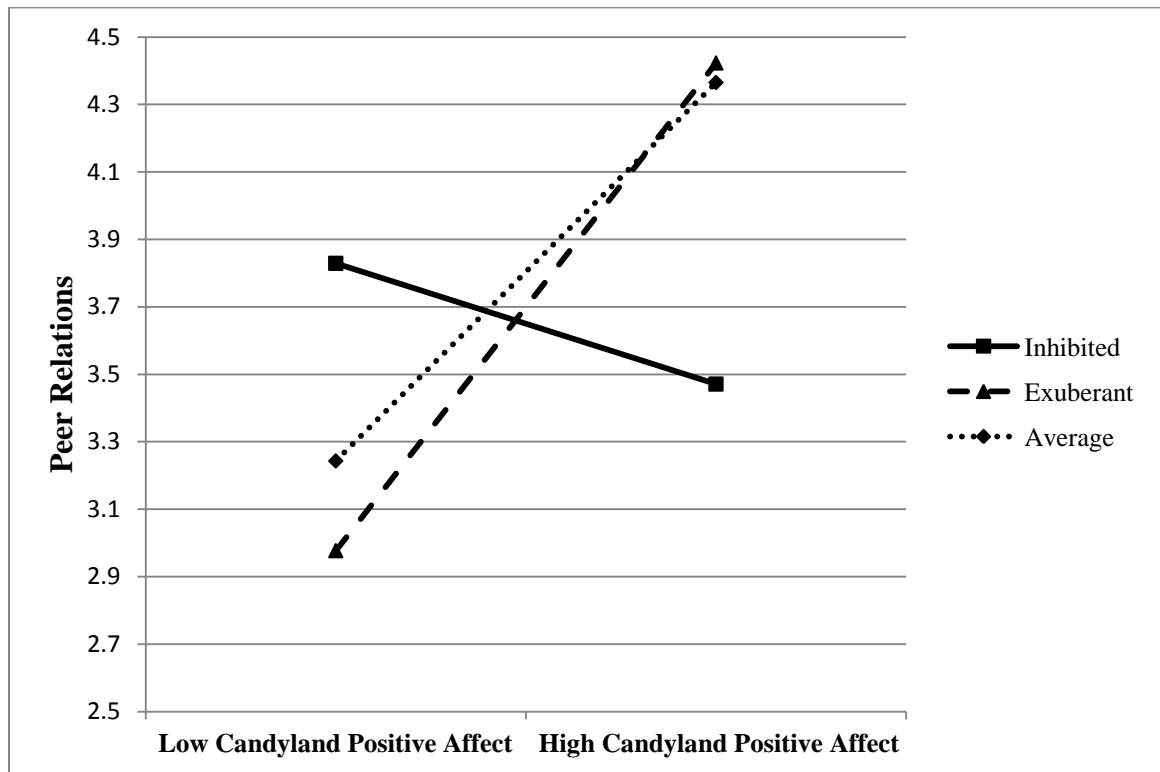


Figure 1.6. Interaction of *Candyland* positive affect and vigor of activity predicting parent-reported social withdrawal.

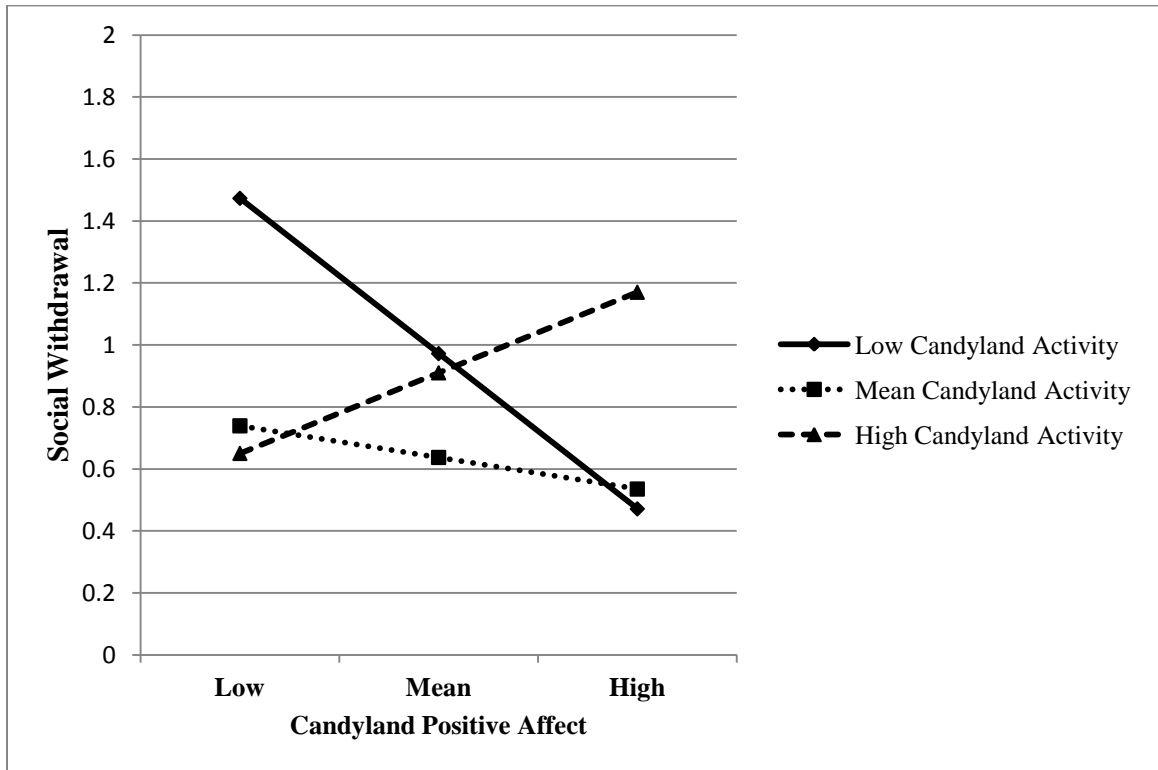


Figure 1.7. Interaction of temperament and *Hippity Hop* vigor of activity predicting parent-reported social withdrawal.

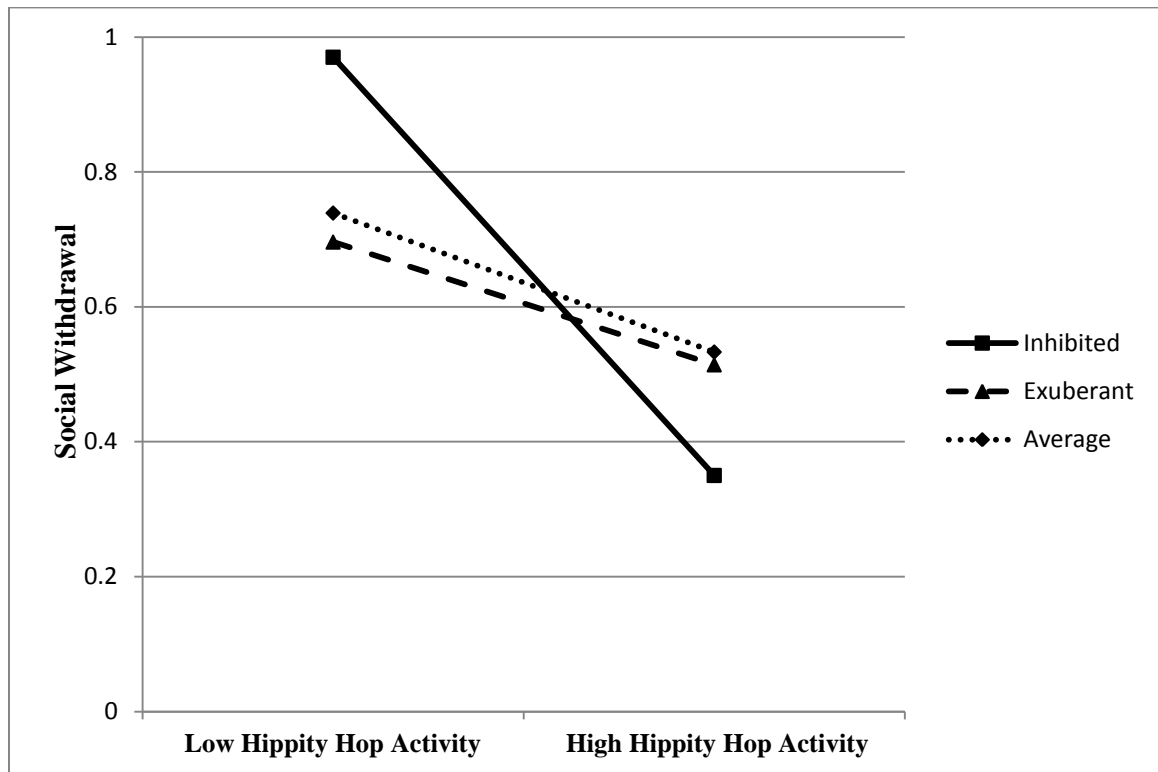


Figure 1.8. Interaction of *Hippity Hop* positive affect and vigor of activity for exuberant children predicting parent reported externalizing behaviors.

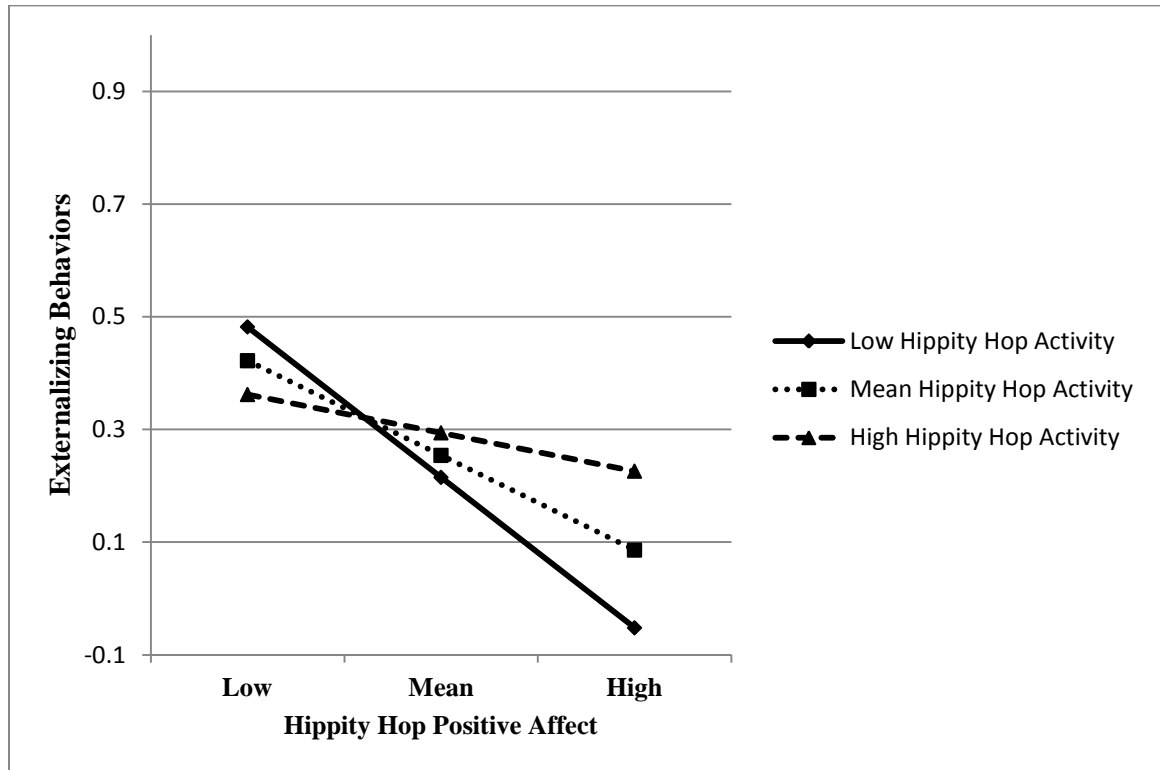




Figure 1.9. Interaction of *Hippity Hop* positive affect and vigor of activity for exuberant children predicting parent-reported conduct problems.

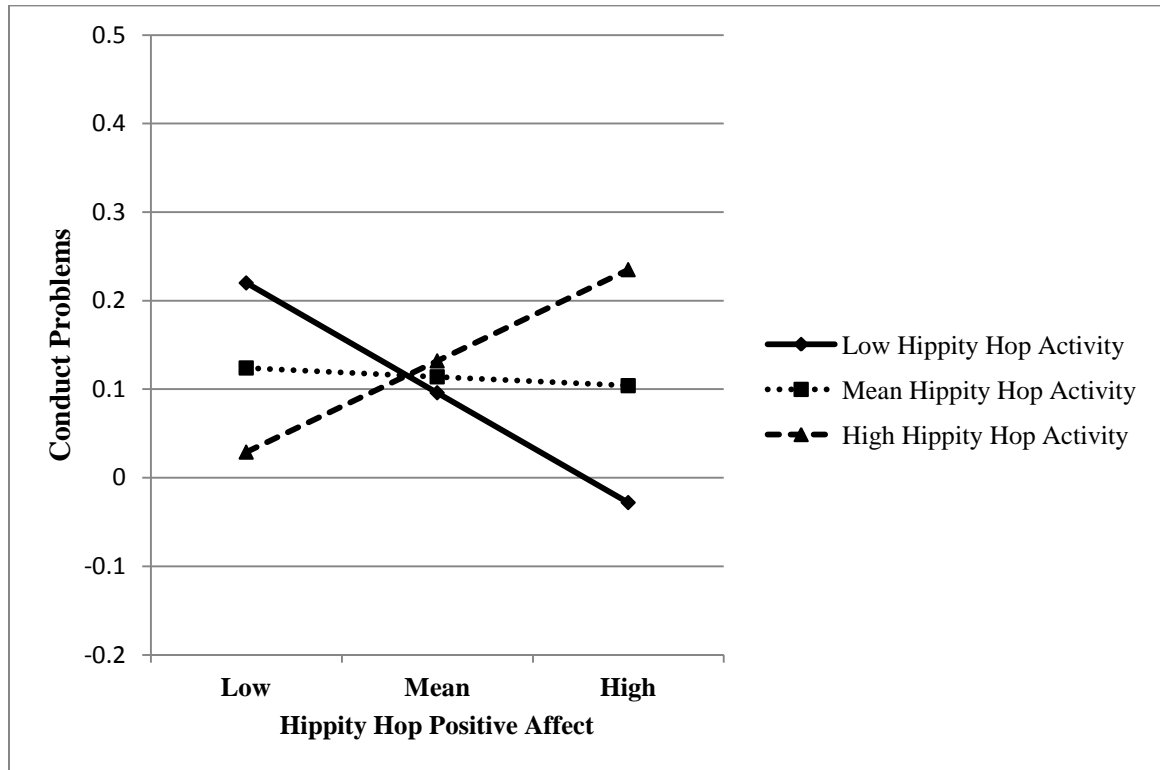
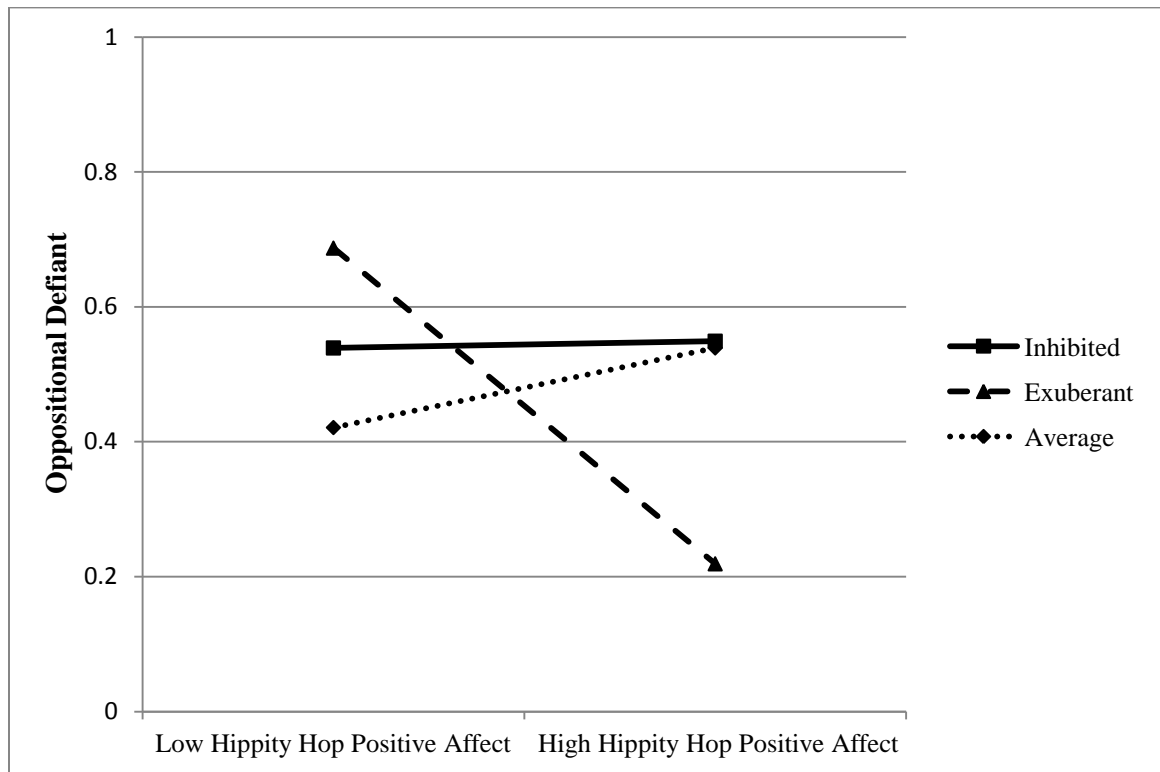


Figure 1.10. Interaction of temperament and *Hippity Hop* positive affect predicting parent-reported oppositional defiant behaviors.



## **STUDY 2:**

### **The Role of Children's Positive Affect Self-Regulation and Maternal Parenting Behaviors: Relations to Child Temperament and Behavior Problems**

Children's ability to flexibly control emotional arousal, or emotion self-regulation, is a central developmental task in early childhood (Kopp, 1982, 1989; Thompson, 1994) and individual differences in emotion self-regulation are believed to develop through a complex interaction of intrinsic (e.g., temperament) and extrinsic (e.g., parenting behaviors) factors across early development (Thompson, 1994; Fox & Calkins, 2003). The study of emotion self-regulation has burgeoned in the last few decades as research has shown repeatedly that children who develop maladaptive patterns of emotion regulation are at risk for developing early mental health problems (Cicchetti, Akerman, & Izard, 1995; Eisenberg et al., 2001; Mullin & Hinshaw, 2007). Despite the fact that the development of emotion regulation is a critical milestone for children's adaptive outcomes, the sum of past research has focused on the regulation of negative affect and very little is known about the importance of up- or down-regulating positive affect.

There has been some speculation that children learning to regulate positive affect could lower their risk for later behavioral and psychological difficulties (e.g., Polak-Toste & Gunnar, 2006) and that the importance of children successfully learning to up- or down-regulate positive affect might depend on the temperamental style of the child. Moreover, even though it is widely agreed that parents play an important role in children's learning successful methods of regulating emotions, little is understood about how parents socialize positive emotions and more specifically, how they teach their children to regulate positive affect depending on the child's temperament. The goals of

the current study were to investigate if children's temperamental styles were directly related to their ability to regulate positive affect and related behavior, as well as exploring if children's ability to up- and down-regulate positive affect was related to the socialization behaviors that parents employ. Further, this study aimed to examine the role of children's temperament and ability to regulate positive affect, as moderated by maternal parenting behaviors, in predicting children's later behavior problems and social behaviors.

### **Temperament and Behavioral Adjustment**

Within the developmental literature, considerable attention has been given to the ways in which particular temperament traits or styles can enhance or buffer a child's risk for psychopathology and maladaptive social outcomes (Frick & Morris, 2004; Nigg, 2006; Rothbart, Posner, & Hershey, 1995). In particular, much research has been conducted with children who vary on their reactions when faced with novel situations and stimuli (e.g., Garcia-Coll, Kagan, & Reznick, 1984; Kagan, Reznick, & Snidman, 1987) and from this research two distinct behavioral profiles were identified. When presented with unfamiliarity, inhibited children display high negative affect, wariness, and low positive affect (Garcia-Coll et al., 1984; Kagan, 1997), whereas exuberant children show low inhibition and negative affect, and high approach and positive affect toward novel stimuli (Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Putnam & Stifter, 2005).

The results of multiple longitudinal studies have provided much support regarding the role of children's temperamental styles as a predictor of later behavior problems and social behaviors. Children who are consistently labeled as inhibited are more likely to

develop internalizing behavior problems (Biederman et al., 2001; Schwartz, Snidman, & Kagan, 1999), as well as social withdrawal (Garcia-Coll et al., 1984). Inhibited children have also been found to be lower in social competence (e.g., Fox et al., 1995), likely because they avoid or withdraw from social situations which heighten their fear. However, the specific mechanisms by which inhibited children develop internalizing and social difficulties is still largely unknown, and therefore it is unclear why some inhibited children develop appropriate social behaviors while other develop socially withdrawn behaviors and internalizing difficulties. On the other hand, existing research has demonstrated that exuberant children are more socially outgoing (Rimm-Kaufman & Kagan, 2005), but are at risk for developing aggressive behaviors and subsequent peer rejection (Gunnar, Sebanc, Tout, Donzella, & van Dulmen, 2003), as well as externalizing behavior problems (Berdan, Keane, & Calkins, 2008; Stifter, Putnam, & Jahromi, 2008). Thus, although exuberant children are sociable and outgoing, they are also at risk for developing maladaptive social behaviors and externalizing behavior problems.

### **Temperament and Emotion Regulation**

One mechanism that might explain the pathways by which children of varying temperamental styles develop maladaptive behavior problems and social behaviors, whereas others are socially and behaviorally well-adjusted, is the development of effective emotion regulation. From a temperament perspective, the influence of emotion regulation in lowering children's risk of developing problematic behaviors could differ based on the types of emotions that children of varying temperaments are prone to experience and express. For instance, exuberant children, who are predisposed to show

high levels of approach, are also likely to show high levels of anger (Derryberry & Reed, 1994; Rothbart, Derryberry, & Hershey, 2000) as limits are frequently placed on their attempts to approach aspects of their environment and exuberant children are confronted with the challenge of learning to regulate their anger. It has been empirically supported that exuberant children's risk of developing externalizing behaviors and being rejected by their peers is lowered if they acquire the ability to regulate their predisposed high levels of anger (Dollar & Stifter, under review; Gunnar et al., 2003). However, in addition to their inclination to experience anger, exuberant children are also predisposed to express intense positive affect, activity, and approach in novel and highly stimulating situations that cause tentativeness in most children (e.g., Fox, et al., 2001; Putnam & Stifter, 2005).

Thus, although there is little research to support this, it is possible that another pathway by which exuberant children develop aggressive, externalizing behaviors which heightens their risk of being rejected by their peers is through their inability to flexibly down-regulate high intensity positive affect and excitable, active behaviors (Polak-Toste & Gunnar, 2006). Although positive affect is frequently thought of as an adaptive quality and serves as a protective factor for some children (e.g., Durbin, Klein, Hayden, Buckley, & Moerk, 2005), problematic behaviors could develop for exuberant children who cannot regulate their intense levels of excitement when coupled with high vigor of activity.

Rydell and colleagues (Rydell, Berlin, & Bohlin, 2003) found support for this hypothesis by showing that children rated as high in positive affect and low positive affect regulation (e.g., being able to quiet down) by their mothers were more likely to show externalizing behaviors. Although the study of Rydell and colleagues provided preliminary support for the importance of positive affect regulation, additional research employing behavioral

observations is needed to replicate this finding. The current study aimed to provide this evidence by examining the possible mediating role of children's down-regulation of positive affect, as measured in the present investigation as the down-regulation of both intensity of positive affect and excitable, high activity behaviors, in the relations between exuberant temperament and later externalizing behaviors and peer relations.

Whereas exuberant children need to acquire the ability to down-regulate anger (Dollar & Stifter, under review; Stifter et al., 2008) and potentially positive affect coupled with excitable behaviors, inhibited children's ability to flexibly regulate their predisposed fear may be a mechanism by which their risk of developing internalizing behaviors, social withdrawal, and peer rejection is lowered. In support of this, Fox (1994) proposed that individual differences in behavioral inhibition are not only due to the inclination to experience fear in novel situations, but are also due to difficulty regulating fear. In research with adults, there is evidence for the adaptiveness of up-regulating positive affect (Davidson, 2000; Fredrickson, 1998; 2001), supporting the notion that children predisposed to experience negative affect, such as inhibited children, may benefit from learning to increase their positive affect in an effort to down-regulate their high negative affect. Indeed, in Fredrickson's undoing hypothesis, which has been empirically supported in research with adults, positive emotions can reverse the effects of negative emotions (Fredrickson & Levenson, 1998; Fredrickson, Mancuso, Branigan, & Tugade, 1998) and therefore, serve as a valuable means of regulating negative emotions. Although this has not been empirically tested with children, it is possible that inhibited children's ability to experience positive affect in situations that cause distress may lower their risk for developing internalizing behaviors and social difficulties.

Further, since much research has shown that positive affect and approach are frequently positively related to one another (Rothbart, 1988) and that inhibited children are low in both constructs (e.g., Putnam & Stifter, 2005), it is plausible that inhibited children's ability to increase approach in situations that cause apprehension will assist them to up-regulate positive affect by seeing the benefit of these situations so as to experience positive affect. Thus, it is likely that inhibited children's ability to engage in situations that typically cause fear will go hand-in-hand with their ability to up-regulate positive affect. In an effort to answer this empirical question, another aim of the current study was to examine the mediating role of children's ability to up-regulate positive affect, as measured in the current study as children's intensity of positive affect in a high-intensity, novel task, in the relations between inhibited temperament and later internalizing behaviors, social withdrawal, and peer relations.

### **Socialization of Emotion Regulation**

While a temperament perspective highlights that children's inherent individual differences influence their emotion regulation abilities, it is also acknowledged that the development of emotion regulation is shaped by parenting. However, existing research on parent socialization of emotion has focused almost solely on negative emotions and not positive emotions, which may prove to be equally important (Fredrickson, 1998). Thus, children's ability to down-regulate positive affect and highly active behaviors, as well as up-regulate positive affect and approach behaviors in situations that cause distress, may be an important skill that is learned by the socialization behaviors that parents employ.



Further complicating our understanding of the role of parental socialization in the development of children's emotion regulatory abilities is that the temperament of the child influences both how parents socialize emotions in their children and moderates the effects of specific parenting behaviors on children's outcomes. Existing research has shown that the stability of inhibited children's fearfulness are associated with parenting behaviors that include overprotection, derisive comments, and intrusiveness (Bayer, Sanson, & Hemphill, 2006; Rubin, Burgess, & Hastings, 2002), whereas gentle encouragement to approach and interact with novel stimuli is hypothesized to reduce children's fear (Arcus, 2001). Thus, it is possible that parents' gentle encouragement of approach and positive interaction with frightening stimuli will teach children to use positive affect and approach to down-regulate negative affect by engaging with and enjoying stimuli that typically elicits distress.

In work with exuberant children's development of self-regulation, the importance of maternal warmth and positivity has been highlighted, likely because it optimizes the child's motivation to change their behavior and meet the expectations of their parent (Grusec & Davidov, 2007; Kochanska, 1997). For example, Cipriano & Stifter (2010) found that exuberant children were better able to regulate their behavior when mothers used commands delivered with a positive tone. As can be seen, parents greatly influence children's development of emotion regulation. Yet, it is unknown what parental socialization behaviors are successful toward (1) exuberant children learning to down-regulate intense positive affect to a level where they can regulate their behavior and comply with the task at hand, or (2) inhibited children learning to engage with and enjoy stimuli and situations that would normally frighten them. Therefore, another aim of the

current study was to examine if children's ability to up- and down-regulate positive affect developed out of the socialization behaviors that parents employed.

### **The Current Study**

The first aim of the current study examined if children's temperamental styles were directly related to their ability to up- and down-regulate positive affect and related behavior. Since existing research has shown that exuberant children experience intense excitement and high approach, active behaviors in novel situations (e.g., Fox et al., 2001; Putnam & Stifter, 2005), it was hypothesized that exuberant children would have difficulty down-regulating their positive affect and excitable behavior after a highly stimulating game. On the other hand, given inhibited children's predisposition to experience fear and low positive affect and approach in situations that are novel and high in intensity, it was hypothesized that these children would be less likely to show positive affect in an unfamiliar situation with a stranger playing a high-intensity game (the current study's measure of up-regulation of positive affect).

The second aim of the current study addressed if maternal parenting behaviors moderated the relationship between children's temperamental styles and ability to down- and up-regulate positive affect. Overall, it was hypothesized that children's ability to up- and down-regulate positive affect would develop out of parental socialization behaviors in contexts that are related to children's temperament-related "risky" behaviors. In regards to inhibited children, based on existing research (e.g., Arcus, 2001; Fox, Henderson, Marshall, Nichols, & Ghera, 2005), it was hypothesized that maternal behaviors that encouraged inhibited children's exploration and approach in novel situations would allow them the opportunity to learn how to regulate fear by using

approach. In turn, it was hypothesized that if these children learned to approach and see the positive side of stimuli that typically cause fear, they would be more positive and enjoy other situations that are unfamiliar. Further, successful parental socialization of emotion has been recently discussed in terms of teaching children to use positive emotions to regulate negative emotions (Fredrickson, 1998); thus, mothers' positive discussion of stimuli that cause fear in inhibited children were hypothesized to assist them to learn to use positive affect to control their negative affect. Finally, based on the literature regarding maternal overprotective behaviors (e.g., Bayer et al., 2006), it was hypothesized that mothers who used these behaviors in a novel situation with their inhibited children, would not use this as an opportunity to teach their children how to up-regulate positive affect and engage in situations that elicit discomfort, which would lower the likelihood that they would show positive affect in other novel situations.

On the other hand, since exuberant children show high positive affect and become engaged in novel activities (e.g., Putnam & Stifter, 2005), it was hypothesized that mothers of exuberant children who employed behaviors that assisted their children to calm down by pointing out the excitement and novelty in a new, less energetic task (attention-grabbing behaviors) would have children who were better able to down-regulate their intense positive affect and excitable behavior. In addition, as research has shown that maternal control behaviors when coupled with a positive tone are successful in regulating exuberant children's outgoing behavior (Cipriano & Stifter, 2010), it was hypothesized that parental commands behaviors coupled with positive emotional tone, would be positively related to exuberant children's ability to down-regulate their positive affect.

The final aim of the current investigation was twofold. First, the role of maternal parenting behaviors and children's ability to down-regulate positive affect in the relation between children's temperament and later externalizing behavior problems and peer relations was investigated. It was hypothesized that moderating role of maternal parenting behaviors found in the previous aim would influence how children's ability to down-regulate positive affect mediated the longitudinal relation between children's temperamental style and later behavior problems/social behaviors. A conceptual model for this aim is seen in Figure 2.1. The second part of this aim tested the hypothesis that the moderating role of maternal parenting behaviors found in aim 2 influenced how children's ability to up-regulate positive affect mediated the longitudinal relation between children's temperamental style and internalizing behaviors, social withdrawal, and peer relations longitudinally. A conceptual model for this aim can be seen in Figure 2.2.

## **Methods**

### **Participants**

Participants were 124 children who were drawn from a larger study of toddler temperament and emotional development. Typically developing toddlers and their families were recruited from published birth announcements. The majority of the families were Caucasian (89.6%) and middle class ( $M = 49.72$ ,  $SD = 10.72$  on the Hollingshead index). When the children were 42-months old ( $M = 42.78$  months,  $SD = 0.69$ ), the child, mother, and father participated in an additional laboratory visit. In addition, at age 48 months, families completed questionnaires assessing temperament and behavior problem symptoms. The current study used data from the 42-month and 48-month assessments.

Families were screened when the children were 18-20 months old in an effort to oversample for toddlers that were high in maternal reports of fear and wariness. The measures used to screen participants included the Infant Toddler Social Emotional Assessment (ITSEA; Carter, Briggs-Gowan, Jones, & Little, 2003) and a 6-item wariness screening questionnaire inquiring about the child's fearfulness in novel situations that most children find fun and engaging (e.g., meeting a team mascot). Children were classified as high in fear if they scored at least 1 *SD* above the published mean on the ITSEA internalizing composite or scored 1 *SD* above the published mean on two of the ITSEA subscales (inhibition to novelty, general anxiety, and separation distress), in addition to scoring at least 1 *SD* above the mean (established on the first 100 cases) on the wariness screening questionnaire. This approach resulted in half of the participants in the original sample being identified as high in fear. This sample participated in a laboratory visit after the child's second birthday ( $M = 24.46$  months,  $SD = 0.47$  months) where children participated in a series of tasks that assessed children's emotional development and self-regulation, in addition to maternal parenting behaviors.

When the children were 42-months old, the families participated in an additional laboratory visit. In addition to the original sample, the 18-month screening questionnaires were reexamined to assess measures of positive emotions (reverse score of depression items), inhibition to novelty (reverse scored), and activity level/impulsivity in order to expand the original sample to include temperamentally exuberant children. Children were identified as exuberant if they met two of the three following criteria: 1 *SD* above the mean on the activity/impulsivity subscale ( $M = 0.82$ ,  $SD = 0.45$ ), 1 *SD* below the mean on the inhibition to novelty subscale ( $M = 0.89$ ,  $SD = 0.45$ ), and scored a

2 on the depression subscale ( $M = 1.95$ ,  $SD = 0.11$ ). This resulted in 81 children being identified as exuberant from 18-month maternal reports. Drawing both from the original sample seen at 24-months and the potential 81 additional children identified as exuberant, 124 children were available at the 42-month visit: of these children, 43 were identified as fearful, 42 as exuberant, and 39 children who did not meet the criteria for the other two groups were identified as average.

## **Procedures**

**42-month Protocol.** When the children were 42-months of age, they came to the laboratory with their mothers and fathers. Prior to the visit, mothers and fathers were mailed a packet including a consent form and several questionnaires to be completed and brought to the visit. This 42-month visit included a variety of tasks measuring children's emotional expression and behaviors during tasks aimed to elicit positive emotions, disappointment, and inhibitory control. Additionally, mothers and fathers participated in parent-child compliance and teaching tasks with their children. Parents also completed a series of questionnaires about their children's temperament, emotional expression, and behavior problems. Central to the aims of the current study, children participated in a task to measure behavioral inhibition and parenting behaviors in response to children's negative affect, a task designed to examine how parents assist in children's regulation of positive affect and excitable, high activity behaviors and one task aimed to elicit children's intense levels of positive affect.

In *Risk Room*, a widely used task to assess behavioral inhibition (Garcia-Coll et al., 1984; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1994), children were allowed to play in the room as they would like, while the mother sat in a chair in the room and

was asked to remain as uninvolved as possible. The room contained a tunnel, stairs with a mattress next to it, a balance beam, a large black box with painted eyes and a mouth opening, and a gorilla mask placed on a wooden stand. After 3 minutes, the experimenter returned to the room and asked the child to interact with each of the 5 objects in the room.

Children also participated in a game designed to elicit intense positive affect and excitable behaviors. In the *Hippity Hop* episode, the experimenter and the child played with hippity hops while the mother sat in the corner of the room in a chair. Hippity hops are large plastic balls with durable handles to provide stability that the child and experimenter sat on (18 inches and 66 inches, respectively) and bounced around the room. The experimenter, child, and mother entered the room where there were two hippity hops on the floor. The experimenter explained to the child how to safely bounce on the hippity hop. The experimenter bounced around the room with the child for two minutes encouraging the child to enjoy the toy, traverse the room, and to hop as high as they can. This task aimed to elicit high intensity of positive affect and vigor of activity.

Prior to the end of the *Hippity Hop* episode, another experimenter entered the room with a book for the mother to read with her child. The mother was told that she should read the picture book with her child and that they could sit in the chair or on a pillow adjacent to the mother's chair. After the instructions were complete, the second experimenter left the room and shortly thereafter the first experimenter told the child that he/she forgot something in the other room and left the room, leaving the hippity hops. This *Book Reading* episode was designed to see how well children are able to calm down after experiencing high-intensity positive affect and excitable behavior. Further, this

episode aimed to measure if and how mothers assisted their children in down-regulating their positive affect and excitable behavior in order to read the wordless book with the mother.

**48-month Protocol.** When the children were 48-months old, parents were mailed an additional packet of questionnaires to assess their child's temperament and behavior problems. Directly related to the current dissertation project, mothers completed the *MacArthur Health Behavior Questionnaire* (HBQ, Armstrong & Goldstein, 2003; Essex et al., 2002).

## **Measures**

### **42-month Measures.**

**Child Behaviors.** The *Risk Room* episode was coded using the traditional scoring from the Lab-TAB manual (Buss & Goldsmith, 2000; Goldsmith et al., 1994). The following behaviors were coded in the first portion of the episode when the child was free to play with the toys on their own: the total time spent playing with each object (reversed in composite), the latency to touch first, second, and third object, and total number of objects touched (reverse scored). Additionally, every 5 seconds the tentativeness of play (0 = no tentativeness; 1 = mild/brief hesitation to engage in play; 2 = moderate hesitation/tentativeness, not engaged a significant portion of time; 3 = maximum tentativeness, child is not engaged in play) was coded. These 6 behaviors were used to create a wariness composite by standardizing each variable and taking the average, where higher scores represented more wariness. Finally, vigor of activity (1 = no/extremely low vigor of activity; 2 = low vigor of activity; 3 = moderate vigor of activity; 4 = high vigor of activity; 5 = extremely high vigor of activity) was coded every 5 seconds. Children's



vigor of activity scores were averaged across the entire episode to create a mean vigor of activity score. Approximately 15% of the sample was double coded. The kappas for tenatitiveness of play and vigor of activity were .76 and .79, respectively. The reliability for the timing variables was calculated as intraclass correlations (ICC; Snijders & Bosker, 1999). They ranged from .81 to .94.

In addition, children's affect was coded in order to identify the degree to which the children displayed positive, neutral, and negative affect during in the first portion of the *Risk Room* episode. Children's peak vocal tone, display of facial affect, and bodily indices of emotion were coded in 5 second intervals throughout the episode. The intensity of positive and negative affect was scored on 0-2 scales (0 = neutral affect; 1 = low/moderate positive/negative affect; 2 = high positive/negative affect). Kappas ranged from .75 to .91. These four variables, wariness, vigor of activity, positive affect, and negative affect were used in the current investigation's latent profile analysis to create temperamental profiles for children.

The *Hippity Hop and Book Reading* episodes were coded continuously for children's facial affect. The purpose of this coding scheme was to identify the degree to which children displayed positive, neutral, and negative affect during these episodes. The second-by-second computerized coding system was based on Cole's (1986) procedures and definitions of facial action units in Ekman and Friesen's (1978) *Facial Action Coding Systems* (FACS). The intensity of positive affect was scored on a 0-3 scale (0 = neutral affect; 1 = low/moderate positive affect; 2 = high positive affect; 3 = laughter with or without positive affect). Reliability was assessed on 15% of the sample. The kappa was .83. Positive affect intensity scores were created by multiplying the

proportion of time for each score by the value of the actual score and then summing the values. Therefore, the range of positive affect intensity scores was 0-4 and the range of negative affect intensity scores was 0-3.

The *Hippity Hop* and *Book Reading* episodes were also behaviorally coded for children's vigor of activity. Children's general level of body motion and degree of energy exhibited during each episode were coded. The codes were created to measure not only children's fine or gross motor movements, but also the manner in which the children moved (e.g., level of energy, excitability, style in which they moved) throughout the task. Children's vigor of activity was coded every minute on a 5-point scale (1 = no/extremely low vigor of activity; 2 = low vigor of activity; 3 = moderate vigor of activity; 4 = high vigor of activity; 5 = extremely high vigor of activity) measuring children level and intensity of activity. An intraclass correlations coefficient (ICC; Snijders & Bosker, 1999) was computed for 15% of the sample. The intraclass correlation coefficient was .94 for *Hippity Hop* and .98 for *Book Reading*. The vigor of activity score for each episode was an average across the entire episode. Finally, children's behaviors during the *Book Reading* episode were also behaviorally coded in 5 second intervals. Although multiple behaviors were coded, only children's on-task behavior will be considered in the current study. A proportion score was calculated this behavior by dividing the number of intervals the behavior occurred by the total number of intervals in the episode. Reliability was assessed on 15% of the sample and the kappa was .97.

The measure of children's down-regulation of positive affect in the current study included three components: a change score of children's intensity of positive affect from

the *Hippity Hop* episode to the *Book Reading* episode, a change score of children's vigor of activity from the *Hippity Hop* to the *Book Reading* episode, and the proportion of time that children spent on-task in the *Book Reading* episode. In addition, the positive affect intensity score in the *Hippity Hop* episode was used as a measure of children's up-regulation of positive affect. Given the highly stimulating, novel nature of the *Hippity Hop* episode, it was hypothesized that some children would not be inclined to experience and express high intensity of positive affect while playing an intense game with an unfamiliar adult. Further, although this measure of up-regulation only included one situation, based on the existing literature, it was hypothesized that since some children (e.g., inhibited) would not be naturally inclined to experience moderate to intense levels of positive affect, they would need to up-regulate their positive affect.

**Maternal Behaviors.** Maternal behaviors in the *Risk Room* episode were coded to examine the manner in which mothers attempted to encourage their children to approach and see the positive side of potentially frightening stimuli in a situation designed to elicit children's wariness and negative affect. The specific behaviors coded were chosen because it was hypothesized that they reflected behaviors that would assist children's approach and to enjoy the novel stimuli. The parenting behaviors were positive discussion of stimuli, encouraging approach, downplaying the stimulus, reassurance, and overprotection (See Table 2.1 for a detailed description of these behaviors). Parenting behaviors were coded in 5 second intervals. Kappas ranged from .78 to .85. Maternal positive discussion of stimuli and encouraging approach were significantly positively correlated with one another ( $r = .30, p < .001$ ). Likewise, maternal downplaying and reassurance were also significantly positively correlated with one another ( $r = .49, p <$

.001) suggesting combining the data to limit the number of analyses. This resulted in three *Risk Room* parenting behaviors: downplaying/reassurance, encouraging approach/positive discussion, and overprotection.

In addition, in the *Book Reading* episode maternal behaviors and affect were behaviorally coded. The parenting behaviors selected to be coded were chosen because they reflected those behaviors believed to potentially assist the child to down-regulate his/her positive affect and excitable behavior. Several parenting behaviors were coded; central to the current study were attention-grabbing, verbal command, redirection, and on-task (See Table 2.1 for a detailed description of these behaviors). Parenting behaviors were coded in 5 second intervals. Proportion scores were calculated for each behavior by dividing the number of intervals the behavior occurred by the total number of intervals in the episode. Reliability was assessed on 15% of the sample. Kappas ranged from .92 to 1.00. A separate team of trained coders behaviorally coded mothers' affect during the *Book Reading* episode. The peak vocal tone and/or display of maternal facial affect were coded in 5 second intervals throughout the *Book Reading* episode. The intensity of positive and negative affect was scored on a 0-2 scale (0 = neutral affect; 1 = low/moderate positive/negative affect; 2 = high positive/negative affect). Reliability was assessed on 15% of the sample. Kappas ranged from .79 to .83.

The intervals in which mother's emotional tone when showing specific maternal behaviors were identified. This resulted in new parenting variables in which the mother's specific behaviors and the emotional tone used with the specific behavior were combined. However, once examined, the parenting behaviors when combined with either negative or neutral affect were very low occurring (occurring less than 1% of the time). Thus, only

the parenting behaviors combined with positive affect were considered within the current study. This resulted in 4 *Book Reading* parenting behaviors: attention-grabbing, positive command, positive redirection, and positive on-task.

**48-month Measures.** Mothers completed the *MacArthur Health Behavior Questionnaire* (HBQ, Armstrong & Goldstein, 2003; Essex et al., 2002), which is a 172-item questionnaire designed to measure mental and physical health, and social and academic competence within the past six months. Items for the mental health scales are rated on a 3-point scale (0 = “rarely applies”, 1 = “somewhat applies”, or 2 = “certainly applies”) and items for the social functioning scales are rated on a 4-point scale (1 = “not at all like”, 2 = “very little like”, 3 = “somewhat like”, or 4 = “very much like”). Published reliability estimates for the HBQ scales range from .65 - .81, with test-retest reliabilities ranging from .68-.78. Scale scores were calculated as averages of scores on each scale item.

Due to the current study’s specific hypotheses regarding behavior problems and social behaviors, the internalizing and externalizing, peer relations and social withdrawal scales were examined. The internalizing scale consisted of 29 items, including subscales of depression (7 items; e.g., “cries a lot”), overanxious (12 items; e.g., “worries about things in the future”), and separation anxiety (10 items; e.g., “worries about being separated from loved ones”). The externalizing scale consisted of 46 items, including subscales of oppositional defiant (9 items; e.g., “defiant, talks back to adults”), conduct problems (12 items; e.g., “disobedient at school”), overt hostility (4 items; e.g., “taunts and teases other children”), and relational aggression (6 items; e.g., “tries to get others to dislike a peer”). The social withdrawal scale (9 items) consisted of the subscales of

asocial with peers (6 items; e.g., “prefers to play alone”) and social inhibition (3 items; e.g., “is shy with other children”). Finally, the peer relations scale (11 items) consisted of the peer acceptance/rejection subscale (8 items; e.g., “has lots of friends at school”) and the bullied by peers subscale (3 items; e.g., “is picked on by other children”). For the current sample, the internalizing alpha was  $\alpha = .78$ , the externalizing alpha was  $\alpha = .78$ , the social withdrawal alpha was  $\alpha = .86$ , and the peer relations alpha was  $\alpha = .70$ .

### **Person-oriented analytic approach: Latent profile analysis**

Although much temperament research has focused on the relation between continuous temperament variables, a person-centered approach aiming to categorize individuals using constellations of several temperament variables also provides valuable information about variations in children’s temperamental dispositions. In the current investigation, person-centered temperament profiles were used as predictor variables in the analyses. Latent profile analysis were used to identify separate subgroups of children with similar patterns of wariness, activity level, positive affect, and negative affect in a frequently used task measuring children’s behavioral inhibition (*Risk Room*). Latent profile analysis is similar to latent class analysis (e.g., Collins, Graham, Long, & Hansen, 1994), but uses continuous, rather than discrete, variables to identify groups of individuals with distinct profiles. Based on existing research (e.g., Putnam & Stifter, 2005), it was hypothesized that a three-profile solution (inhibited, exuberant, and normal approach) would emerge.

To determine the optimal number of classes that best fit the data, a model with 2-5 profiles were fit in an effort to identify mutually exclusive and exhaustive subgroups of children with similar temperamental profiles. Determination of best model fit was

evaluated with the following fit indices: Akaike information criterion (AIC), Bayesian information criterion (BIC), Sample-Size Adjusted BIC, and the *adjusted Lo-Mendell-Rubin likelihood ratio test (LMR-LRT)*. The model with the smallest BIC value and a significant LMR-LRT test, indicating that the addition of one more profile significantly improves model fit, was selected given its indication as the best model fit. However, in addition to the given fit indices, theoretical and empirical justification, interpretability, and model parsimony were taken into account in model selection (Bauer & Curran, 2003; Muthén, 2004; Jung & Wickrama, 2008). The model fit indices can be found in Table 2.2. Given that the lowest BIC value was combined with a significant LMR-LRT for the four-class model, this model was chosen as the best fitting model.

As can be seen in Figure 2.3, the first profile, labeled Inhibited, characterized the children ( $n = 37$ ) who showed low levels of activity (0.83 *SDs* lower than the sample mean) and positive affect (0.81 *SDs* lower than the sample mean) and high levels of wariness (0.63 *SDs* higher than the sample mean) and negative affect (0.71 *SDs* higher than the sample mean). The second profile, labeled High Inhibited, characterized the children ( $n = 6$ ) who showed very low levels of activity (1.6 *SDs* lower than the sample mean) and positive affect (1.3 *SDs* lower than the sample mean) and very high levels of wariness (1.3 *SDs* higher than the sample mean) and negative affect (2.8 *SDs* higher than the sample mean). The third profile, labeled Exuberant, distinguished the children ( $n = 28$ ) who showed high levels of activity (1.0 *SDs* higher than the sample mean) and positive affect (1.5 *SDs* higher than the sample mean) and low levels of wariness (1.3 *SDs* lower than the sample mean) and negative affect (0.87 *SDs* lower than the sample mean). Finally, the fourth profile, labeled Average, characterized the children ( $n = 50$ )

who showed mean levels of activity, positive affect, wariness and slightly lower levels of negative affect (0.40 *SDs* lower than the sample mean). Although the four profile solution provided the best fit, due to the small number of children in the high inhibited profile ( $n = 6$ ), the similarity between the inhibited and high inhibited profiles, and the current studies specific hypotheses that three temperament groups would emerge, the inhibited and high inhibited profiles were combined. This left three distinct temperament profiles: Inhibited, Exuberant, and Average.

### **Analysis of Attrition and Missing Data**

It is increasingly acknowledged by developmental researchers that using listwise deletion to exclude participants who do not have complete longitudinal data may unnecessarily limit power and potentially bias parameter estimates (Howell, 2007; Widaman, 2006). Given that there was missing data at 48-months for 18 children, it was chosen to impute missing data for problem behavior and social behaviors at kindergarten. Forty-two month study variables were compared with data from families who failed to complete the 48-month assessment and no significant differences on any variable were found. Additionally, to provide a more rigorous test the Missing Value Analysis in SPSS to measure the pattern of missing data was performed. This test revealed a non-significant Little's MCAR test,  $\chi^2 = 72.93$ ,  $df = 62$ ,  $p = .16$ , suggesting that missing data were likely missing at random. Therefore, following current recommendations in the literature for longitudinal data (Howell, 2007), multiple imputation for the missing data using the expectation/maximization likelihood treatment of missing data (i.e., the EM algorithm) was used. For the multiple imputations, ten data sets were generated and the results were combined using a mean composite for each variable.



## Results

Sample means and standard deviations for the study variables are reported in Table 2.3. Intercorrelations were computed among all study variables prior to conducting the primary analyses and are presented in Table 2.4.

### **Children's Temperament Profiles and Regulation of Positive Affect**

The first goal of the current investigation was to examine if children's temperamental styles were directly related to their ability to up- and down-regulate positive affect. To test this aim, two One-way Analysis of Variance models were conducted with children's temperamental profiles as the grouping factor and children's up-regulation and down-regulation of positive affect as the dependent variable. Against expectations, there were no significant differences among children's temperamental styles in their ability to up-regulate ( $F = 0.60, p > .10$ ) or down-regulate positive affect ( $F = 0.02, p > .10$ ).

### **Temperament x Parenting Behaviors in Predicting Children's Regulation of Positive Affect**

The second goal of the present investigation was to examine if maternal parenting behaviors moderated the relationship between children's temperamental styles and ability to down- and up-regulate positive affect. To address this aim, multiple regression analyses were conducted with children's up- and down-regulation of positive affect as the dependent variables. One set of analyses included maternal parenting behaviors in the *Book Reading* episode as the moderating variables with children's down-regulation of positive affect as the dependent variable, while another set of analyses included maternal parenting behaviors in the *Risk Room* episode as the moderating variables with children's

up-regulation positive affect as the dependent variable. Children's temperamental profiles were entered in the first step, centered maternal parenting behaviors were entered in the second step, and the interaction between the centered maternal parenting variables and children's temperament were entered into the final step. Dummy variables were created for the temperament profiles with the exuberant group as the reference. Interaction terms were created by centering the maternal parenting behaviors and then multiplying them by the dummy variables. Following the procedures recommended by Aiken and West (1991), the simple effects of maternal parenting behaviors were examined separately in the three temperament groups at 1 *SD* above and 1 *SD* below the mean of maternal parenting behaviors.

**Predicting Children's Down-Regulation of Positive Affect.** Four regression models, one for each maternal parenting behavior during the *Book Reading* task (attention-grabbing, positive command, positive redirection, and positive on-task), were run to investigate the moderating role of maternal parenting on the relation between children's temperamental style and ability to down-regulate positive affect. The model examining children's temperament profiles and maternal attention-grabbing behaviors revealed a marginally significant interaction,  $\beta = 0.22$ ,  $t = 1.79$ ,  $p < .10$ . Because there was a specific hypothesis regarding the moderating role of maternal attention-grabbing behaviors, this interaction was examined further. Follow-up analyses showed that the slope was significant for exuberant children,  $\beta = 0.42$ ,  $t = 2.28$ ,  $p < .05$ . As can be seen in Figure 2.4, mothers' of exuberant children who used higher levels of attention-grabbing in the *Book Reading* task had children who were better able to down-regulate their positive affect.

There was also a marginally significant interaction between mothers' positive commands and children's ability to down-regulate positive affect,  $\beta = 0.20$ ,  $t = 1.80$ ,  $p < .10$ . Again, because there was a specific hypothesis regarding the moderating role of maternal positive commands, this interaction was examined further. Follow-up analyses of this interaction showed that mothers of exuberant children who used higher levels of positive commands in the *Book Reading* episode had children who were better able to down-regulate their positive affect,  $\beta = 0.39$ ,  $t = 1.80$ ,  $p < .05$  (Figure 2.5).

In the two models examining mothers' positive on-task behavior and positive redirection, two main effects emerged. Mothers who used more positive on-task behaviors had children that were more likely to down-regulate their positive affect,  $\beta = 0.35$ ,  $t = 2.67$ ,  $p < .01$ , whereas mothers' positive redirection was negatively related to children's ability to down-regulate positive affect,  $\beta = -0.52$ ,  $t = -3.30$ ,  $p < .001$ . There were no other significant main or interaction effects.

**Predicting Children's Up-Regulation of Positive Affect.** Three multiple regression analyses were run to examine the moderating role of maternal parenting behaviors (overprotection, downplaying/reassurance, and encouraging approach/positive discussion) in the *Risk Room* episode as a moderator in the relation between children's temperament and ability to up-regulate positive affect. A significant interaction between children's temperament and mothers' use of encouraging approach/positive discussion emerged in an analysis predicting children's up-regulation of positive affect,  $\beta = 0.25$ ,  $t = 1.65$ ,  $p < .05$ . Follow-up analyses of this interaction showed that for exuberant children there was a significant positive relationship between mothers' use of encouraging approach/positive discussion in the *Risk Room* episode and their up-regulation of positive

affect,  $\beta = 0.35$ ,  $t = 1.72$ ,  $p < .05$ . Mothers who used more encouraging approach/positive discussion with their exuberant children, had children who were exhibited more positive affect in the *Hippity Hop* episode (Figure 2.6).

In the model examining the moderating role of maternal overprotection, a significant temperament x maternal overprotective behaviors interaction was revealed,  $\beta = -0.22$ ,  $t = -2.03$ ,  $p < .05$ . Follow-up analyses indicated that this effect was significant for inhibited children,  $\beta = -0.22$ ,  $t = -1.93$ ,  $p < .05$ . As can be seen in Figure 2.7, as mothers of inhibited children showed more protective behaviors in the *Risk Room* episode, their children were less likely to up-regulate their positive affect in the *Hippity Hop* episode. There were no significant findings regarding mother's use of downplaying/reassurance behaviors as the moderating variable.

### **Moderated Mediation Analyses**

The final goal of the current investigation was twofold. The first part of aim 3 was to examine the role of maternal parenting behaviors and children's ability to down-regulate positive affect in the relation between children's temperament and later externalizing behavior problems and peer relations. It was hypothesized that moderation found in aim 2 would affect how children's ability to down-regulate positive affect mediated the longitudinal relation between children's temperamental style and later externalizing behaviors and peer relations. A conceptual model for this aim is seen in Figure 2.1. The second part of aim 3 was to examine models in which maternal parenting behaviors affected how children's ability to up-regulate positive affect mediated the relation between children's temperament and later internalizing behaviors, social withdrawal, and peer relations. A conceptual model for this aim is seen in Figure 2.2.

Following guidelines for moderated mediation analyses (Baron & Kenney, 1986; Muller, Judd, & Yzerbyt, 2005; Preacher, Rucker, & Hayes, 2007), multiple moderated mediation analyses were conducted to examine if maternal behaviors moderated the three paths (path A, path B, and path C). Following existing practices for interpreting moderated mediation (Muller et al., 2005; Preacher et al., 2007), it was hypothesized that there would be a significant direct relationship between children's temperamental styles and later behavior problems/social behaviors (path C). If this relationship is not significant, the moderated mediation model could not be examined further. In addition, it was hypothesized that maternal behaviors would not moderate the direct relation between children's temperamental styles and later behavior problems/social behaviors in each model, but rather that it would moderate the relation between children's temperamental styles and children's ability to up-/down-regulate positive affect, the relation between children's ability to up-/down-regulate positive affect and behavior problems/social behaviors, or both. In addition, if maternal behaviors did not moderate either of these two paths, it was expected that a main effect would still be present. There would be strong evidence for a moderated mediation if children's temperament predicted behavior problems/social behaviors less strongly with children's up-/down-regulation of positive affect and all significant moderations in the model.

### **The Role of *Book Reading* Maternal Behaviors in Longitudinal Relations.**

Based on the specific hypotheses of the current study that there was a longitudinal relation between children's temperament, maternal parenting behaviors, children's ability to down-regulate positive affect and later social behaviors and behavior problems, these analyses examined whether and how maternal parenting behaviors in the *Book Reading*

episode and children's ability to down-regulate positive affect influenced the relationship between children's temperament and later externalizing behaviors and peer relations. Since there were two significant moderating effects of parenting behavior (*Book Reading* maternal attention-grabbing and positive commands) for down-regulation of positive affect in exuberant children, these parenting behaviors were used in the moderated mediation models predicting later externalizing behaviors and peer relations. Figure 2.1 graphically presents the tested model. Path A represents the relation between children's temperamental styles and ability to down-regulate positive affect (moderated by *Book Reading* attention-grabbing or positive commands), path B represents the relation between children's ability to down-regulate positive affect and 48-month externalizing behavior problems or peer relations, and path C represents the relation between children's temperamental styles and later externalizing behavior problems or peer relations.

***Predicting Externalizing Behaviors.*** The first model was conducted to examine the hypothesis that *Book Reading* maternal parenting behaviors (attention-grabbing and positive commands) would influence how exuberant children's ability to down-regulate positive affect mediated the relation between children's temperament and externalizing behaviors. However, contrary to the hypothesis that there would be a direct relationship between children's temperamental profiles and externalizing behaviors, path C was not significant in the initial regression model for the moderated mediation analysis,  $\beta = 0.09$ ,  $t = 0.89$ ,  $p > .10$ . Thus, the moderated mediation analyses could not be conducted given that a central premise for this analysis that there is a direct relation between children's temperament and later externalizing behaviors (path C) was not supported.

***Predicting Peer Relations.*** The second model examined the hypothesis that *Book Reading* maternal parenting behaviors (attention-grabbing and positive commands) would affect how children's ability to down-regulate positive affect mediated the relation between children's temperament and peer relations. In the initial regression for testing this model, a significant direct effect for inhibited temperament and maternal rating of peer relations was revealed,  $\beta = -0.228$ ,  $t = -2.08$ ,  $p < .05$ . More specifically, this path showed that inhibited children were more likely to have poorer peer relations. However, given the fact that previous moderation analyses did not show a significant interaction between maternal behaviors in the *Book Reading* episode and inhibited children's temperament in predicting children's ability to down-regulate positive affect (these moderation analyses were only significant for exuberant children), the moderated mediation analyses to address the goals of aim 3a could not be tested further.

***The Role of Risk Room Maternal Behaviors in Longitudinal Relations.*** The next set of analyses were conducted to examine the hypotheses that the moderating role of *Risk Room* maternal parenting behaviors would affect how inhibited children's ability to up-regulate positive affect mediated the longitudinal relation between children's temperament and later internalizing behaviors, social withdrawal, and peer relations. Since there were two significant moderating effects of parenting behavior (*Risk Room* maternal overprotection and encouraging approach/positive discussion) for up-regulation of positive affect, these parenting behaviors were used in the moderated mediation models predicting later internalizing behaviors, social withdrawal, and peer relations. In Figure 2.2, Path A represents the relation between children's temperamental styles and up-regulation of positive affect (moderated by *Risk Room* maternal overprotection and

encouraging approach/positive discussion), path B represents the relation between children's up-regulation of positive affect and 48-month internalizing behaviors, social withdrawal, or peer relations, and path C represents the relation between children's temperamental styles and later internalizing behaviors, social withdrawal, or peer relations.

***Predicting Internalizing Behaviors.*** The first model was conducted to examine the mediating role of children's positive affect up-regulation on the longitudinal relation between children's temperament and later internalizing behaviors, as moderated by Risk Room maternal behaviors (overprotection, encouraging approach/positive discussion). However, contrary to the hypothesis that there would be a direct relationship between children's temperamental profiles and internalizing behaviors, path C was not significant in the initial regression model for the moderated mediation analysis,  $\beta = 0.12$ ,  $t = 1.16$ ,  $p > .10$ . Thus, the moderated mediation analyses could not be conducted given that a central premise for this analysis is that there is a direct relation between children's temperament and later internalizing behaviors.

***Predicting Social Withdrawal.*** The next set of analyses were conducted to test the hypothesis that *Risk Room* maternal parenting behaviors (overprotection, encouraging approach/positive discussion) would affect how inhibited children's ability to up-regulate positive affect mediated the relation between children's temperament and social withdrawal. However, in contrast to the study's hypotheses, in the initial regression model (path C) there was not a significant direct relationship between children's temperamental profiles and social withdrawal,  $\beta = 0.12$ ,  $t = 1.18$ ,  $p > .10$ . Therefore, the moderated mediation analyses could not be conducted given that a central premise for



this analysis is that there is a direct relation between children's temperament and social withdrawal.

***Predicting Peer Relations.*** The final moderated mediation analysis was conducted to examine the hypothesis that *Risk Room* maternal parenting behaviors (overprotection, encouraging approach/positive discussion) would affect how inhibited children's ability to up-regulate positive affect mediated the relation between children's temperament and peer relations. In the initial regression for testing this model (path C), children's temperamental profiles predicted later maternal ratings of peer relations,  $\beta = -0.24$ ,  $t = -2.22$ ,  $p < .05$  (Figure 2.8). More specifically, this path suggests that inhibited children were more likely to have poorer peer relations. Given that this path was only significant for inhibited children, only maternal overprotection could be examined as a moderating variable in the moderated mediation analysis since it was the only *Risk Room* maternal behavior that moderated the relation between inhibited temperament and up-regulation of positive affect in aim 2 (maternal encouraging approach/positive discussion was a significant moderator only for exuberant children).

The next step in the moderated mediation analysis was to examine if maternal overprotection moderated the relation between children's inhibited temperament and later peer relations (path C). As expected, path C was not moderated by maternal overprotection,  $\beta = 0.04$ ,  $t = 0.39$   $p > .10$ . The third step in conducting this analysis was to test if maternal overprotection moderated path A. As shown in the results related to aim 2, moderation analyses showed that inhibited children's temperament was related to their ability to up-regulate positive affect only when mothers also demonstrated low

levels of overprotection,  $\beta = -0.22$ ,  $t = 1.93$ ,  $p < .05$ . In other words, maternal overprotection moderated path A.

The subsequent regression model was conducted to investigate maternal overprotection as a moderator of the relation between children's up-regulation of positive affect and later peer relations, above and beyond temperament, maternal overprotection, and the interaction between temperament and maternal overprotection (path B). This model revealed a significant interaction effect for maternal overprotection and children's up-regulation of positive affect,  $\beta = 0.35$ ,  $t = 2.30$ ,  $p < .05$ . As can be seen in Figure 2.9, children who were unable to up-regulate their positive affect and had mothers who were overprotective in the *Risk Room* episode were more likely to have poorer peer relations.

The final step required to examine if the moderated mediation had occurred was to assess if inhibited temperament predicted later peer relations less strongly with child up-regulation of positive affect and all relevant moderations in the model (Preacher et al., 2007). With all variables included in the final model (temperament, maternal overprotection, positive affect up-regulation, temperament x overprotection, and positive affect up-regulation x overprotection), and maternal overprotection centered as its mean, the relation between inhibited temperament and peer relations became non-significant (Figure 2.8). In addition, the inclusion of the additional variables in the model as predictors resulted in a significant change in the overall model,  $\Delta R^2 = .11$ ,  $p < .05$ , suggesting moderated mediation.

## **Discussion**

Existing research has shown that emotion self-regulation is a critical developmental accomplishment that stems from internal (e.g., temperament) and external sources (e.g., parental socialization) of the child (Calkins, 1994; Fox & Calkins, 2003). Even though the development of emotion self-regulation has been the center of much theoretical and empirical inquiry, the sum of past research has focused on the regulation of negative affect and very little is known about the importance of up- or down-regulating positive affect. There has been some speculation that learning to up- and down-regulate positive affect could lower children's risk for later psychological difficulties, and that this risk may vary depending upon their temperament. Since this topic appears to be a promising avenue toward a greater understanding of childhood mental health and social adjustment, the current study aimed to examine (1) whether maternal parenting behaviors assisted children of varying temperamental styles (e.g., inhibited, exuberant) to up- or down-regulate positive affect, and (2) whether these relationships, in turn, influenced the development of children's behavior problems and social behaviors.

### **Down-Regulation of Positive Affect and Excitable Behaviors**

A great deal of research has shown that exuberant children are at risk for developing externalizing behaviors and being rejected by their peers (Berdan, et al., 2008; Gunnar et al., 2003; Stifter et al., 2008). Existing research has provided support for the importance of exuberant children's ability to down-regulate their predisposed high levels of anger in lowering their risk of developing these behaviors (Dollar & Stifter, under review; Stifter et al., 2008). However, a central aim of the current investigation was to examine if exuberant children's risk for developing externalizing behaviors and

peer rejection was also lowered by their ability to down-regulate their intense positive affect, as measured in the present investigation as the down-regulation of both intensity of positive affect and excitable, high activity behaviors. Further, this study hypothesized that one important way that exuberant children learn to down-regulate positive affect and are able to comply with the task at hand was through the socialization behaviors that their mothers employed.

Much support was found for this hypothesis. In particular, two maternal behaviors, attention-grabbing and positive commands, were found to be important for exuberant children. Exuberant children were better able to down-regulate their positive affect when mothers employed high levels of attention-grabbing behaviors and positive commands. A common component of these two maternal behaviors was that both included mothers' employment of positive tone along with the specific behaviors (e.g., using commands and pointing out the novel, exciting feature of the book). Thus, these findings support and extend existing research that has indicated that exuberant children, who are predisposed to show fearless, active behaviors coupled with intense excitement, are more likely to comply with the demands of a situation when the mother is positive and warm in her interaction with her child (Cipriano & Stifter, 2010; Kochanska, 1997). It has been suggested that maternal warmth and positivity optimizes positive motivation in children to change their behavior, even when it is positive, to meet the parent's expectations (Grusec & Davidov, 2007).

The current study's finding with maternal positive commands closely replicates the results of the study conducted by Cipriano & Stifter (2010) by showing that exuberant children are better able to regulate their behavior when mothers use commands delivered

with a positive tone with their children. These authors speculated that contexts that pull for exuberant children's impulsive and novelty-seeking behavior, such as the one in the current study, elicits mothers' employment of more command and prohibitive type behaviors in order to stop their children from engaging in inappropriate behavior. Further, it has been shown that gentle discipline is not enough to induce fear arousal to foster compliant behavior in exuberant, fearless children; however, to simply increase the applied pressure with these children also does not work (Kochanska, 1997). Instead, these studies and the findings of the current investigation suggest that parenting behaviors that are controlling in nature, when coupled with positive affect, seem to effectively foster exuberant children's self-regulation. The current study extends this to a situation where children need to regulate their active behavior, as well as their intense excitement, in order to comply with the situation at hand and meet their mothers' expectations.

Importantly, maternal attention-grabbing in the *Book Reading* episode was established for the first time as a successful parenting behavior that assisted exuberant children's ability to regulate their intense positive affect. Recall that maternal attention-grabbing behaviors included mothers presenting the book to their child as a novel, exciting item while using a positive, enthusiastic tone. This behavior was deliberately coded because it was hypothesized that mothers of exuberant children who employed behaviors that assisted their children to calm down by pointing out the excitement and novelty in a new less energetic task would have children who were better able to down-regulate their intense positive affect. Based on exuberant children's inclination to explore new and highly engaging stimuli, it is not surprising that it would require another novel, exciting game to successfully lure them away from continued engagement with the

hippity hops. Indeed, mothers who were able to capitalize on their children's temperamental proclivities toward engaging with novel and exciting stimuli were better able to "rein in" their children's behavior to match the goals of the situation. This suggests that parents of exuberant children can use their children's interest in novelty to play up a situation that their child might not normally be interested in engaging, particularly when engaged in a more exciting activity that matches their predisposition. Implications for this finding include a method for parents of exuberant children to get through to their children and assist them in learning to down-regulate their positive affect and excitable behaviors when the demands of the situation require it.

### **Up-Regulation of Positive Affect**

Support was also found in regards to maternal behaviors as a mechanism by which children learn to up-regulate their positive affect, as measured in the current investigation as children's intensity of positive affect in a highly stimulating, novel situation (*Hippity Hop*). Two maternal behaviors, overprotection and encouraging approach/positive discussion, were identified as moderating the relationship between children's temperamental style and ability to up-regulate positive affect. Support was not found for the hypothesis that mothers of inhibited children who engaged in positive discussion and encouraged their children to approach novel stimuli would have children who were better able to up-regulate positive affect. Instead, results of the current study suggest that mothers of exuberant children who employed more positive discussion and encouraged their children to approach novel stimuli in the *Risk Room* episode had children who were better able to up-regulate their positive affect in the *Hippity Hop* episode.

Given the fact that exuberant children are more likely to approach novel stimuli and enjoy engaging in the *Risk Room*, it is curious as to why mothers of these children would encourage them to approach and positively discuss the stimuli with them. However, it is important to note that the coding employed in the *Risk Room* episode did not discriminate between mothers who used such behaviors to encourage their child to engage with the stimulus for the first time, such as if their child was fearful, and those mothers who may have been encouraging the behavior to continue. Since exuberant children quickly approach and engage with novel stimuli, it is likely that these mothers of exuberant children were maintaining their children's exploration and enjoyment of the *Risk Room* stimuli, which resulted in their continued ability to show intense positive affect in the *Hippity Hop* episode. In other words, these mothers were supporting the stability of their exuberant children's approach and enjoyment towards novel situations and activities, which these children applied in a different novel and engaging game. This finding has potential implications for the importance of exuberant children's mothers to foster their children's inclination toward positive affect in situations and at levels that it is appropriate; however, as this is speculative, additional research is warranted.

There were also multiple findings regarding mothers' use of overprotective behaviors in relation to inhibited children's ability to up-regulate positive affect, as well as later peer relations. There is mounting evidence that although mothers of inhibited children may believe that they are supporting and comforting their children by employing overprotective behaviors, the use of these parenting behaviors does not appear to help their children in the long term (e.g., Bayer et al., 2006; Kiel & Buss, 2010; Nachmias, Gunnar, Mangelsdorf, Parritz, & Buss, 1996). While existing studies have largely

examined the relationship between inhibited temperament and maternal overprotection in predicting children's later anxiety, the present study augments our knowledge by showing that maternal overprotection may hinder inhibited children's ability to regulate their high levels of fear arousal.

In particular, the mediated moderation model provided preliminary evidence for the adaptive role of inhibited children's up-regulation of positive affect by showing that their ability to up-regulate positive affect in the *Hippity Hop* task lowered the direct influence of children's inhibited temperamental nature on the development of their later peer relations. However, this relationship was moderated by maternal overprotective behaviors, such that inhibited children were less likely to up-regulate positive affect when their mothers were overprotective in the *Risk Room* episode. These findings substantiate the literature that maternal overprotection may prevent children's independent regulation of their predisposed levels of fear and unintentionally communicate to the children that the stimuli merits fear. Moreover, results from this study suggest that mothers' use of overprotective behaviors prevent children from learning strategies to use positive affect and approach behaviors to down-regulate their distress in situations that cause them discomfort. Importantly, this opportunity to learn independent regulation skills and use positive affect and approach to down-regulate their distress is likely very important for inhibited children who need extra practice in learning to regulate their negative affect to lower their risk of maladaptive outcomes (Arcus, 2001; Park, Belsky, Putnam, & Crnic, 1997).

Finally, a discussion is warranted regarding the lack of empirical support for several study hypotheses. Counter to expectations, children's up- and down-regulation of



positive affect, as moderated by maternal parenting behaviors, did not mediate the relationship between children's temperamental styles and later internalizing, externalizing, and socially withdrawn behaviors. In large part, this was due to the lack of a direct relationship between children's temperament and later behavior problems. Methodological issues are one potential explanation of why these relations did not occur. In the current study, mothers' reports of children's behavior problems were relatively low and lacked variability, likely due to both the low-risk nature of the sample and the young age of the children. Although speculative, given that there is much existing research showing the relationship between inhibited temperament and internalizing and socially withdrawn behaviors (e.g., Biederman et al., 2001; Garcia-Coll et al., 1984; Kagan, 1997), as well as exuberant temperament and externalizing behaviors (e.g., Berdan et al., 2008; Schwartz et al., 1996; Stifter et al., 2008), this reasoning could explain the lack of association between temperament and later behavior problems in the current study. It may also be that the regulation of positive affect is not as salient at this age and/or that positive affect regulation is not as relevant as negative affect regulation in relation to children's behavior problems. However, as this is one of the first studies to examine the topic of positive affect regulation, additional empirical studies are needed to establish if positive affect regulation is a mechanism by which children's risk of developing behavior problems is reduced.

### **Study Limitations and Future Directions**

This study adds to the existing literature by examining the importance of children's ability to up- and down-regulate positive affect; however, it is not without limitations. It is important to note that the sample was homogeneous and the

generalizability of the current study's findings is limited to a low-risk, predominantly white sample. In addition, given that mothers might show bias in the ratings of their children's characteristics (Kagan, 1998), caution should be exercised in interpreting the parent-reported outcome measure used within the current investigation. Further, the measure of behavior problem and social behaviors are screening instruments, not clinical assessments, used to identify behaviors that may put children at risk for problem behaviors. Related to this issue, mothers' report of children's behavior problems in the current study were relatively low and lacked variability, likely due to both the low-risk nature of the sample and the young age of the children. Finally, although by definition this study is longitudinal, the primary research questions of this study should be examined across a longer period of time. This would address many of the limitations of the current investigation, including a question regarding the direction of effects and children's stability of and prevalence of reported behavior problems.

In sum, the findings from the present study suggest that maternal parenting behaviors moderate the relation between children's temperamental styles and ability to up- and down-regulate positive emotions. Further, preliminary support was revealed for the role of children's temperament and ability to regulate positive emotions, as moderated by parenting behaviors, in influencing children's later peer relationships. This study's results can be used to inform future research examining the role of children's regulation of positive affect toward a greater understanding of childhood mental health and social adjustment.

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*Table 2.1. Book Reading and Risk Room episode maternal behaviors.*

Behavior	Description
Attention-grabbing	The mother presents the book as a novel item and something exciting that enhances the novelty of the item. The tone of the mother must be positive and enthusiastic.
Positive Verbal Command	The mother tells the child to engage in a certain behavior while coupled with positive affect. This code must convey the mother's agenda and it is not necessarily related to the task. The mother must also convey this in a firm manner, but while still exhibited positive affect.
Positive Redirection	The mother uses gentle guidance and suggestions to the child in an effort to re-engage the child in the book reading task. This behavior should be effortful. This behavior must be coupled with positive affect.
Positive On-Task	The mother continues to maintain her on-task behavior of reading the book. The mother does not have to be talking for this behavior to be coded. This behavior must be coupled with positive affect.
Encouraging Approach	The mother encourages the child to approach stimuli in the room. This might occur when the child is apprehensive or already engaged with the stimuli.
Positive Discussion	The mother says something to cast a positive spin on the stimuli.
Overprotection	The mother protects or shields the child from the stimulus.
Downplaying	The mother talks about the stimuli in a manner that reduces how scary it is.
Reassurance	The mother says something to reassure the child that it is safe to engage with the stimuli. The child must initiate this interaction.

Table 2.2. 42-month latent profiles of *Risk Room* affect and behavior.

	AIC	BIC	Adj. BIC	Adj. <i>p</i> LMR LRT
2-class	512.94	549.29	503.45	0.04
3-class	446.07	496.39	439.48	0.03
4-class	406.40	470.01	397.98	0.04
5-class <sup>a</sup>				

Note. AIC = Akaike information criterion; BIC = Bayesian information criterion; Adj. BIC = Sample-Size Adjusted ; BIC; Adj. LMR LRT = Adjusted Lo-Mendell-Rubin likelihood-ratio test.

<sup>a</sup>Class 5 did not identify a fit.

Table 2.3. Descriptive statistics for study variables.

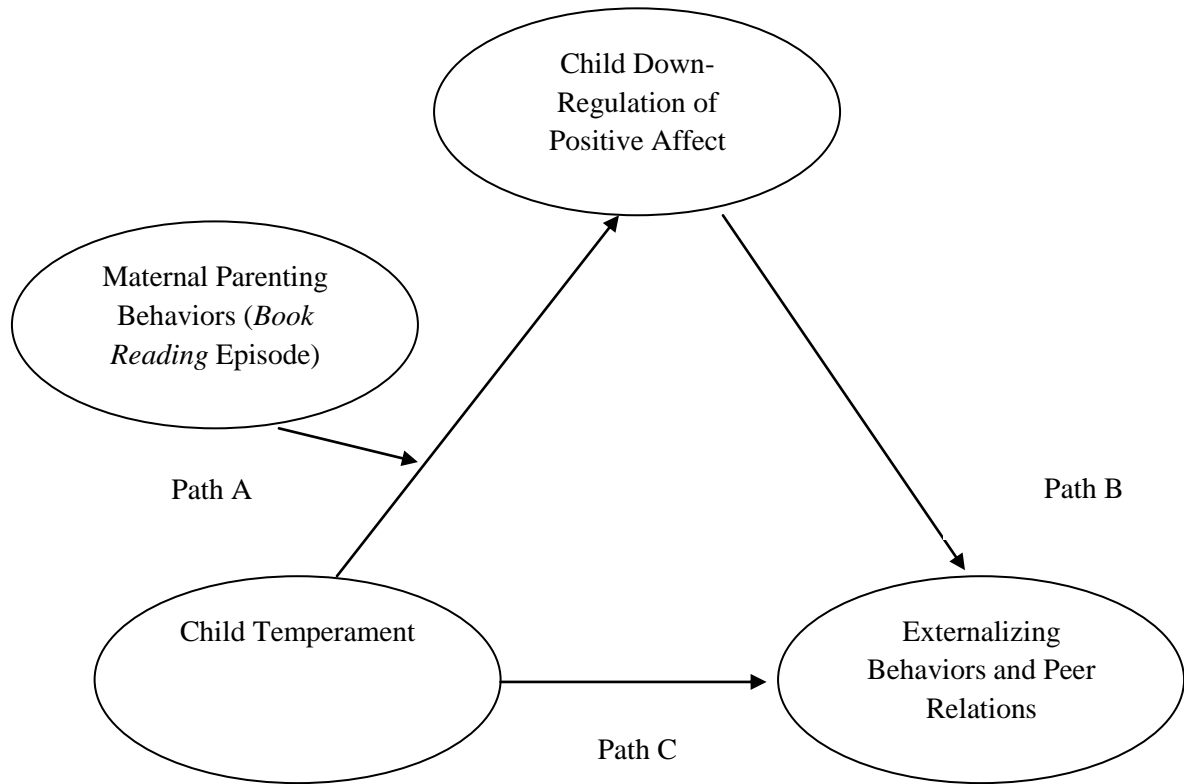
	Mean	SD	Range
<b>Predictors</b>			
Down-Regulation of Positive Affect	0.00	2.24	-6.30-4.84
Up-Regulation of Positive Affect	1.40	0.60	0.00-2.78
Maternal Attention-Grabbing	0.10	0.07	0.00-0.31
Maternal Positive Command	0.01	0.02	0.00-0.08
Maternal Positive Redirection	0.25	0.05	0.00-0.25
Maternal Positive On-Task	0.56	0.24	0.00-0.90
Maternal Downplaying/ Reassurance	0.06	0.10	0.00-0.57
Maternal Encouraging Approach/Positive Discussion	0.15	0.14	0.00-0.63
Maternal Overprotection	0.01	0.03	0.00-0.18
<b>Outcomes</b>			
Internalizing Behaviors	0.25	0.16	0.00-0.83
Externalizing Behaviors	0.28	0.20	0.00-1.04
Social Withdrawal	0.64	0.39	0.00-1.92
Peer Relations	3.26	0.30	2.31-3.50

Table 2.4. Bivariate correlations among study variables.

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Down-Regulation of Positive Affect	--												
2. Up-Regulation of Positive Affect	.42***	--											
3. Maternal Attention-Grabbing	.20**	-.02	--										
4. Maternal Positive Command	.01	.13	-.07	--									
5. Maternal Positive Redirection	-.32***	.15 <sup>+</sup>	-.13	.35***	--								
6. Maternal Positive On-Task	.38***	-.02	.29**	-.26**	-.24***	--							
7. Maternal Downplaying/Reassurance	.02	.11	-.10	-.02	-.09	.01	--						
8. Maternal Encouraging Approach/Positive Discussion	-.07	.10	-.02	-.01	.17 <sup>+</sup>	-.07	.46***	--					
9. Maternal Overprotection	-.16 <sup>+</sup>	-.04	.05	-.06	.11	-.19*	-.03	.05	--				
10. Internalizing Behaviors	.06	.15	-.08	.07	.01	.03	.06	.02	-.03	--			
11. Externalizing Behaviors	-.03	.04	-.10	.23*	.09	.03	-.08	-.03	.01	.48***	--		
12. Social Withdrawal	-.05	.03	-.10	-.22*	-.13	.12	.03	-.02	.07	.46***	.18*	--	
13. Peer Relations	.23*	.14	-.02	.18 <sup>+</sup>	-.10	-.01	.10	-.01	-.09	-.36***	-.28**	-.60***	--

Note. \*\*\* $p < .001$ ; \*\* $p < .01$ ; \* $p < .05$ ; <sup>+</sup> $p < .10$

*Figure 2.1.* A conceptual model of maternal behaviors and child down-regulation of positive affect as a mechanism from child temperament to later externalizing behaviors and peer relations.



*Figure 2.2.* A conceptual model of maternal behaviors and child up-regulation of positive affect as a mechanism from child temperament to later internalizing behaviors and social behaviors.

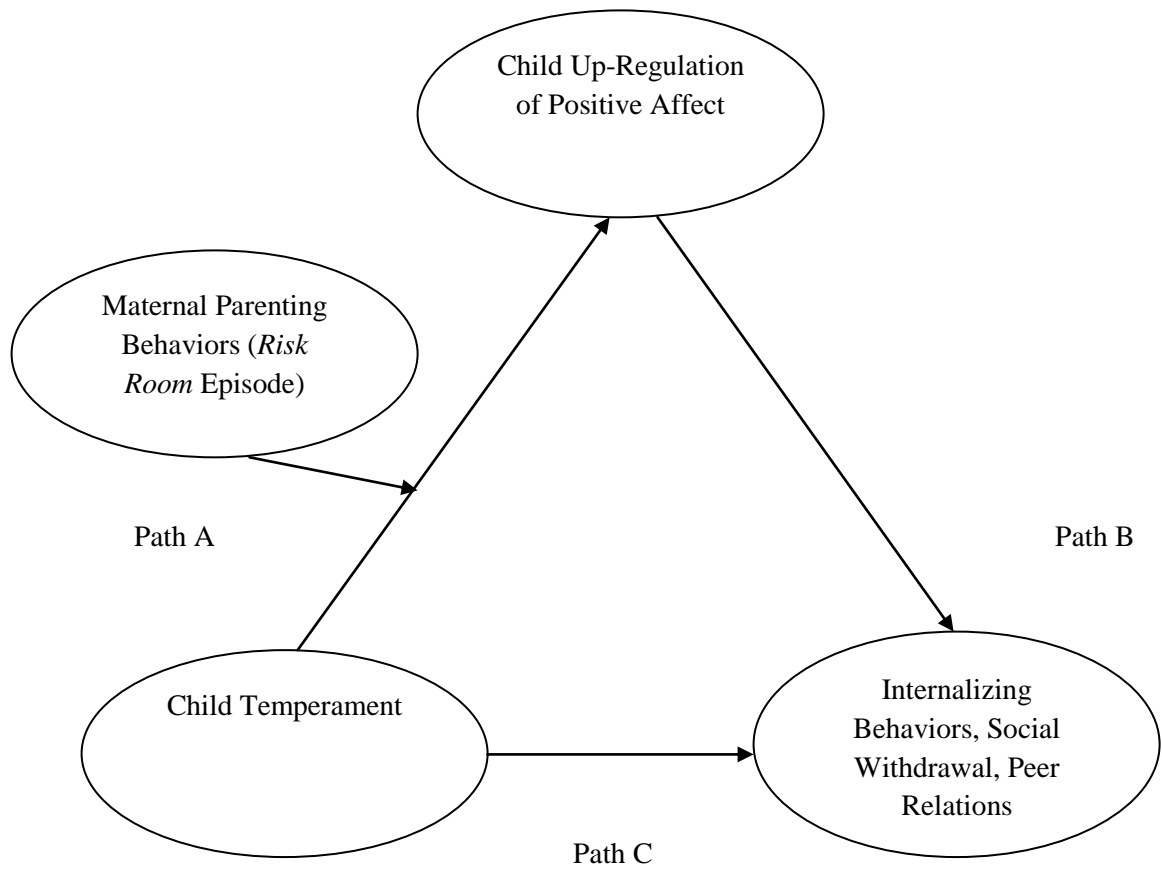


Figure 2.3. 42-month profiles of temperament.

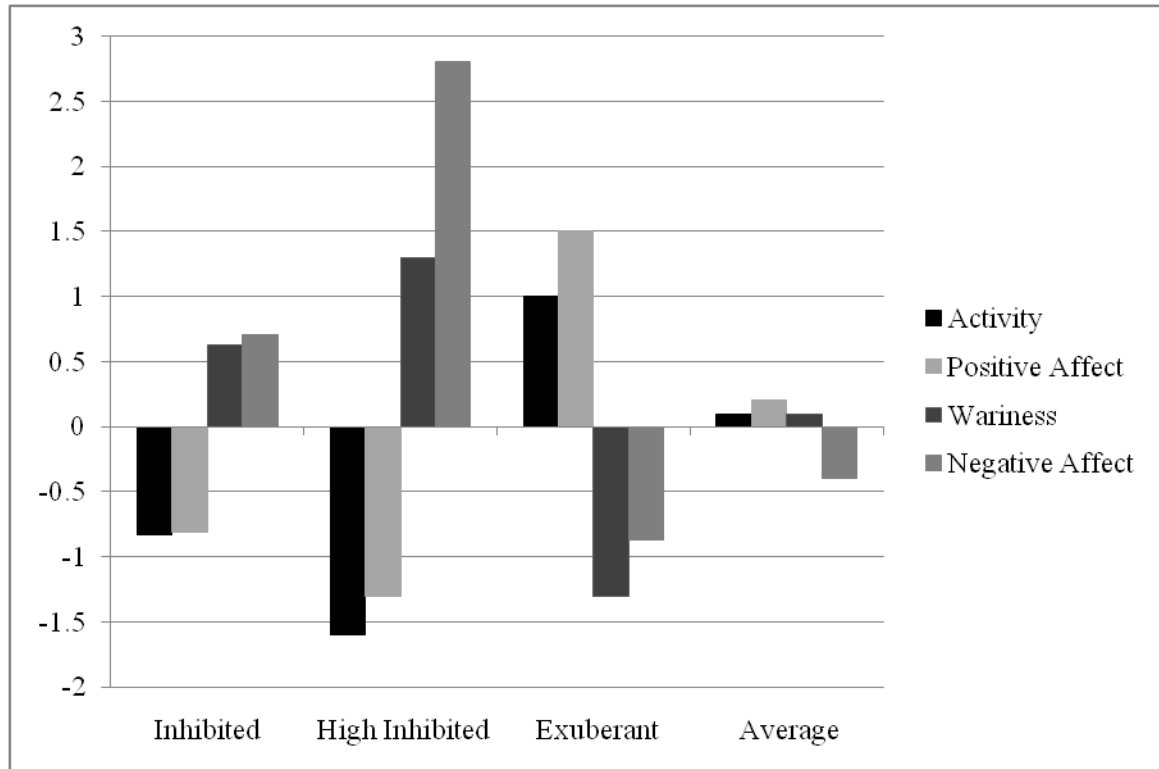


Figure 2.4. Interaction of temperament and maternal attention-grabbing in predicting children's down-regulation of positive affect.

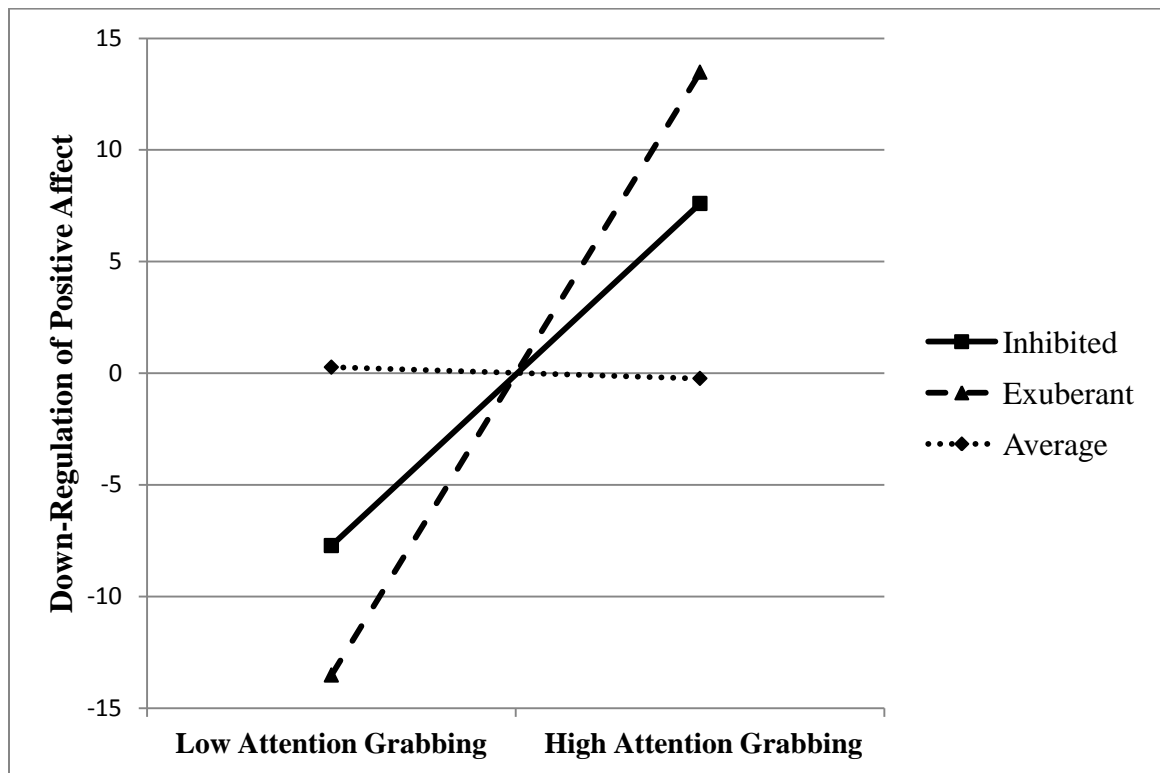




Figure 2.5. Interaction of temperament and maternal positive commands in predicting children's down-regulation of positive affect.

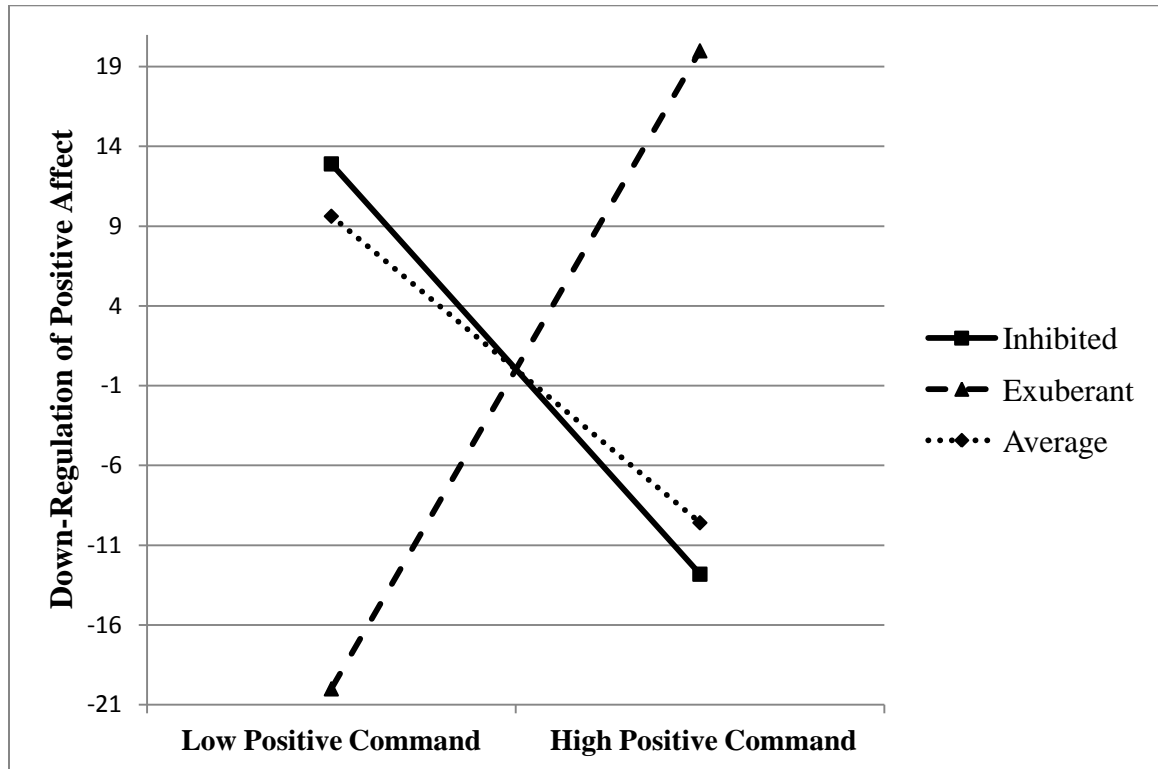


Figure 2.6. Interaction of temperament and maternal positive discussion/encouraging approach in predicting up-regulation of positive affect.

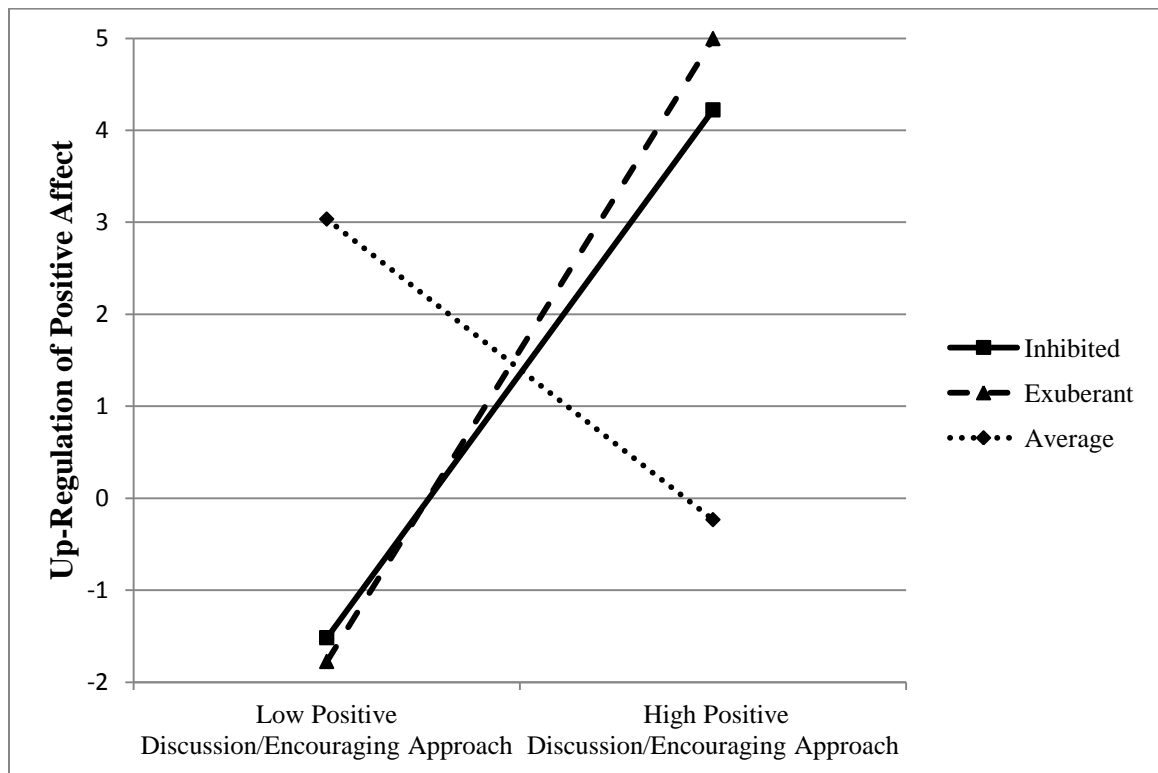


Figure 2.7. Interaction of temperament and maternal overprotection in predicting up-regulation of positive affect.

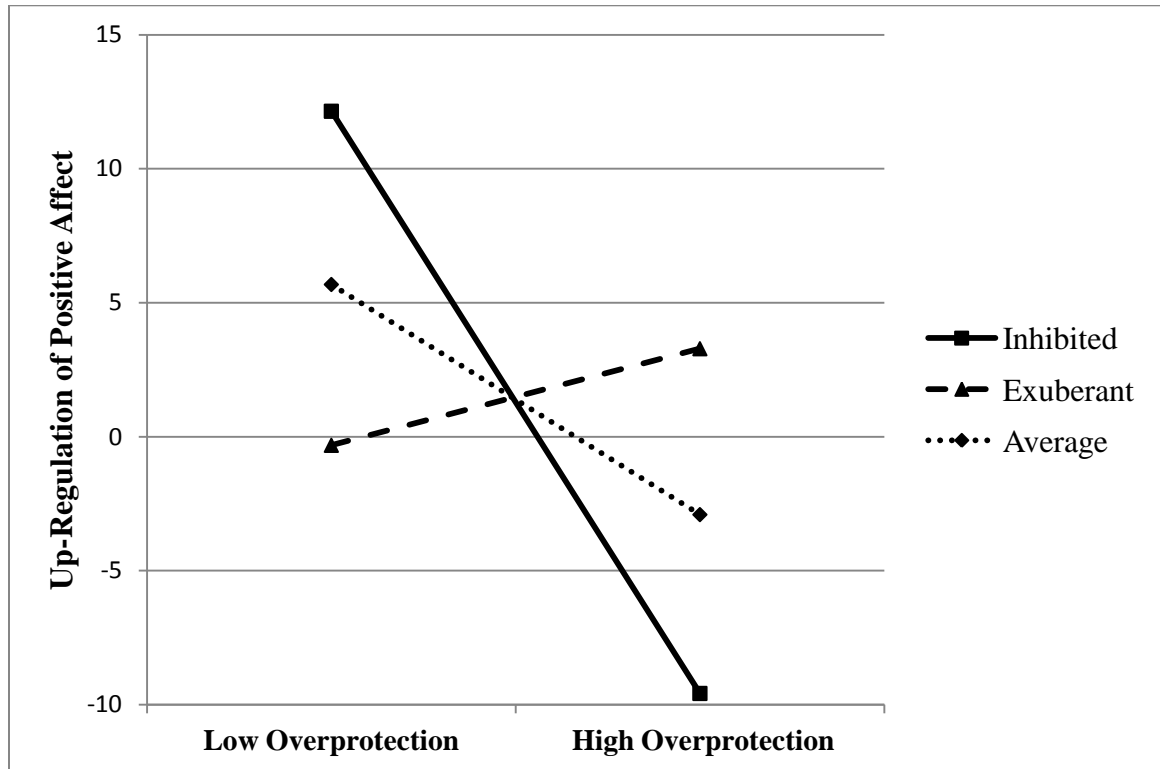


Figure 2.8. Moderated mediation of the relation between children's temperament and age 4 peer relations with maternal overprotection centered at its mean.

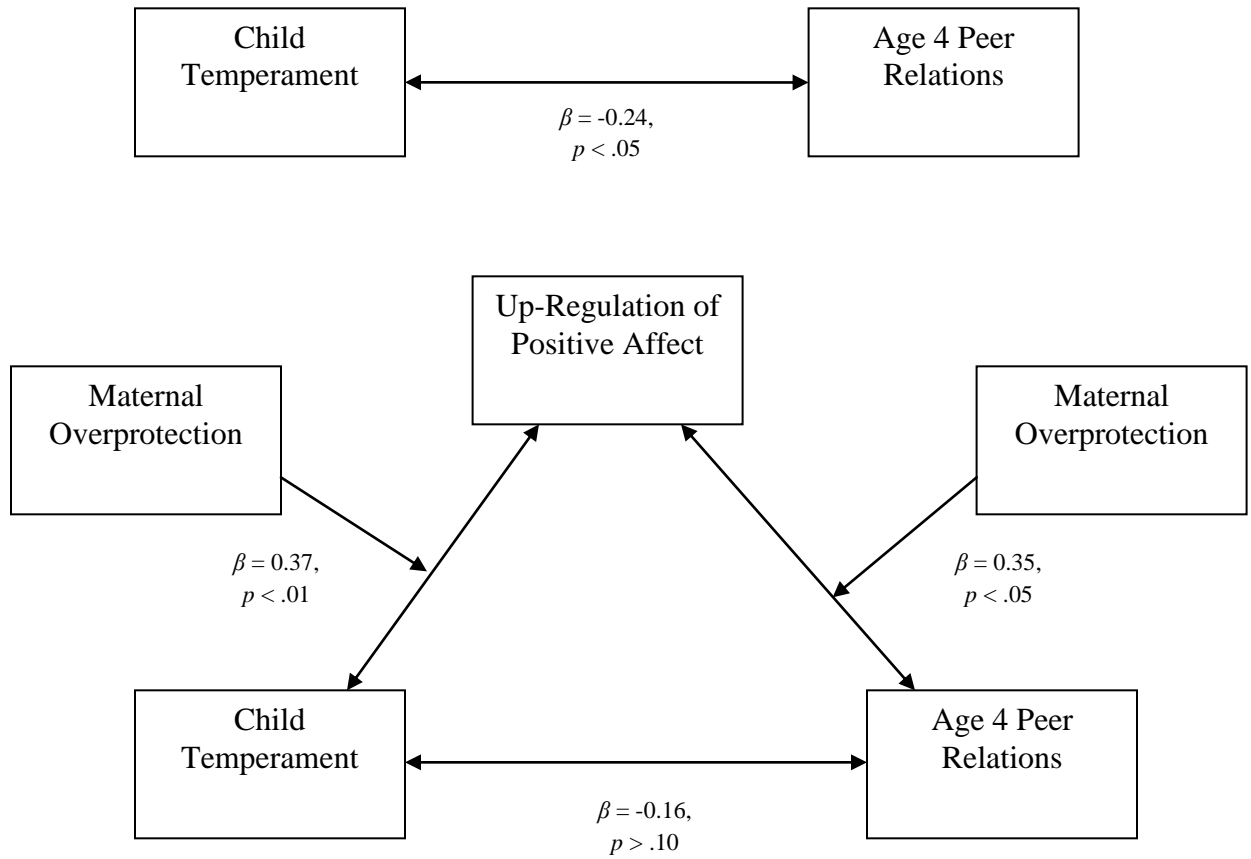
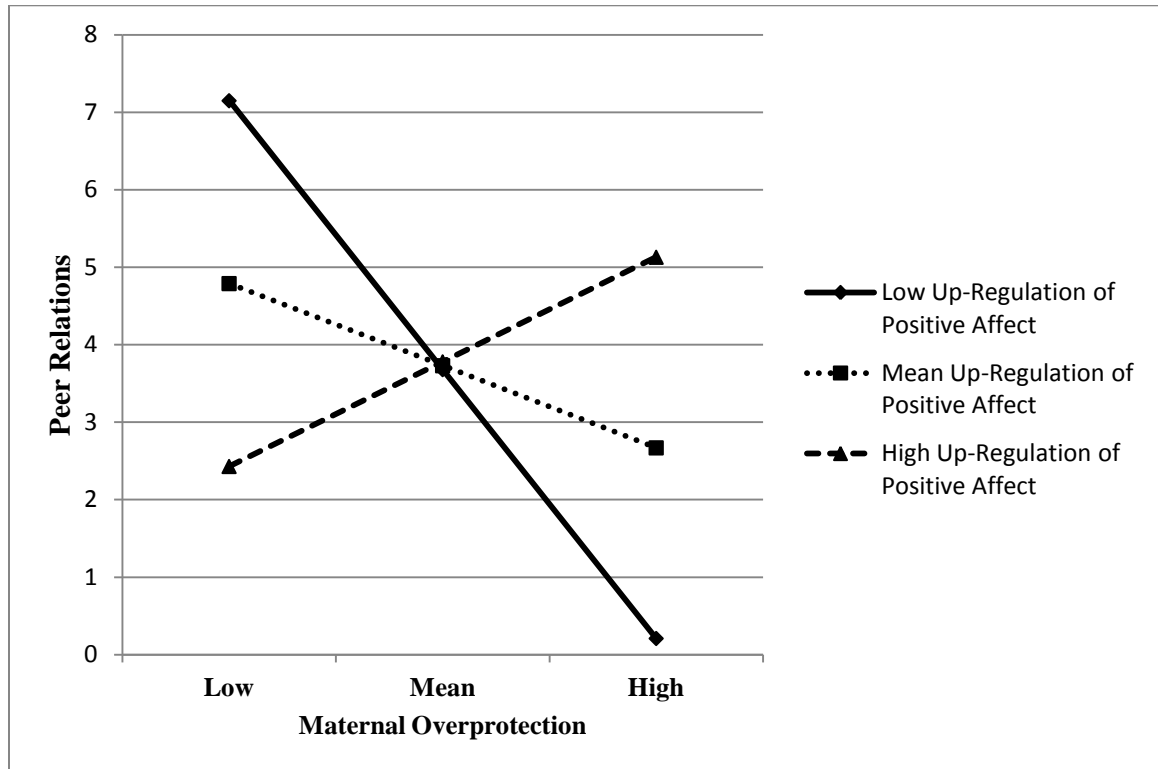


Figure 2.9. Interaction of children's up-regulation of positive affect and maternal overprotection in predicting mother-rated peer relations (path B).



## **CONCLUDING REMARKS**

The current dissertation project advances the literature on the role of childhood positive affect as a protective or risk factor in the development of adaptive social and psychological adjustment. Across the two dissertation studies, the role of children's intensity of positive affect and vigor of activity, as well as children's ability to up- and down-regulate positive affect, in predicting later social and behavioral adjustment varying according to the temperamental style of the child was examined. Further, the present dissertation project investigated whether children's ability to up- and down-regulate positive affect was influenced by the socialization behaviors that parents employed. Although much research has emphasized the importance of children's emotional expression and emotion self-regulation as critical factors in children's mental health outcomes (e.g., Calkins & Fox, 2002; Cicchetti, Akerman, & Izard, 1995; Eisenberg et al., 2001; Rothbart & Bates, 2006), the sum of past research has largely focused on the role of negative affect and very little is understood about how positive affect is associated with risk or well-being.

Across the two dissertation studies some support was provided for notion that the role of positive affect in supporting or hindering children's adaptive outcomes varies according to the intensity of positive affect, the behavior associated with positive affect, the temperamental style of the child, and the child's ability to up- or down-regulate positive affect. In terms of exuberant children, the adaptive function of positive affect was found in that exuberant children who showed higher intensity of positive affect were rated to have more successful peer relations, as well as fewer oppositional defiant behaviors, than exuberant children who showed low intensity of positive affect.

Evidence was also provided for the importance of considering the behavior that accompanies exuberant children's intense positive affect. Specifically, decreases in vigor of activity for exuberant children who showed high intensity of positive affect significantly lowered their risk of externalizing behavior problems, specifically conduct problems. On the other hand, the combination of intense positive affect and high vigor of activity appears to be a risk factor for the development of exuberant children's conduct problems. Collectively, these findings substantiate the protective role of positive affect when not coupled with intense vigor of activity for exuberant children in lowering their risk of developing aggressive and externalizing difficulties. However, exuberant children's inability to restrain their intense, vigorous activity when excited might represent a liability to the child.

Building upon these findings, Study 2 examined if exuberant children's ability to down-regulate their intense positive affect and excitable behaviors (e.g., vigor of activity) lowered their risk for developing externalizing behaviors. Counter to the study's hypotheses, empirical support was not revealed for the role of exuberant children's ability to down-regulate positive affect in lowering their risk of developing externalizing behavior problems. The lack of empirical support for this hypothesis could be explained by the inclusion of *both* intensity of positive affect and vigor of activity in the measure of children's down-regulation of positive affect. Indeed, the findings from Study 1 provide some evidence that the ability to regulate vigorous activity, not intense positive affect, is an important skill for exuberant children to acquire early in development. However, as this is one of the first empirical investigations addressing this developmental question, additional research is needed to substantiate this speculation.

Although evidence for the importance of exuberant children's ability to down-regulate positive affect in lowering their risk of developing externalizing behaviors was not found in Study 2, much support was revealed for the significance of maternal parenting behaviors as a mechanism by which exuberant children learn to down-regulate positive affect. In particular, exuberant children were better able to down-regulate positive affect when mothers employed high levels of attention-grabbing behaviors and positive commands. These findings support and extend existing research showing that exuberant children are more likely to comply with the demands of a situation when the mother is positive and warm in her interaction with her child (Cipriano & Stifter, 2010; Kochanska, 1997). Importantly, mothers who were able to capitalize on their children's temperamental proclivities toward interest in novelty and exciting stimuli were better able to "rein in" their children's behavior to match the goals of the situation. Implications for this finding include a method for parents of exuberant children to teach their children to down-regulate positive affect and excitable behaviors when the demands of the situation require it.

The current dissertation project also provided some evidence for the function of positive affect in regards to inhibited children's developmental trajectories. Counter to hypotheses, empirical support was not found for the direct role of intensity of positive affect on lowering inhibited children's risk of developing internalizing behaviors and social withdrawal in Study 1. However, a mediated moderation analysis in Study 2 provided preliminary support for adaptive role of inhibited children's up-regulation of positive affect by showing that their ability to up-regulate positive affect lowered the direct influence of children's inhibited temperament on the development of their later



peer relations. This suggests that inhibited children's ability to increase their intensity of positive affect to a socially appropriate level, even if the situation provokes feelings of being overwhelmed and tentative, is a potential mechanism by which they develop more successful relations with their peers.

Importantly, maternal overprotective behaviors during a situation that was designed to elicit fear and tentativeness were found to lower the likelihood that inhibited children would show up-regulation of positive affect. These findings substantiate the literature that maternal overprotection is related to maladaptive outcomes for inhibited children (e.g., Bayer, Sanson, & Hemphill, 2006; Kiel & Buss, 2010) and suggest that mothers' use of overprotective behaviors prevents mothers from capitalizing on an opportunity to teach their children that some novel stimuli is innocuous and in fact, they may enjoy engaging with the novel stimuli. In turn, this missed opportunity for inhibited children to learn how to use positive affect and approach to regulate distress is likely important for these children who need extra practice in learning to regulate their negative affect to lower their risk of maladaptive social and behavioral outcomes (Arcus, 2001).

There were many strengths of the dissertation project, including the use of latent profile analysis to substantiate the existence of children's distinct temperamental styles (Putnam & Stifter, 2005), validation of tasks that elicit varying intensities of preschool children's positive affect and vigor of activity, and employment of behavioral observations of children's behaviors and affect to examine an understudied topic of developmental research. While this investigation provided some empirical evidence supporting positive affect as an important construct in the development of childhood social and psychological adjustment, there were also unsubstantiated hypotheses in both

studies. Given that this is one of the first investigations examining this developmental topic, both the significant and non-significant findings from the current study can be used to guide future research.

First, although the studies within this dissertation project were by definition longitudinal given that the assessments were conducted at two different time points across a six month period (42- and 48-months of age), future research is needed to examine the relationship among the study variables across a longer period of time. For example, behavior problems were assessed through maternal ratings when the children were 48-months of age; however, as many behavior problems and clinical disorders become much more prevalent later in childhood and into adolescence, it is likely that measuring children's behavior problems at a later time point would provide more informative results. Further, in the current study, mothers' reports of children's behavior problems were relatively low and lacked variability, likely due to both the low-risk nature of the sample and the young age of the children. Thus, additional research on this topic is warranted with a sample at higher risk for developing behavior problems and social difficulties. Another limitation that should be addressed by future studies is in regard to the concurrent nature of the predictor variables within the current dissertation project. Since the predictor variables used within both studies were measured at one measurement occasion, conclusions cannot be made regarding the direction of effects in terms of children's temperamental styles, ability to regulate positive affect, and maternal parenting behaviors. For instance, although there were several significant findings in terms of the parenting behaviors that mothers employed and children's ability to both up- and down-regulate positive affect, the contemporaneous nature of the data prevents conclusions to

be drawn that maternal behaviors were the source of children's ability to regulate positive affect.

Related to this issue, future studies should employ additional measurement occasions across preschool and early childhood to provide a greater understanding of if children's ability to regulate positive affect is more salient at specific points in development in terms of predicting their later behavioral and social adjustment. Given the lack of research examining the role of intensity of positive affect and positive affect regulation in the development of childhood behavior problems and social behaviors, it is widely unknown if and at what age these constructs are most relevant to childhood adjustment. For example, the role of children's ability to either up- or down-regulate positive affect depending on their temperamental style may be more important later in childhood when children's social relationships and behavioral difficulties are more significant.

An additional point worthy of consideration by future research is that the measure of children's up-regulation of positive affect in the present dissertation project was children's intensity of positive affect in one highly stimulating task. Given the novel nature of the *Hippity Hop* task, it was hypothesized that some children (e.g., inhibited) would not be inclined to experience and express high intensity of positive affect while playing this intense game with an unfamiliar adult. Thus, children's intensity of positive affect in the *Hippity Hop* task could be considered as a measure of up-regulation of positive affect since some children would not be naturally inclined to experience moderate to intense levels of positive affect and therefore would need to up-regulate their positive affect. However, this measure of up-regulation of positive affect requires

inferring that some children regulated their experience of positive affect and it was not directly measured. The use of this measure of positive affect up-regulation could explain the lack of significant findings regarding the protective role of this ability and future research should employ additional measures of children's up-regulation of positive affect to investigate if this ability is a protective factor in children's, especially inhibited children's, developmental adjustment. For example, future studies should examine the temporal relations of children's intensity of positive affect by employing time-synchronized assessment or temporal analyses to infer the up-regulation of positive affect. Another method that should be considered by future studies is to examine children's expression of positive affect in contrasting conditions, such as in the Disappointment task.

Finally, counter to the hypotheses of the current dissertation project, it is possible that the importance of the expression and regulation of positive affect is not as salient as negative affect in predicting children's behavioral and psychological adjustment. Much research has shown the significance of children's ability to regulate negative emotions, such as fear and anger, in lowering their risk of developing maladaptive behaviors (e.g., Cicchetti et al., 1995; Mullin & Hinshaw, 2007; Stifter, Putnam, & Jahromi, 2008) and there was limited support for the importance of children's ability to regulate positive affect. However, as this is one of the first empirical investigations of this developmental topic, additional research is warranted to substantiate the importance, or lack thereof, of the expression and regulation of positive affect in relation to children's developmental outcomes.

In conclusion, the results from these studies add to the existing literature by showing that the role of positive affect in children's social and behavioral adjustment largely depends on children's vigor of activity, as well as their temperamental style. Further, evidence was provided that one mechanism by which children learn to up- and down-regulate positive affect is through the socialization behaviors that mothers employ and children's ability to regulate positive affect may affect later behavioral and social adjustment.

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Dollar, J. M. & Stifter, C. A. (2008, March). *The role of positive affect and regulation in predicting later adaptive outcomes.* Poster presented at the Biennial International Conference on Infant Studies.