

TEMPERAMENT AND EMOTIONALLY REGULATED REACTIONS TO
PROBLEM SITUATIONS IN PRESCHOOL CLASSROOMS: AN EXPLORATION OF
THE MODERATING EFFECTS OF EMOTION KNOWLEDGE

by

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A Dissertation submitted in partial fulfillment of the requirements for the degree of
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DEDICATION

To my wonderfully loving and supportive husband, Carter.

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I would like to thank my family and friends for their unwavering belief in me.

The tireless hours dedicated by the members of the Child Development Lab in early childhood classrooms made the data presented in this dissertation possible. I would like to thank Dr. Susanne Denham, who graciously welcomed me as a student when I lost my home at GMU and who provided invaluable support in reaching this milestone. I would also like to thank Dr. Tim Curby for his brilliant advice—in statistics and in life—and Dr. Hideko Bassett for her kind support and good humor throughout this project.

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TABLE OF CONTENTS

	Page
List of Tables	vii
List of Figures	viii
Abstract	ix
Chapter One	1
Introduction	2
Temperament	3
Negative affectivity	3
Surgency	5
Effortful control	6
Potential for moderation	7
Emotion Knowledge	8
Emotion Regulation	9
Chapter Two	13
Research Questions	14
Chapter Three	16
Method	17
Participants	17
Measures	17
Temperament	17
Negative emotion knowledge	18
Emotion regulation	19
Chapter Four	22
Data Analysis	23
Chapter Five	24
Results	25
Research Question 1: Main Effects	27

Research Question 2: Interactions.....	29
Chapter Six.....	32
Discussion.....	33
Effortful Control and Emotion Dysregulation	33
Negative Emotion Knowledge and Emotion Dysregulation.....	34
Effortful Control x Negative Emotion Knowledge Interactions	35
Implications and Future Directions.....	39
References.....	41

LIST OF TABLES

Table	Page
Table 1: <i>MPAC-R/S items</i>	20
Table 2: <i>Descriptive statistics</i>	25
Table 3: <i>Correlations</i>	26
Table 4: <i>Multiple regression results</i>	27

LIST OF FIGURES

Figure	Page
Figure 1: <i>Effortful control x emotion knowledge interaction predicting emotion dysregulation</i>	29
Figure 2: <i>Effortful control x emotion knowledge interaction predicting emotion regulation</i>	30

ABSTRACT

TEMPERAMENT AND EMOTIONALLY REGULATED REACTIONS TO PROBLEM SITUATIONS IN PRESCHOOL CLASSROOMS: AN EXPLORATION OF THE MODERATING EFFECTS OF EMOTION KNOWLEDGE

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In this study, I explore how temperament and negative emotion knowledge combine to predict children's ($N = 337$) emotionally regulated and dysregulated responses to problem situations in preschool classrooms. Parent reports of child temperament were obtained, emotion knowledge was directly assessed, and reactions to emotionally arousing problem situations were observed in the classroom. Children with higher levels of effortful control and, separately, higher levels of negative emotion knowledge showed fewer emotionally dysregulated reactions to problem situations. The effects of effortful control were moderated by negative emotion knowledge in predicting emotionally regulated reactions to problem situations such that for children with more advanced negative emotion knowledge, effortful control was negatively related to regulation. On the other hand, a marginal effortful control x emotion knowledge interaction emerged in predicting emotionally dysregulated reactions to problem situations: for children with more

advanced negative emotion knowledge, effortful control was also negatively related to emotion dysregulation. Results suggest that social-emotional interventions may best be targeted at children with low levels of effortful control.

CHAPTER ONE

INTRODUCTION

From the earliest days of life, children differ in their emotional and behavioral responses to their environments. Whereas some children joyfully respond to new experiences with excitement and without reservation, others respond with more negative emotionality or wariness. And, whereas some children quickly bounce back from states of emotional over-arousal, others recover over much longer periods. Temperament is the foundation of these early-appearing individual differences in emotional and behavioral reactivity and regulation, notably affecting behavior and relationships in early childhood classrooms (Rimm-Kaufman & Kagan, 2005; Rothbart & Jones, 1998; Rudasill & Konold, 2008). Like temperament, emotion knowledge is an important contributor to children's behavior in the classroom with children who understand their own and others' emotions demonstrating better social and academic adjustment (Bassett, Denham, Mincic, & Graling, 2012; Deneault & Ricard, 2013; Denham, McKinley, Couchoud, & Holt, 1990; Denham et al., 2012; Izard et al., 2001; Schultz, Izard, Ackerman, & Youngstrom, 2001). It is well known that both temperament and emotion knowledge are important contributors to children's behavior in the classroom (Blair, Denham, Kochanoff, & Whipple, 2004; Deneault & Ricard, 2013; Izard et al., 2001, 2008; Nelson, Martin, Hodge, Havill, & Kamphaus, 1999; Sanson, Hemphill, Yagmurlu, & McClowry, 2011; Schultz et al., 2008), but emerge through different processes. Temperament is an inherited disposition (Rothbart & Bates, 2006), whereas emotion knowledge is learned through socialization (Denham, Bassett, & Wyatt, 2010). Emotion knowledge is a skill

that may help children regulate temperamental reactivity in favor of socially competent behavioral reactions to emotionally arousing or difficult problem situations, particularly for children who are predisposed to negative and/or under-controlled emotionality and behavior. The purpose of this study is to explore the effects of temperament on emotion regulation as moderated by emotion knowledge.

Temperament

Temperament refers to individual differences in emotional, behavioral, and attentional reactivity and regulation (Rothbart & Derryberry, 1981). Temperament-linked differences are biologically based and relatively stable over time (Howarth, Fetting, Curby, & Bell, under review; Rothbart & Bates, 2006), laying the foundation for later adult personality (Rothbart, 2007). Derived from the Rothbart research tradition, there are believed to be three higher-order dimensions of temperament: negative affectivity, surgency, and effortful control. In this study, I examine the associations between these three dimensions of children's temperament and their regulatory behavior in preschool classrooms.

Negative affectivity. Negative affectivity is the tendency experience negative emotions like fear, frustration, sadness, and discomfort, often marked by difficulty recovering from such emotional experiences (Putnam, Ellis, & Rothbart, 2001; Rothbart, Ahadi, Hershey, & Fisher, 2001). Within the negative affectivity construct, fear- and frustration-related emotionality comprise two distinct clusters of negative affect that may be differentially motivated by approach and withdrawal orientation (Putnam, Rothbart, & Gartstein, 2008; Rothbart & Putnam, 2002). Children with more fear-related emotionality experience

negative affect related to anticipated distress or threat, worry frequently, and are slow to approach novel situations.

In the Kagan research tradition, children with fearful temperaments are characterized as inhibited (Kagan & Snidman, 2004) and although I will not examine inhibited temperaments per se, a brief discussion of inhibited temperament will illustrate the behavior and risks faced by children who are temperamentally fearful. Children who are inhibited are characterized as shy, fearful, and anxious, and are at risk for internalizing problems, the most notable of which is social anxiety (Fox, Henderson, Rubin, Calkins, & Schmidt, 2001; Schwartz, Snidman, & Kagan, 1999). Children who are rated as shy in preschool are likely handle peer conflict through passive or avoidant coping strategies through elementary school (Eisenberg et al., 1998), suggesting they are unlikely to freely express feelings related to difficult social encounters.

Children with more frustration-related emotionality experience negative affect related to the interruption of activities or blocked goals, suffering, and disappointment, and typically experience difficulty recovering from emotional arousal. Children who are prone to frustration and irritability are at risk for problems that are both internalizing and externalizing in nature, although externalizing problems are more common (Eisenberg et al., 2005; Martel, Gremillion, & Roberts, 2012; Rothbart, 2007; Seifer, 2000). There are two plausible processes linking experiencing frustration and engaging in problem behavior: (1) the experience of frustration itself may motivate externalizing behaviors like aggression if children are poorly regulated and/or do not have the tools to handle their frustration, and (2) frustration and irritability are unlikely to invite acceptance and

positive interactions with peers, leading to negative interactions or even rejection, which may exacerbate negative emotionality and ultimately lead to both internalizing and externalizing problems. Children who show high levels of dispositional anger do, in fact, tend to behave more aggressively and are less accepted by peers (Arsenio, Cooperman, & Lover, 2000). Although the fear- and anger-related components of negative affectivity may emerge through different motivational systems, the components are related in the broader factor structure and there is empirical evidence to support study at the combined level (De Pauw, Merviedle, & Leeuwen, 2009; Rothbart et al., 2001).

Surgency. Surgency refers to the tendency to be physically active, impulsive, uninhibitedly approach new situations, and enjoy fast-paced, complex, or novel activities (Putnam et al., 2001; Rothbart et al., 2001). Children who are surgent are approach-oriented, frequently show positive emotions, and tend to be social. Rothbart and Putnam (2002) speculate that individual differences in surgency are partially driven by reward sensitivity that motivates children to attend to and explore potentially rewarding and novel environments that may include interactions with peers. Children with surgent temperaments often impulsively approach potentially rewarding experiences and have difficulty inhibiting their approach behavior.

In a recent study, higher levels of surgency were not only related to lower levels of social wariness, but also to more negative behavior toward peers and maternal report of aggression (Dollar & Stifter, 2012). These findings suggest that although surgent children uninhibitedly approach opportunities for peer interaction, their behavior during such interactions has the potential to be negative or aggressive. Furthermore, surgent children

whose access to rewarding experiences is blocked, as in not being allowed to go to the center of their choice because it is full, are likely to experience and act on negative emotions (Degnan et al., 2011). Accordingly, surgency predicts externalizing problems related to under-regulated impulsivity like ADHD and hyperactivity-impulsivity (Martel et al., 2012).

Effortful control. Effortful control, supported by the executive attention system, is the major component of temperamental-driven regulation, relating to the inhibition of dominant response tendencies, planning, and focusing attention on goal-relevant stimuli (Rothbart & Rueda, 2005). Further, the ability to perceive subtle changes in the environment and react to such changes with positive affect are often captured in the measurement of effortful control (Putnam et al., 2001; Rothbart et al., 2001). Effortful control emerges late in the first year, improving significantly through early childhood where it becomes more stable (Kochaska, Murray, & Harlan, 2000). In the short years from toddlerhood to preschool-age, children become better able to wait to take a turn, attend to the important features of a task and inhibit a dominant response tendency, and delay behavior in anticipation of reward, (Kochaska, Murray, & Harlan, 2000; Rothbart & Rueda, 2005). Further, effortful control works to modulate temperamental reactivity in favor of controlled and socially adaptive emotional and behavioral responses (Kochaska, Murray, & Harlan, 2000).

Higher levels of effortful control are typically related to better social adjustment (Olson, Sameroff, Kerr, Lopez, & Wellman, 2005; Rudasill & Konold, 2008). For example, children with higher effortful control are more likely to interact competently with peers

(i.e., demonstrate prosocial behavior, help peers, express affection, etc.) and follow emotional display rules that maintain social harmony in response to emotionally arousing problem situations (Fabes et al, 1999; Kieras, Tobin, Graziano, & Rothbart, 2005). Effortful control works to help children regulate both fearful withdrawal and reactive approach tendencies (Kieras et al., 2005). In particular, effortful control relies on the ability to consciously shift attention and initiate or inhibit behavior in pursuit of a goal (Eisenberg, Hofer, & Vaughan, 2007; Rothbart & Sheese, 2007).

Potential for moderation. Although temperament is a powerful determinant of young children's behavior, it is not the only determinant and is modifiable through experience (Rothbart & Bates, 2006). Of particular relevance to this study, the effects of temperament on social outcomes may be moderated by socialization. For example, young children with fearful temperaments whose mothers employ gentle discipline techniques have more developed consciences than fearful children whose mothers discipline them differently (Kochanska, 1997) and children with uninhibited temperaments whose parents are inconsistent have less empathy and guilt than uninhibited children whose parents are more authoritarian (Cornell & Frick, 2007). Further, temperament appears to be sensitive to moderation by social-emotional competencies developed in early childhood. Dollar and Stifter (2012) recently found that high levels of surgency were moderated by emotion regulation in that the use of certain emotion regulation strategies during a frustrating task was related to lower maternal reports of aggression and higher reports of social competence. In this study, I explore whether temperament is moderated by another social-emotional competency: emotion knowledge.

Emotion Knowledge

Broadly, emotion knowledge refers to the ability to understand one's own and others' experiences and expressions of emotions (Denham, 1998). Recent research suggests that emotion knowledge is comprised of two distinct, but related, fundamental skills during the preschool years: expression recognition and situational understanding (Bassett et al., 2012). Expression recognition involves the ability to identify the emotional expressions of others, whereas situational understanding is a more sophisticated skill that involves the ability to interpret emotions in social contexts and understand that the same situations may elicit different emotional reactions across individuals. For example, a child with advanced situational understanding will understand that although she feels anxious when it is her turn for show and tell, other children may feel happy and excited when it is their turn.

Most often, expression recognition and situational understanding are examined as a single index of emotion knowledge. Total emotion knowledge is a powerful predictor of social and academic competence, as well as reduced behavior problems in early childhood (Bassett et al., 2012; Deneault & Ricard, 2013; Izard et al., 2001; Schultz, Izard, Ackerman, & Youngstrom, 2001). Children who are older, have higher cognitive ability, and lower risk status tend to have more sophisticated emotion knowledge (Bennett, Bedersky, & Lewis, 2005; Denham, Bassett, et al., 2012; Izard et al., 2001, 2008).

Emotion knowledge helps children navigate their social worlds, affecting both their own experiences of and regulation of emotion, as well as their interactions with others.

Previous work with Head Start samples has shown positive relations between emotion

knowledge and emotion regulation, social competence, and positive interactions with others (Izard et al., 2008; Miller et al., 2006). Children, particularly boys, with better emotion knowledge are less likely to show angry and aggressive behavior across preschool and kindergarten (Denham et al., 2002) and are more likely to behave in prosocial ways (Esnor, Spencer, & Hughes, 2011). Additionally, children with better emotion knowledge—particularly understanding of anger and fear situations—tend to be more well-liked by peers (Denham et al., 1990). In this study, I examine *negative* emotion knowledge, i.e., the ability to understand negative emotional expressions and situations that elicit negative emotions.

Further, interventions that teach emotion knowledge are effective in enhancing social-emotional competence for preschool-age children (Izard et al., 2008). The positive associations between emotion knowledge and emotion regulation suggest that for children with fewer regulatory skills, boosted emotion knowledge may lead to more successful regulation as part of an overall more socially-emotionally competent behavioral profile. This point is important to the current study and the broader field because it suggests that enhanced emotion knowledge has the potential to improve social-emotional outcomes for preschool-age children and may even work to moderate the effects of risk status related to socioeconomic status or even temperament.

Emotion Regulation

In the examination of the effects of temperament on preschool classroom behavior, I am especially interested in regulatory behavior and, in particular, emotion regulation as an outcome. As mentioned previously, emotion reactivity is most often viewed as

temperament-based and stable (Calkins & Mackler, 2011). Although temperament—effortful control, in particular—is also the foundation for the regulation of emotion reactivity, emotion regulation strategies are often shaped through interactions between temperament and social context and tend to become relatively fixed by middle childhood (Bridges, Denham, & Ganiban, 2004; Calkins & Mackler, 2011). Thus, regulation is still malleable in preschool, a time that may be opportune for intervention.

Based on temperament, children may be more or less likely to use certain emotion regulation strategies. However, social interaction and feedback from social partners has the potential to modify or expand a child's repertoire of emotion regulation strategies. For example, early opportunities for positive interactions with peers may teach fearful children the social approach skills that may ultimately help them regulate their social anxieties and lead to greater comfort in novel situations and less inhibition over time (Degnan & Fox, 2007).

Emotionally regulated behavior is important in establishing and maintaining positive relationships in that it helps children modify experiences of emotional reactivity in order to behave in harmony with social standards. Children who are temperamentally predisposed to extreme emotional reactivity *and* who have difficulty regulating this reactivity often have difficult relationships with peers and tend to be less sensitive to important information in social settings (Denham, 2007; Rose-Krasnor & Denham, 2008). Children who have difficulty regulating their emotions in positive ways are referred to as emotionally dysregulated. Emotion dysregulation does not imply the absence of emotion regulation, but rather the use of maladaptive or socially inappropriate

strategies to regulate. In this study, I examine interpersonal and object aggression such as yelling or hitting in response to an emotionally arousing problem situation as evidence of emotionally dysregulated reactions to problem situations and talking about feelings arising from problem situations as evidence of emotionally regulated reactions.

Children's ability to regulate their emotions predicts a wide range of social and academic outcomes across early childhood. For example, children who have poor emotion regulation skills tend to be less liked by peers than children who are more proficient in regulating their emotions (Denham et al., 2003). Further, emotion regulation predicts lower levels of anxiety, better social skills, and more positive relationships with preschool teachers whereas emotion dysregulation predicts more aggression, anxiety, and lower levels of social skills and school adjustment (Herndon, Bailey, Shewark, Denham & Bassett, 2013; Miller et al., 2006; Spritz, Sandberg, Maher, & Zajdel, 2010).

Gender is an also important consideration in the study of emotion regulation. Gender may have implications for the ways in which emotion regulation skills are perceived and socialized. For example, girls tend to be perceived as more regulated and socially competent, whereas boys tend to be perceived as more impulsive (Blair, Denham, Kochanoff, & Whipple, 2004; Eisenberg et al., 2005). Although research corroborates that girls do outperform boys on directly assessed behavioral regulation tasks in early childhood (Matthews, Ponitz, & Morrison, 2009), adults' gender-based perceptions may also affect how children evaluate their own and others' regulatory behaviors and social competence, and the socialization of emotion regulation strategies.

Last, age may also impact children's use and understanding of emotion regulation strategies. Cole and colleagues (2008) recently found that older preschool-age children are more likely to select effective emotion regulation strategies for dealing with anger than younger children in response to hypothetical problem situations. Further, emotion regulation strategy understanding predicted children's observed behavior in response to a frustrating situation, suggesting that older children not only have greater understanding of emotion regulation strategies but are also more likely to put them to practice. Ultimately, being female and/or older may relate to the use of positive emotion regulation strategies in response to emotionally arousing problem situations.

CHAPTER TWO

RESEARCH QUESTIONS

Clearly, both temperament and emotion knowledge individually affect children's behavior in classroom and social interactions. However, no research to date has examined the interactive effects of temperament and emotion knowledge in relation to classroom behavior (or any other outcome). I am particularly interested in children who are temperamentally predisposed to be emotionally positive and impulsive (high in surgency) or emotionally negative and difficult to soothe (high in negative affectivity) and expect that emotion knowledge may have a moderating effect in regulating temperamental reactivity. I am further interested in socially competent classroom behaviors—particularly in the form of emotion regulatory behaviors—that help children establish and maintain positive relationships with peers and teachers. Thus, I explore the following research questions:

RQ1. *Main Effects:* How do temperament and emotion knowledge relate to children's reactions to emotionally arousing problem situations in the classroom?

Hypotheses: Due to their predominant associations with externalizing problems, I expected that both negative affectivity and surgency affect would positively predict emotionally dysregulated reactions. However, I expected that effortful control would positively predict emotionally regulated reactions to problem situations and negatively predict emotionally dysregulated reactions. In light of previously reported positive associations between emotion knowledge and emotion regulation, but not dysregulation (Izard et al., 2008; Miller et al., 2006), I

expected emotion knowledge would positively predict emotionally regulated reactions to problem situations.

RQ2. *Interaction:* Are the effects of temperament on reactions to emotionally arousing problem situations moderated by emotion knowledge?

Hypotheses: I expected that emotion knowledge would interact with temperament such that the emotionally dysregulated reactions experienced by children who are high in negative affectivity (and, separately, surgency) would be reduced through better emotion knowledge. I also expected that emotion knowledge would reduce emotionally dysregulated reactions for children who are low in effortful control.

CHAPTER THREE

METHOD

Participants

Participants in this study included 337 children (181 boys, 156 girls) from a longitudinal study of social-emotional development in preschool. Families were recruited from three- and four-year-old classrooms in 24 private and Head Start centers in Northern Virginia and the Northern Neck of Virginia. Recruitment took place during pick-up time or back-to-school events before or just after the school year began. All children were typically developing and ranged in age from 33 to 60 months ($M = 48.10$, $SD = 7.22$). Of the 247 parents who provided demographic information, approximately 71% identified their children as Caucasian, 13% as African American, 5% as Asian, 9% as Multiracial, and 2% as other. Median level of education for both mothers and fathers was graduation from college. Data presented in this paper were collected in the fall after children enrolled in the study.

Measures

Temperament. Temperament was assessed with the Child Behavior Questionnaire-Very Short Form (CBQ-VSF; Putnam & Rothbart, 2006), a 36-item parent report questionnaire that yields factor scores for negative affectivity, surgency, and effortful control (12 items load onto each factor). In previous work, factor scores on the CBQ have predicted social behavior and emotion regulation in preschool-age children (Berdan, Keane, & Calkins, 2008; Blair et al., 2004; Labile, 2004). On the CBQ-VSF, parents respond to questions about their children's typical reactions to different situations on a

seven-point Likert-type scale on which 1 = *never*, 4 = *about half the time*, and 7 = *always*. In this sample, internal consistency estimates ranged from .69 to .71. Further, the CBQ-VSF has shown adequate stability during the preschool period (Putnam & Rothbart, 2006).

Negative emotion knowledge. Children's knowledge of negative emotions was measured with the Affect Knowledge Test (AKT; Denham, 1986), a direct assessment in which trained administrators use puppets with detachable faces to assess children's nonverbal recognition and verbal labeling of emotional expressions, and the identification of emotions unequivocally appropriate to certain situations. The AKT has been extensively used in research with preschool-age children and has been shown to reliably assess both emotion recognition and situation knowledge as well as predict positive social-emotional and classroom adjustment (Denham et al., 1990; 2003).

Children were first asked to identify happy, sad, angry, and afraid facial expressions verbally, by naming them (expressive identification), and then non-verbally by pointing (receptive identification). Because virtually all three- and four-year-old children excel at recognizing happiness, only scores for negative emotion recognition were used in this study. Next, the emotion identification task explored how well children know others' feelings in three common situations that elicit unequivocally negative emotional reactions, such as fear at having a nightmare. In the emotion identification task, the puppeteer made standard facial and vocal expressions of emotions while enacting an emotion-laden story. Children were asked to place the face on the puppet that depicted the puppet's feelings in that situation.

Children received a score of 2 if they correctly identified an emotion, 1 if they incorrectly identified an emotion by pointing to an emotion of the same valence (e.g., pointing to sad instead of angry), and a score of 0 if they incorrectly identified an emotion by pointing to an emotion of the opposite valence (e.g., happy instead of angry). In this study, an average score was computed from the standardized emotion recognition and identification items, yielding a total negative emotion knowledge score where higher scores indicate more knowledge about negative emotions ($\alpha = .68$). Further information can be found about this assessment can be found elsewhere (Denham, 1986; Denham & Couchoud, 1990a, b).

Emotion regulation. The Minnesota Preschool Affect Checklist—Revised/Shortened Form (MPAC-S/R; Denham et al., 2012), an 18-item observational tool, was used to measure children’s emotionally regulated and dysregulated reactions to problem situations. The MPAC-R/S is a shortened version of the 66-item MPAC-R (Denham & Burton, 1996; Denham, Zahn-Waxler, Cummings, & Iannotti, 1991) and a reliable and valid naturalistic observation tool for assessing children’s social-emotional behavior in preschool classrooms (Denham, Bassett, Thayer, Mincic, Sirotkin, & Zinsser, 2012; Herndon et al., 2013). In this study, children were observed for four 5-minute periods in different weeks. For each item, children were given a score of 1 if the behavior was observed and a score of 0 if the behavior was not observed during the observation period. Scores for each item were averaged across the four observations to yield a single summary score for each visit.

Data from 4 of the 18 items were used in this study, comprising two subscales (**Error! Reference source not found.**): emotion regulation (2 items, $\alpha = .81$, average $r_{\text{inter-item}} = .71$) and emotion dysregulation (2 items, $\alpha = .24$, average $r_{\text{inter-item}} = .20$).

Table 1: *MPAC-R/S items*

<p>Emotionally regulated reactions to emotionally arousing problem situations</p> <ol style="list-style-type: none"> 1. The child <u>verbally expresses the feelings arising from problem situations</u>, then moves on to the same or a new activity (versus withdrawing, displacing the emotion onto others or objects, or staying upset). 2. The child shows primarily <u>neutral or positive emotion during this behavior</u>.
<p>Emotionally dysregulated reactions to emotionally arousing problem situations (usually anger-related)</p> <ol style="list-style-type: none"> 1. The child displays <u>context-related interpersonal aggression</u> (verbal or physical). Someone does something emotionally arousing, to which the child response with aggression (emotionally arousing preceding event must be observed). 2. The <u>child hits, kicks, shoves, knocks over, or throws objects</u> (emotionally arousing preceding event must be observed).

In order to receive a score for either subscale, an emotionally arousing event must have been observed prior to the coded reaction. Productively talking about feelings in response to the event was necessary to receive a score for emotion regulation whereas an aggressive response was necessary to receive a score for emotion dysregulation.

To compute subscales, summary scores from each visit were summed, resulting in final subscale scores that could range from 0 to 4 in this study. Average inter-item correlations are shown because Cronbach's alpha may not be an appropriate indicator of internal consistency with so few items (Spiliotopoulou, 2009) and mean inter-item correlations above .15 are considered acceptable for broad constructs (Clark & Watson, 1995). Following training on this measure, observer reliability was assessed with average intraclass correlations, showing excellent reliability between a master coder and all trainees on 22 short reliability videos (ICC = .74 for emotion regulation, ICC = .99 for emotion dysregulation).

CHAPTER FOUR

DATA ANALYSIS

Analyses were conducted in a structural equation modeling (SEM) framework in AMOS 19.0 software (Arbuckle, 2010). Missing data were accounted for through full information maximum likelihood (FIML), a technique that has been shown to yield less-biased estimates of missing data than listwise deletion (Enders & Bandalos, 2001). Four structural regression models were built in AMOS to answer both research questions. Emotionally regulated and dysregulated reactions were regressed onto all predictors simultaneously in each of the tested models.

In Model 1, negative affectivity, surgency, effortful control, and emotion knowledge were entered as predictors and were retained in each of the subsequent tested models. Age and gender were initially added to Model 1 as control variables, but were ultimately dropped to retain degrees of freedom because they did not predict either outcome ($ps > .10$).

In Models 2 through 4, one interaction term—negative affectivity x emotion knowledge, surgency x emotion knowledge, or effortful control x emotion knowledge, respectively—was added as a predictor. All interaction terms were added to Model 1 separately to avoid excessive competition for variance. Before testing any models, all predictor variables were mean centered. Because all predictors as well as the two outcomes were allowed to correlate in the model, the model was saturated and no degrees of freedom were available for calculations of model fit.

CHAPTER FIVE

RESULTS

Descriptive statistics for all study variables are provided in **Error! Reference source not found.**

Table 2: *Descriptive statistics*

Variable	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
Negative Affectivity	246	3.98	0.87	1.67	6.50
Surgency	246	4.58	0.83	2.08	6.50
Effortful Control	246	5.25	0.84	2.33	7.00
Neg. Emotion Knowledge	327	0.001	0.53	-2.22	0.57
Emotion Regulation	334	0.62	0.69	0.00	3.00
Emotion Dysregulation	334	0.15	0.32	0.00	2.00

The number of children with data for each variable is noted and although a total of 337 children were included in the analyses, the number of children with data on any given variable ranged from 246 to 334. Temperament had the fewest cases ($N = 246$). However, children whose parents did not complete the CBQ-VSF showed no differences on emotion knowledge or observed emotion regulation and dysregulation ($ps > .10$) compared to children whose parents did complete it. Of the three temperament factors, parents rated their children highest on effortful control and lowest on negative affectivity. Additionally, correlations for all study variables are provided in **Error! Reference source not found.**

Table 3: *Correlations*

	1	2	3	4	5
1. Negative Affectivity	--				
2. Surgency	-.07	--			
3. Effortful Control	.12 [†]	-.02	--		
4. Neg. Emotion Knowledge	.09	-.07	.10	--	
5. Emotion Regulation	-.03	.04	-.03	.02	--
6. Emotion Dysregulation	.07	-.03	-.13*	-.12	.16**

[†] $p < .10$, * $p < .05$, ** $p < .01$

Only emotion dysregulation significantly correlated with other variables: higher levels of emotionally dysregulated reactions were related to less effortful control and more emotion regulation.

In all, more children showed emotionally regulated ($N = 189$) than dysregulated ($N = 74$) reactions to emotionally arousing problem situations in their classrooms. For children who showed dysregulation, there were few instances of this behavior with limited variability. Children who showed emotionally regulated reactions, however, tended to demonstrate this behavior more frequently on average and across more visits (**Error! Reference source not found.**). Additionally, most children performed well on the AKT, demonstrating substantial knowledge of negative emotions. Raw average scores for the each question ranged from 1.05 to 1.83. Children had the most difficulty verbally naming the afraid face and performed best when asked to identify the angry face through pointing.

Research Question 1: Main Effects

To answer the first research question, I evaluated the main effects of temperament and negative emotion knowledge in predicting emotionally regulated and dysregulated reactions to problem situations. In the evaluation of this research question, there were no significant main effects in predicting emotion regulation (**Error! Reference source not found.**).

Table 4: *Multiple regression results*

	<i>B</i>	β	<i>t</i>
Variable → Emotion Regulation			
Model 1			
Negative Affectivity	-0.02	-0.03	-0.38
Surgency	0.03	0.03	0.53
Effortful Control	-0.02	-0.02	-0.33
Negative Emotion Knowledge	0.03	0.03	0.46
Model 2			
Negative Affectivity	-0.03	-0.04	-0.61
Surgency	0.03	0.04	0.58
Effortful Control	-0.02	-0.03	-0.42
Negative Emotion Knowledge	0.07	0.05	0.87
Negative Affectivity x Neg. Emotion Knowledge	0.13	0.08	1.20
Model 3			
Negative Affectivity	-0.02	-0.02	-0.33
Surgency	0.03	0.03	0.47
Effortful Control	-0.02	-0.03	-0.39
Negative Emotion Knowledge	0.02	0.02	0.30
Surgency x Neg. Emotion Knowledge	0.13	0.08	1.26
Model 4			
Negative Affectivity	-0.01	-0.02	-0.25
Surgency	0.03	0.04	0.63
Effortful Control	-0.02	-0.02	-0.41
Negative Emotion Knowledge	0.02	0.02	0.28
Effortful Control x Neg. Emotion Knowledge	-0.20	-0.14	-2.12*
Variable → Emotion Dysregulation			
Model 1			

Negative Affectivity	0.04	0.10	1.53
Surgency	-0.01	-0.04	-0.55
Effortful Control	-0.05	-0.13	-2.03*
Negative Emotion Knowledge	-0.07	-0.12	-2.23*
Model 2			
Negative Affectivity	0.03	0.08	1.28
Surgency	-0.01	-0.03	-0.50
Effortful Control	-0.05	-0.13	-2.12*
Negative Emotion Knowledge	-0.06	-0.10	-1.65
Negative Affectivity x Neg. Emotion Knowledge	0.05	0.08	1.19
Model 3			
Negative Affectivity	0.04	0.10	1.54
Surgency	-0.02	-0.04	-0.56
Effortful Control	-0.05	-0.13	-2.04*
Negative Emotion Knowledge	-0.08	-0.13	-2.24*
Surgency x Neg. Emotion Knowledge	0.01	0.02	0.24
Model 4			
Negative Affectivity	0.04	0.11	1.66 [†]
Surgency	-0.01	-0.03	-0.48
Effortful Control	-0.05	-0.13	-2.11*
Negative Emotion Knowledge	-0.08	-0.13	-2.38*
Effortful Control x Neg. Emotion Knowledge	-0.08	-0.11	-1.79 [†]

[†] $p < .10$, * $p < .05$

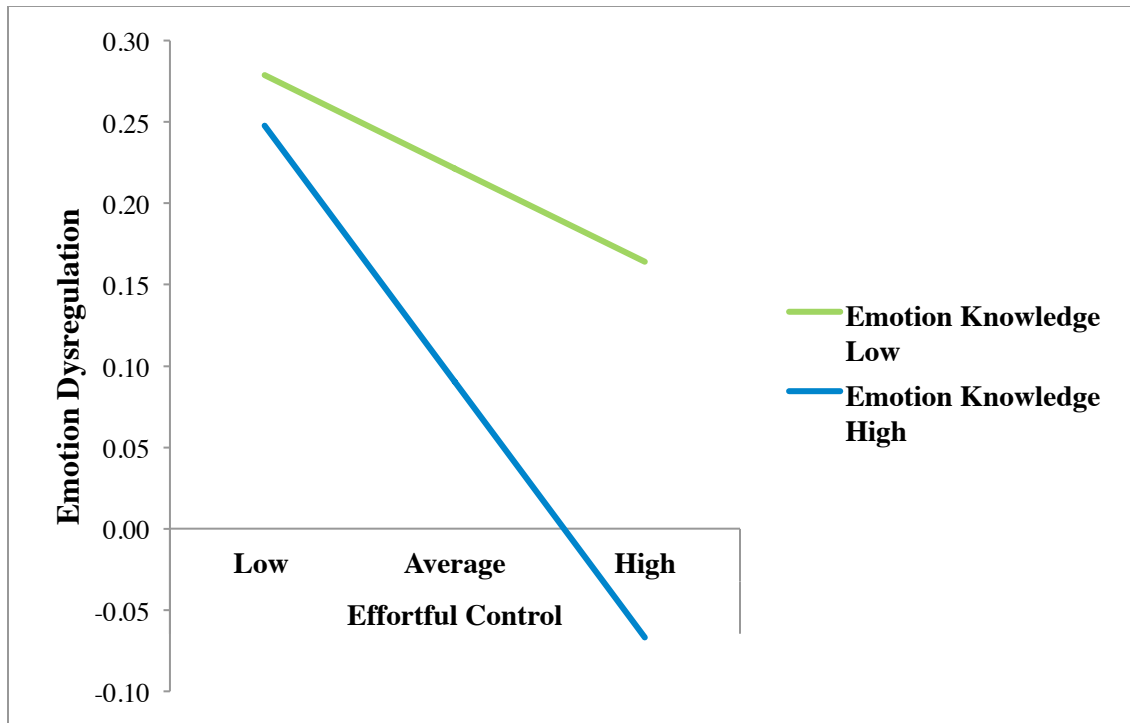
In terms of emotion dysregulation, one main effect of temperament emerged in which effortful control negatively predicted emotionally dysregulated reactions. That is, children with higher levels of effortful control showed lower levels of dysregulation. Further, there was a main effect in which negative emotion knowledge predicted dysregulation. In particular, children with more emotion knowledge showed slightly lower levels of emotionally dysregulated reactions. All other main effects predicting both emotionally regulated and dysregulated reactions were non-significant.

Research Question 2: Interactions

My second research question was whether the effects of temperament on reactions to emotionally arousing problem situations were moderated by emotion knowledge. To answer this research question, I evaluated the temperament by negative emotion knowledge interactions. Two significant interactions emerged, both involving effortful control (**Error! Reference source not found.**). Both interactions were probed for significance following the procedure outlined in Holmbeck (2002) and significant regression lines are identified in the figures discussed below.

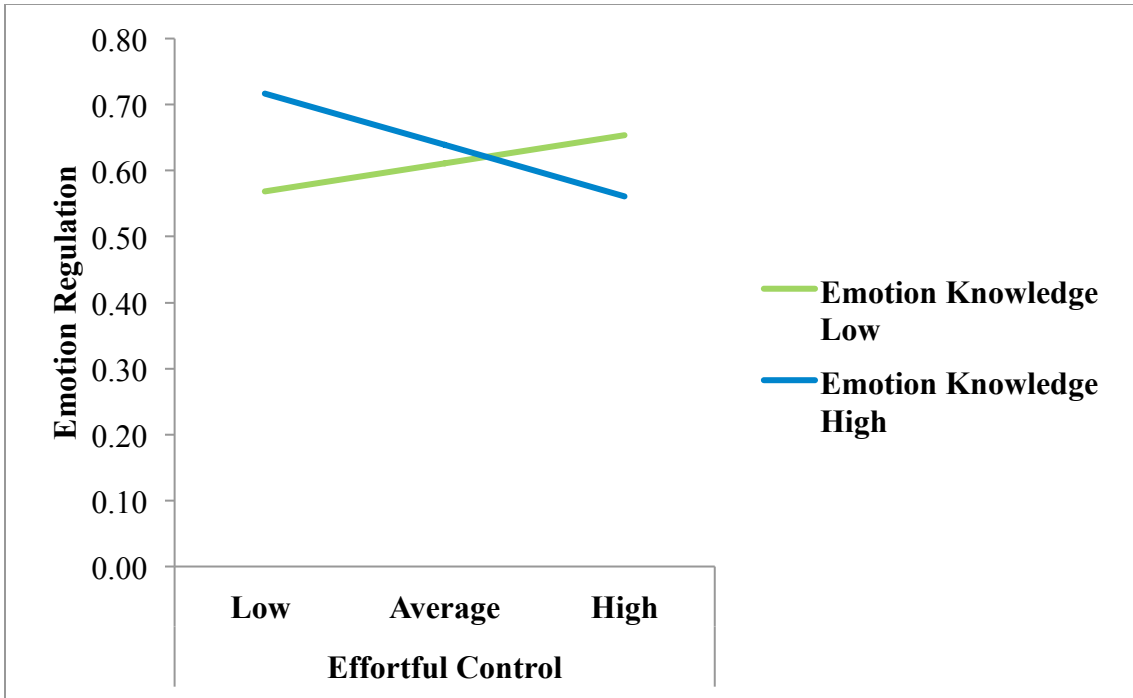
For emotion dysregulation, the interaction term was marginally significant, but the slope of the regression line for children with high levels of emotion knowledge was significant (**Error! Reference source not found.**), indicating that for children with high levels of negative emotion knowledge, effortful control was negatively related to emotion dysregulation. Further, for children with low effortful control, level of negative emotion knowledge does not appear to affect dysregulation.

Figure 1: *Effortful control x emotion knowledge interaction predicting emotionally dysregulated reactions to problem situations*



For emotion regulation, the interaction term was significant, but the slope of the regression line for children with high levels of negative emotion knowledge was marginally significant (**Error! Reference source not found.**), indicating that for children with high levels of negative emotion knowledge, effortful control was negatively related to emotion regulation.

Figure 2: *Effortful control x emotion knowledge interaction predicting emotionally regulated reactions to problem situations*



CHAPTER SIX

DISCUSSION

My first goal in this study was to explore the ways in which temperament is related to children's reactions to emotionally arousing problem situations in preschool classrooms. Because children with temperaments characterized by high levels of surgency or negative affectivity may be impulsive or difficult to soothe, aggressive, and at risk for externalizing problems (Arsenio et al., 2000; Dollar & Stifter, 2012; Martel et al., 2012), I expected that these dimensions of temperament would predict dysregulated emotional reactions to problem situations. Based on results of structural regressions, two findings emerged from this study. First, there was a main effect of both effortful control and negative emotion knowledge negatively predicting dysregulation. Second, effortful control was the only temperament variable moderated by negative emotion knowledge in predicting emotionally regulated and dysregulated reactions.

Effortful Control and Emotion Dysregulation

Effortful control emerged as the only significant temperament predictor of emotionally dysregulated reactions. Children with higher levels of effortful control were less likely to show lapses in impulse control when confronted with an emotionally arousing problem situation in their preschool classroom than children with lower levels of effortful control. This finding was consistent with the hypothesis that effortful control would help children inhibit their reactive impulses. I also expected that effortful control would predict emotionally regulated responses to emotionally arousing problem situations. However, the results did not support this hypothesis. In fact, there were no main effects for

temperament in predicting emotionally regulated reactions. One possible explanation for this finding is that emotion dysregulation is driven, in part, by unchecked temperamental reactivity whereas emotion regulation is a more sophisticated combination of temperament and purposeful employment of social-emotional competencies.

My findings suggest that although higher levels of effortful control help children refrain from acting out aggressively in response to emotionally arousing problem situations, higher levels of effortful control alone do not necessarily lead to demonstrably more regulated emotional and behavioral responses. Although it was unsurprising that higher levels of effortful control were related to less active dysregulation, the absence of a predictive relation between effortful control and emotion regulation was unexpected. In line with the results of a recent study that found effortful control to be negatively associated with the anger subscale on the CBQ (Olson et al., 2005), it may be that children with high effortful control are simply less likely to experience or show anger and frustration in an outwardly aggressive manner. In this study, any negative emotion including anger, sadness, disappointment, or even anxiety, could initiate observed emotion regulation (although anger was most common). It is thus possible that children with high effortful control may be less likely to experience or show *any* negative emotion in an outwardly aggressive manner.

Negative Emotion Knowledge and Emotion Dysregulation

In relation to negative emotion knowledge, it was only found to be predictive of less emotionally dysregulated reactions to problem situations. In particular, children with more knowledge of negative emotions tended to show fewer lapses in impulse control in

response to emotionally arousing problem situations. This result is consistent with previous work that suggests that preschool children with more emotion knowledge tend to behave less aggressively (Denham et al., 2002).

Whereas previous work has found emotion knowledge to be positively related to teacher-reported emotion regulation (Izard et al., 2008), negative did not predict observed regulation in this study. This pattern of results, in which emotion *dysregulation* but not emotion regulation is predicted by the main effect of a construct, is similar to the pattern of results for effortful control. Further, it is encouraging that negative emotion knowledge appears to reduce dysregulation as dysregulated behavior may be most salient to teachers and peers in preschool classrooms. The reduction of emotion dysregulation through emotional competence interventions has the potential to significantly improve the quality of interactions and the overall classroom environment.

Effortful Control x Negative Emotion Knowledge Interactions

The second goal of this study was to explore whether the effects of temperament on children's regulated or dysregulated reactions to emotionally arousing problem situations were moderated by negative emotion knowledge. For the reasons mentioned above, I expected that children characterized by high levels of surgency or negative affectivity would show more emotion dysregulation in the classroom and that this dysregulation could be moderated by negative emotion knowledge. This hypothesis was not supported. I also expected that effortful control would be moderated by negative emotion knowledge in predicting emotionally dysregulated reactions such negative emotion knowledge would reduce dysregulation in children with low levels of effortful control. This hypothesis was

partially supported. Effortful control was, indeed, moderated by negative emotion knowledge at a marginal level, but not in the way that I expected. For children with low levels of effortful control, negative emotion knowledge did not reduce dysregulation. That is, children with low levels of effortful control were likely to show lapses in impulse control in response to problem situations regardless of their level of negative emotion knowledge. For children with higher levels of effortful control, however, more knowledge of negative emotions was related to less dysregulation.

This result suggests that children require a minimum level of effortful control in order to employ their negative emotion knowledge to curtail lapses in impulse control in real world settings. The regulatory aspects of effortful control rely on attention and inhibitory control (Rueda, Posner, & Rothbart, 2005). Even if they have good emotion knowledge, children with low effortful control may not have the attentional resources to consider their own and others' emotions and take a moment to inhibit their reactive or aggressive behavior in emotionally arousing problem situations. Indeed, attention and inhibitory control are related to theory of mind in preschool children (Blair & Razza, 2007; Carlson & Moses, 2001) and children with low effortful control may have difficulty considering others' perspectives, particularly in the midst of conflict.

Although I expected effortful control would be moderated by negative emotion knowledge in predicting emotion dysregulation, I did not predict that effortful control would be moderated by negative emotion knowledge in predicting regulation.

Nevertheless, I found a significant interaction in which children with low effortful control and high negative emotion knowledge were more likely to show emotionally regulated

reactions to problem situations. This suggests that for children with low effortful control, negative emotion knowledge played a compensatory role and increased their tendency to react positively to emotionally evocative problem situations.

This finding is somewhat contrary to the hypothesis that children with low effortful control may not have the attentional and inhibitory control resources to support a less dysregulated response to problem situations, even with high levels of negative emotion knowledge. In the measure of emotion regulation used in this study, children needed to be observed talking about their feelings in relation to an emotionally arousing problem situation to be coded as regulating. For children with low effortful control, emotion knowledge may provide a foundation for understanding and talking about their negative feelings that can be drawn on when the problem situation elicits less extreme emotional reactivity. Additionally, for children with high effortful control, the meaning of low scores on the emotion regulation measure may be obscured in that children with high effortful control may rely on more subtle regulation strategies like shifting attention that would not be captured with the MPAC-R/S, which requires children to talk about their feelings in order to be coded as regulating.

Further, emotion regulation and dysregulation were related in that children who showed more emotion regulation were also likely to show more dysregulation in the classroom. Children who show any evidence of emotion regulation or dysregulation may simply be more emotional, sometimes relying on appropriate regulation strategies and other times relying on less appropriate strategies. After all, preschool children are just learning how to behave in a classroom and regulate their emotions accordingly. It is possible that the

same children with low effortful control who had difficulty inhibiting their impulses at times are also able to proactively regulate their behavior at other times *if* they have good emotion knowledge. My findings suggest that children with low effortful control are predisposed toward impulsive reactions when confronted with emotionally arousing problem situations. They likely react quickly and aggressively. However, with high levels of emotion knowledge, children with low effortful control may be able to employ this knowledge to react positively some of the time.

Finally, I found that children with high effortful control and high negative emotion knowledge were less likely to show regulated reactions. For children who lack control, emotion knowledge may provide a framework in which to slow down and consider their own and others' emotions as well as a language to talk about distressing situations. On the other hand, children with high effortful control and high negative emotion knowledge may be more likely to understand their own emerging emotions and be more measured in their experience of and reactions to frustration, ultimately relying on more internal strategies that were not easily captured through observation.

Strengths and Limitations

Perhaps the greatest strength of this study is the fact that each construct was measured via a different method: temperament with parent report, emotion knowledge with direct assessment, and emotion regulation with naturalistic observation. Ultimately, multiple sources of information converged to support the findings of this study. Additionally, the sample was relatively diverse in terms of race and socioeconomic background, largely reflecting the region of Virginia from which it came.

The large amount of missing parent report data is a limitation of this study. Measures were taken to encourage parents to respond, including email reminders, sending questionnaires home in children's cubbies, and hosting questionnaire reading nights with dinner at centers for low income families. Families from private and Head Start centers responded at equal rates and I feel confident that the number of responses was maximized through these efforts and, further, that the missing values were robustly estimated through FIML in AMOS.

Finally, minimized burden on families necessitated the use of the Very Short Form of the CBQ, but it is possible that the limited number of items for each factor (12) also limited the predictive power of my temperament data. This may be particularly true of the surgency and negative affectivity factors, which had the most number of items that target negative child behaviors. The full version of the CBQ or even behavioral observations of temperament may have yielded more variable and predictive temperament data.

Implications and Future Directions

I believe this is a particularly interesting area of study in which a teachable skill may contribute to more positive social interactions for children who are temperamentally predisposed to under-regulated or negative behavior. My results suggest that social-emotional interventions may be best targeted at children who are low in effortful control. Not only is less effortful control related to more emotionally dysregulated behavior in preschool classrooms, but negative emotion knowledge appears to moderate this dysregulation for children with average to high levels of effortful control. Further, enhanced emotion knowledge may help children with low effortful control be more

emotionally regulated. Although my moderation effects were of marginal statistical significance, the practical significance is substantial and worth exploring further.

The possibility of follow-up work investigating both the effects of teachers on these relations, as well future applied intervention studies, is exciting. Future work may include an examination of what teachers are already doing in classrooms to support the emotion regulatory skills of children who were identified as temperamentally vulnerable in this study, i.e., children low in effortful control. The identification of the specific teacher behaviors related to more positive outcomes from early to late preschool and beyond for temperamentally vulnerable children and designing interventions around this may be a particularly fruitful area of further development.

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