

PUT ON YOUR GAME FACE! INHIBITORY AND SOCIOEMOTIONAL CORRELATES OF EMOTION
REGULATION IN EARLY AND MIDDLE CHILDHOOD

by

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ABSTRACT

Emotion regulation can be defined as the ability to alter expressive displays of emotion. Children's developing capacity to regulate emotions may depend on individual characteristics and pertinent inhibitory and socioemotional skills. The current thesis examined children's emotion regulatory abilities using pre-existing and novel measures, and related these abilities with age, sex, inhibitory control, theory of mind, and emotion and display rule knowledge. Study 1 examined the relations between each of these variables and 5- to 7-year-olds' regulation of emotion in a disappointing gift paradigm. Children's understanding of others' emotions and emotion display rules, and their inhibitory control skills, emerged as significant correlates of emotion regulation and predicted children's responses to the disappointing gift after controlling for other relevant variables. Study 2 related 5- to 10-year-olds' regulation of negative emotions in the disappointing gift paradigm with regulation of positive emotions in a novel staged accident task, and compared socioemotional and cognitive correlates of positive and negative emotion regulation. Results revealed a significant *negative* correlation between regulation of negative and positive emotions, and these correlated differently with theory of mind and inhibitory control. In Study 3, a single controlled procedure for studying regulation of positive and negative emotions was created in which children won a good or bad gift and watched the experimenter win a good or bad gift, in different contexts (i.e., opening the gift before or after the experimenter opened one of greater or lesser value). Four- to 10-year-olds succeeded in regulating positive and negative emotions in some contexts, but not others. Significant associations with emotion regulation were observed for age, sex, and display rule knowledge. Findings from the three studies suggest that children struggle to regulate emotions and that emotion regulation may not be a single unified skill, but one that varies systematically with the valence of the elicited emotion. Moreover, emotion regulation seemingly requires (1) *knowledge* of context-appropriate emotions as well as (2) *inhibitory* abilities to use that knowledge and effectively control emotions.

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CHAPTER 1 INTRODUCTION

1.1. Background

Emotion regulation involves inhibiting a felt (but undesirable or inappropriate) emotion and summoning an alternative emotional response (Thompson, 1994). Such regulatory abilities undergo rapid change during childhood (Zelazo & Cunningham, 2007). Controlling one's emotions becomes increasingly important during early and middle childhood as children attempt to build new friendships and obey classroom rules (Kopp, 1989). For example, regulating aggression and frustration during conflicts helps children respond in constructive ways and develop healthy interpersonal relations. In fact, successful suppression of inappropriate emotional responses has been linked to positive social outcomes (McDowell, O'Neil, & Parke, 2000), whereas difficulties in this domain are associated with social rejection and punishment (Scheff, 1984). Emotion regulation also has important academic consequences: Accumulating evidence suggests a role for social and emotional skills in learning and academic success (Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011; Gumora & Arsenio, 2002).

In the broad context of socioemotional skills, emotion regulation works in concert with cognitive, social, and behavioral competencies to promote social adjustment and diminish emotional distress and conduct problems (Durlak et al., 2011). Moreover, adaptive regulatory functions are thought to promote childhood resiliency (Eisenberg et al., 1997) and enduring mental health (Gross & Muñoz, 1995). In contrast, maladaptive emotion regulation has been linked to several childhood and adulthood pathologies (Jackson, Malmstadt, Larson, & Davidson, 2000; Leckman et al., 1997; Rădulescu & Mujica-Parodi, 2008; Maedgen & Carlson, 2000). Hence, developmental studies of emotion regulation not only elucidate normal and atypical developmental

trajectories, but also provide insight into potential causes of emotion dysregulation and affective symptoms that may characterize clinical conditions.

Emotion regulation has been the focus of much developmental research. Indeed, developmental research on emotion regulation has addressed a breadth of questions, examining children's ability to modulate emotional experience, related physiological states, and expressive displays (Band & Weisz, 1988; Cole, Zahn-Waxler, & Smith, 1994; Diener, Mangelsdorf, McHale, & Frosch, 2002; Mangelsdorf, Shapiro, and Marzolf, 1995; Stifter, Spinrad, & Braungart-Rieker, 1999). The specific psychological processes that are used to regulate these diverse components of emotion have also been explored vigorously (Carlson & Wang, 2007; Cole et al., 1994; Field, 1994; Fox, 1994). Commonly reported regulatory processes include approach and avoidance behaviors, self-soothing behaviors, selective orienting/ distraction, and control of emotion-related displays (Carlson & Wang, 2007; Diener et al., 2002; Harman, Rothbart, & Posner, 1997; Rothbart & Derryberry, 1981). Other documented approaches to emotion regulation involve problem-focused and emotion-focused coping, instrumental behavior, cognitive reframing, and effortful restraint (Diener et al., 2002; Eisenberg et al., 2010; Gullone, Hughes, King, & Tonge, 2010; Tamir, Mitchell, & Gross, 2008). Such research has been conducted across a range of age groups, spanning infancy (Diener et al., 2002; Mangelsdorf et al., 1995), toddlerhood, early and late childhood (Eisenberg, 2002; Jaffe, Gullone, Hughes, 2010), adolescence (Hare, Tottenham, Galvan, Voss, Glover, & Casey, 2008; Kobak, Cole, Ferenz-Gillies, Fleming, & Gamble, 1993), and adulthood (Carstensen & Charles, 1998; Ochsner, Bunge, Gross, & Gabrieli, 2002). As a result, much insight has been gained into how individuals regulate emotions, as well as how these skills develop with age.

Despite the wealth and breadth of research, as a whole, developmental research on emotion regulation lacks a strong theoretical and organizational framework, limiting our ability to

study it and, arguably, to appreciate the phenomenon. Part of this disorganization stems from a failure to agree upon common and inclusive terminology. Similar emotion regulatory processes are often assigned different labels and are not grouped together using appropriate overarching concepts. As an example, parent-directed orienting, object-directed orienting, gaze aversion, and distraction are common means of regulating emotions in infancy and toddlerhood (Buss & Goldsmith, 1998, Mangelsdorf et al., 1995), yet they are rarely presented as a group of attention-based regulatory processes. In the same way, toddlers and children may take a problem-solving approach to emotion regulation, seeking help or guidance from an adult, bargaining to achieve more desirable outcomes, or approaching a problem from a number of different ways (Melnick & Hinshaw, 2000; Vaughn, Kopp, & Krakow, 1984). Although all of these approaches involve modifying the emotion-eliciting situation in one's favor, they are rarely conceptualized in this way.

In addition, traditionally, there has been ambiguity concerning the use of the term *emotion regulation* itself. In particular, emotion regulation has been used to describe two distinct processes. On the one hand, when emotions influence other functions, emotions are said to be *regulating*. That is, emotions have been documented to have a strong influence on a variety of mental processes (Bartolic, Basso, Schefft, Glauser, & Titanic-Schefft, 1999; Dreisbach & Goschke, 2004; Gable & Harmon-Jones, 2010; Isen, Niedenthal, & Cantor, 1992; Qu & Zelazo, 2007). On the other hand, emotions can be manipulated by other processes. In these cases, emotions are said to be *regulated*. For instance, individuals can employ strategies to alter the quality, timing, or intensity of an emotional response (Thompson, 1994). Given that most of the literature has focused on the latter type of emotion regulation (e.g., Eisenberg, Spinrad, & Smith, 2004; Gross, 1998; 2002), emotion regulation can be broadly defined as the process of altering the quality, intensity, or timing of physiological, experiential, and/or behavioral components of the emotion.

1.2. Defining a Framework for Studying Emotion Regulation

As noted, an overarching organizational scheme is currently lacking in the developmental literature and developmental research could benefit greatly by adopting an explicit framework for organizing findings on emotion regulation. Considering that emotion regulation is commonly described in terms of regulatory processes (Grolnick, Bridges, & Connell, 1996; Gross, 1998; Thompson, 1994), it is advantageous to delineate emotion regulation based on the type of regulatory process being employed. Indeed, researchers in the adult literature have attempted to identify and label various regulatory processes that are employed when controlling emotion, and as a result, several frameworks have been proposed for categorizing adults' regulatory strategies. For example, certain researchers have chosen to describe each strategy individually as a unique mode of control, aiming to identify specific behavioral attempts to alter emotions. In doing so, some have identified hundreds of regulatory examples. For instance, in one study, Parkinson, Totterdell, Briner, and Reynolds (1996) provided a behavioral directory of over 200 mood-control practices, ranging from exercise to social interaction. Other seminal work in the area of mood regulation has also focused on distinct activities that adults engage in to feel better (e.g., Tice, Bratslavsky, & Baumeister, 2001).

Other categorization attempts have relied on a more general examination of strategies, grouping processes into inclusive categories based on general similarities. For example, Walden and Smith (1997) clustered regulatory efforts into groups based on the target emotional component, be it expressive, physiological, or experiential. Although this approach may be superior to detailed behavioral accounts in terms of organization and practicality, it is not without fault. For instance, very different strategies may result in the same type of outcome (e.g., altered emotional experience), without warranting a similar classification (Gross, 1998).

Alternatively, Gross (1998) classified emotion regulatory practices based on the type of strategy used. Classifying by strategy type holds a number of advantages over other potential classification methods. For instance, strategy use can be prompted and observed across paradigms and is not constrained to particular tasks, emotions, or emotional components. Moreover, this organizational system allows strategies to be grouped by the point in the emotion generative process at which they are practiced. In particular, Gross viewed emotion regulation as being (1) antecedent to or (2) modulatory of the emotional response.

Building on his two-way model, Gross (1998) expanded this classification scheme to include five main classes of regulatory strategies. This scheme categorizes strategies based on their temporal location in the emotion generative process. *Situation selection strategies* are antecedent focused, representing the earliest point of emotion regulation implementation. They involve making choices about interactions, activities, and events based on the expected emotional outcomes (Gross, 1998, 2002). This form of regulation can actually be self-defeating depending on whether short- or long-term outcomes are prioritized (Tice & Bratslavsky, 2000). For example, consider the dieter who chooses to feel the immediate gratification of a prohibited food, but in the long run feels unsuccessful for deviating from the long-term goal. The second, third and fourth groups of strategies are also all antecedent focused. The second group is termed *situation modification* and occurs post-situation selection. Situation modification involves reshaping current activities to achieve a desired emotional state (Gross, 1998, 2002). For example, when working on a frustrating task, one might seek help from others to ease the task and accomplish the goal. The third class of regulatory attempts involves *attention deployment* (Gross, 1998, 2002). Attention control strategies have been described by Thompson (1994) and Ochsner and Gross (2005) as a form of cognitive emotion control. Attention deployment involves ignoring or attending to certain aspects of the

environment to achieve emotion regulatory goals. For instance, attention inhibition can be helpful in avoiding distraction and temptation (i.e., ignoring the television while studying for an exam). Conversely, attention control can entail attentional allocation to selective aspects of the environment, such as looking at a friendly face while giving an oral presentation. The fourth category of strategies in Gross' model is *reappraisal, or cognitive change*, and involves reinterpreting the situation to modulate event-related emotional responses. The meaning one attributes to an event strongly influences the elicited emotion, and has been shown to alter physiological, behavioral, and expressive aspects of emotion (Gross, 2002; Ochsner & Gross, 2005). For instance, cognitively reshaping events in non-affective terms has been shown to reduce subjective and physiological emotional responses (Gross, 1998, 2002; Jackson, Malmstadt, Larson, & Davidson, 2000).

Finally, the fifth class of regulatory processes is practiced at the stage of the response itself, and is the subject of the experimental investigation in the current thesis. It does not necessarily alter the individual's immediate experience, but is focused on the expressive component of the response (Gross, 1998; Gross 2002). This tailoring of emotional displays is often called *response modulation* (Thompson, 1994), but is also referred to as suppression when it involves inhibiting emotional expressions (Gullone et al., 2010).

A review by Hudson and Jacques (2013) organized relevant developmental findings across different strategy types using Gross' framework. Given that response modulation holds the most relevance for the current thesis, a synopsis of Hudson and Jacques' review of this particular form of emotion regulation is provided here. Whereas this specific form of emotion regulation has been termed *response modulation* in the adult literature (Gross, 2002), it tends to be labeled as emotion regulation more broadly in the developmental arena. Consequently, from here on in, emotion

regulation is used to refer to the control of overt displays of emotion.

1.3. Reviewing the Developmental Literature on Emotion Regulation

Children's strategic regulation of emotional displays has strong social implications. Whereas other emotion regulatory strategies are aimed at altering an individual's internal experience, regulation of emotional responses is primarily concerned with external displays of emotions and generally serves a prosocial (considerate of others/socially normative) or self-protective (preservative of reputation or image) role (DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996), although some discuss response modulation as a means of coping with emotions (Gullone et al., 2010; Jaffe et al., 2010).

Regulation of negative emotional displays has been more widely studied than regulation of positive emotional displays. One task commonly used to study children's regulation of negative emotional responses is the disappointing gift paradigm (Saarni, 1984). In this paradigm, children are led to believe that they will receive a desirable gift. However, when they open the gift, they are left with an unwanted item (e.g., a baby toy or a block of wood). Because North American social rules dictate that one responds positively when given a gift, children are required to mask their disappointment and feign positive affect. Saarni's original study indicated that regulation of affect develops across childhood, with 6-year-olds displaying overt negative emotions in response to receiving the undesirable gift and 10-year-olds demonstrating more appropriate positive responses. However, more recent studies using this task have exposed regulatory skills even among preschoolers, suggesting that control over affective displays may emerge earlier than originally thought (Cole, 1986; Garner & Power, 1996; Liew, Eisenberg, & Reiser, 2004). For example, when presented with the disappointing gift, 5-year-olds tend to show less disappointment and are more inclined to say they like the gift than 4-year-olds (Carlson & Wang, 2007). Children's capacity to

suppress inappropriate shows of emotion matures into late childhood, however, with 7- to 8-year-olds showing divergent responses to desired and undesired gifts and only 9- to 10-year-olds responding to disappointing gifts in a way that is indiscernible from their responses to desired gifts (Simonds, Kieras, Rueda, & Rothbart, 2007).

Other exemplar protocols for measuring school-aged children's ability to control negative emotions include a frustration-inducing Lego® task in which Lego pieces are tactically misplaced (Hinshaw & Melnick, 1995; Melnick & Hinshaw, 2000), and competitive puzzle tasks in which children are rigged to lose (Walcott & Landau, 2004). For example, Melnick & Hinshaw (2000) examined a number of emotion regulation variables in 6- to 12-year-old boys with high and low aggression ADHD and comparison boys while they performed the frustrating Lego® task. They found better overall emotion regulation (staying task-oriented; expressing emotions in a non-disruptive way) and reduced negative responses (e.g., blaming others; complaining) in the low aggression and control groups, relative to the high aggression ADHD group.

In a related study (King et al., 2009), 6- to 12-year-olds were led to believe they were playing a competitive computer game against an opponent online. During the game, children could take points, send a buzz of noise, and/or write a message to their competitor, while their supposed opponent did the same (although in reality the researcher controlled responses). King et al. (2009) found that nonmedicated children with ADHD displayed higher levels of aggression (based on their online interactions with the 'opponent') and reported higher levels of anger after being provoked, compared to control children and medicated children with ADHD. Thus, deficiencies in response-focused emotion regulation are seemingly associated with childhood disorders characterized by emotional problems, such as ADHD.

Smith, Hubbard, and Laurenceau (2011) created a scenario comparable to King et al.'s in

which participating children lost a game against a confederate who cheated and measured 8-year-olds' expressive control, finding a large degree of individual variability in children's observable responses. Self-report and physiological (skin conductance reactivity) measures were also recorded, revealing several distinct anger control profiles: physiology-and-expression controllers, expression only controllers, non-controllers, non-reactors, and non-reporters. Work on adult emotion regulation typically finds enhanced physiological activity upon suppression of expressive displays (e.g., Gross, 2002). Thus, the emergence of a physiology-and-expression controller group in the Smith et al. study is exciting, suggesting that certain individuals may simultaneously downregulate both behavioral and physiological components of emotion.

Emotion regulation has been studied in younger children using alternative tasks that maintain the important elements of the disappointing gift task and other similar tasks, namely eliciting negative emotions and requiring their control. For instance, Dennis (2006) measured regulation of emotional responses in 3- and 4-year-olds based on their persistence in an impossible circle drawing task (LabTAB; Goldsmith & Rothbart, 1996) and their frustration in a transparent/toy-enclosed box task (LabTAB; Goldsmith & Rothbart, 1996). Children displayed moderate persistence (persevering for some time, but stopping or protesting at some point during the task) and ranging levels of frustration (based on facial, verbal, and behavioral displays). Other measures from Goldsmith & Rothbart's LabTAB battery have been applied to study regulation of emotional responses in late toddlerhood and the preschool years, including snack barrier, stranger approach, and puzzle tasks (Calkins & Dedmon, 2000; Zimmerman & Stansbury, 2003). Clean-up tasks and candy-denial paradigms have also been employed as indices of regulatory abilities during this period of development (Stansbury & Sigman, 2000). Such studies have focused largely on how various parent and child variables influence children's emotional outcomes.

Regulation of negative emotions has been assessed in older age groups using a frustration-inducing bead sorting task (Zalewski, Lengua, Wilson, Trancik, & Bazinet, 2011) and by prompting parent-teen discourse or public speaking under social evaluative conditions (Zalewski et al., 2011; Zimmerman, Mohr, & Spangler, 2009). For instance, Zimmerman et al. (2009) had adolescents and their mothers take part in a socially evaluative talk show task, in which the mother interviewed them on personal topics in front of a live audience. The interview was video recorded and coded for indicators of emotional reactivity and emotion regulation. There was a wide range of individual variability in adolescent emotionality and emotion regulation, which corresponded dually to genetic influences and attachment status.

Although most research has focused on children's ability to control negative emotional displays, two tasks have been devised to study regulation of *positive* responses for use in younger children. For example, in the puppet-tickling task, children witness a dialogue between two humorous puppets who proceed to tickle the child (LAB—TAB; Goldsmith & Rothbart, 1992). Kochanska, Murray, and Harlan (2000) argue that in situations of excitement and exhilaration, children are expected to control their eagerness and enthusiasm, and thus children should modulate shows of joy in the puppet task to comply with social rules. Administration of the puppet task to toddlers (aged 22 to 33 months) yields highly variable responses, which can be partially attributed to differential levels of inhibitory control (referred to as effortful control by the authors; Kochanska et al., 2000). In a related task - the secret keeping task - children are required to keep an exciting secret about a magic talking fish from the experimenter (Carlson & Wang, 2007). Four- and 5-year-olds have been found to successfully conceal their excitement and maintain the secret when initially provoked, but to give in to later prompts; thus, regulation of excitement appears to be fleeting in the late preschool years.

In addition, Mischel's classic delay of gratification paradigm, in which children must resist an immediate reward to attain a larger but more distal reward (Mischel, Ebbesen, & Zeiss, 1972), can be conceptualized as a measure of positive emotion regulation. Although this task is not traditionally discussed as a direct measure of emotion regulation, its accepted validity to assess impulse control in emotion-laden circumstances qualifies it as such. Specifically, resisting the urge to eat a desirable treat represents a form of control over appetitive responses, hence its qualification as an index of positive emotion regulation. Indeed, others have conceptualized delay of gratification as a form of 'hot' or emotion-based executive function (Garon, Bryson, & Smith, 2008).

Finally, researchers have used parent- and self-report measures with child and adolescent samples. For example, Rydell, Berlin, and Bohlin (2003) examined regulation of negative (anger, fear) and positive emotions (exuberance) in children at age 5, and again at age 6, using The Emotion Questionnaire, which assesses children's ability to self-regulate and to regulate emotions with the assistance of others. Emotion regulation variables were interrelated, but correlations were strongest for same-valence emotions. Relatedly, Gullone, Hughes, King, and Tonge (2010) administered the Emotion Regulation Questionnaire for Children and Adolescents (ERQ-CA) to youth ranging from 9-15 and found that participants in the lower end of this age range reported suppressing emotions more than their older peers. It is noteworthy that the items from this questionnaire are not in relation to socially appropriate response modulation (which is the focus of the behavioral paradigms discussed above), but rather in reference to controlling emotional displays as a means of private coping (e.g., I control my feelings by not showing them). Along with age effects, expected gender effects were described by Gullone et al., with boys reporting more use of emotion suppression strategies than girls. Such gender differences in emotion regulation may be

especially prominent during the school years, when gender is treated as a culture or social category and is associated with stronger and more differentiated gender-specific behaviors (Maccoby, 1988).

1.4. Gaps in the Literature and Thesis Objectives

In reviewing the developmental literature on emotion regulation as it pertains to response modulation, it becomes clear that there are certain overarching gaps. Researchers in other areas of cognitive development have taken a structural approach to understanding broader abilities in terms of more basic underlying cognitive functions (e.g., Alloway et al., 2004; Jenkins & Astington, 1996). By breaking down complex skills (e.g., arithmetic abilities) into more basic processes (e.g., processing speed, working memory, phonological abilities), important contributing variables can be identified (Fuchs et al., 2006). Recent work in the area of emotion regulation has followed a similar means of understanding emotion regulation in terms of its related cognitive and socioemotional skills.

More precisely, there is empirical and theoretical evidence that emotion regulation may depend on developments in theory of mind, emotion and display rule knowledge, and inhibitory control (Blankson, O'Brien, Leerkes, Marcovitch, Calkins, & Weaver, 2013; Carlson & Wang, 2007; Leavitt & Power, 1989; Liebermann, Giesbrecht, & Müller, 2007). In other words, children may require knowledge of others' emotions and of normative emotions and displays associated with various situations, as well as basic inhibitory abilities, before they can successfully regulate emotions. However, no study to date has included such measures concurrently, making it difficult to identify which of these interrelated skills relates most strongly to emotion regulatory function. Therefore, across the three thesis experiments, tasks that assess these socioemotional and cognitive skills have been included to determine how they correlate with established and novel measures of emotion regulation. As a first step, Study 1 was conducted to assess how potentially

relevant variables relate with performance on an established measure of negative emotion regulation - the disappointing gift paradigm.

In addition, for the most part, emotion regulation research tends to focus on regulation of negative emotional displays (Dennis, 2006; Melnick & Hinshaw, 2000; Saarni, 1984; Zimmerman & Stansbury, 2003), while information on children's ability to modify positive reactions is relatively sparse (but see Carlson & Wang, 2007; Kochanska et al., 2000). Moreover, existing positive emotion regulation tasks are limited, especially in terms of their targeted age ranges, which are restricted to toddlers and preschoolers. Regulating negative emotions has intuitive appeal, but at times it is also necessary to control positive emotions. In fact, children who can control both positive and negative emotions are deemed to have superior social skills (McDowell & Parke, 2000). For instance, during serious or solemn occasions, such as a funeral, it is appropriate to control positive displays. Thus, another thesis objective was to develop protocols for studying regulation of positive emotions in a broader age range. Studies 2 and 3 address this objective by presenting two novel measures of positive emotion regulation. As noted, Study 1 first established correlates of emotion regulation, using the disappointing gift paradigm as a standard measure of negative emotion regulation. In Studies 2 and 3, this line of research was extended to new measures of positive emotion regulation to determine whether the same variables related in the same way with these two measures.

More specifically, in Study 1, children were administered Saarni's disappointing gift paradigm as an indicator of negative emotion regulation, as well as a battery of tasks to measure theory of mind, emotion and display rule knowledge, and inhibitory control. Correlational analyses were conducted to establish relations between these variables and children's regulation of disappointment. Regression analyses were also conducted to identify unique predictors of emotion regulation. Study 2 also used the disappointing gift paradigm as an index of negative emotion

regulation, and included a novel measure of positive emotion regulation – the staged accident task – in which children were engaged in an exciting game with the experimenter and had to control positive game-playing behaviors during a staged game piece spill. The primary objective of this study was to determine how children’s regulation of positive emotions (in the staged accident task) related with their regulation of negative emotions (to the disappointing gift). In addition, Study 2 examined whether socioemotional and cognitive correlates were similar or dissimilar for regulation of positive versus negative emotions. Finally, in Study 3, a rigged card game was created to study children’s regulation of positive and negative emotions, in which children won a good or bad gift and watched the experimenter win a good or bad gift in different contexts (i.e., opening the gift before or after the experimenter opened one of greater or lesser value). Children’s ability to control negative and positive emotions was compared, and relations between socioemotional reasoning, inhibitory control, and regulation of emotions in the different rigged card game scenarios was assessed. In all three studies, individual characteristics (i.e., age and sex) were also included as potential correlates of emotion regulation as these have been shown to relate to emotion regulatory abilities in previous studies (Cole, 1986; Saarni, 1984; Simonds et al., 2007).

CHAPTER 2 (STUDY 1)

2.1. Introduction

In studying emotion regulation, it is important to measure its development together with other potential contributing skills. By doing so, functions that may be responsible for individual- and age-related differences in emotion regulation and dysregulation can be identified. Hence, the current study examined theoretical constituents of emotion regulation in 5- to 7-year-olds to provide insight into specific processes that may contribute to emotion regulation. The period from 5- to 7-years of age was selected as this represents a time when emotion regulatory abilities undergo rapid development (Denham et al., 2007). Children's ability to control their display of negative affect was used as an index of emotion regulation and was assessed using a well-validated disappointing gift paradigm (Saarni, 1984).

2.1.1. Correlates of emotion regulation. Developments in emotion regulation may depend on the development of key related abilities. For example, children may need adequate social and emotional knowledge to engage in appropriate emotion regulation (Garner & Power, 1996). That is, emotion regulation generally serves self-protective, prosocial, or norm maintenance purposes (DePaulo et al., 1996), and thus mature reasoning about one's own and others' emotions and understanding of social display rules may be important precursors to regulatory attempts. Likewise, the ability to control one's emotions may draw upon *executive functions* (i.e., cognitive processes necessary for the voluntary control of thought and action; Jacques & Marcovitch, 2010; Miyake et al., 2000; Zelazo, Carter, Reznik, & Frye, 1997), and *inhibitory control* in particular (Carlson & Wang, 2007; Hofmann, Schmeichel, & Baddeley, 2012; Kieras, Tobin, Graziano, & Rothbart, 2005). Inhibitory control refers to the ability to inhibit one's behavior when that behavior is or becomes inappropriate. Thus, activating appropriate emotional displays in social situations, despite

conflicting internal feelings, likely involves overriding the natural reaction of displaying true affect and summoning a more appropriate response (Duncan & Owen, 2000).

In short, children may not only need to know about emotions and about how emotional displays affect others, but also be able to control their behavior, before they can implement this knowledge to effectively regulate emotional displays. This dual requirement of knowledge of appropriate responses as well as inhibitory control over inappropriate responses has been documented in other areas of development, such as rule use (Zelazo, Frye, & Rapus, 1996). Thus, measures of socioemotional understanding (neutral and affective *theory of mind* (ToM), knowledge of emotions and social display rules) and measures of inhibitory control (to both neutral and affective stimuli) were included as potential predictors of emotion regulation. Emotion regulation was also examined as a function of age and sex to determine whether these individual characteristics predict emotion regulation.

As discussed below, theoretical and empirical evidence suggests that developments in these domains could contribute to children's growing ability to regulate emotions (e.g., Carlson & Wang, 2007; Garner & Power, 1996; Saarni, 1984). Yet, no study to our knowledge has concurrently examined links between emotion regulation and relevant aspects of socioemotional reasoning (theory of mind, emotion and display rule knowledge) and executive functions (inhibitory control), making it difficult to identify which of these skills best account for variation in emotion regulation. That is, because socioemotional skills, such as ToM, and inhibitory skills are interrelated (Carlson & Moses, 2001), it is necessary to consider these competencies together to identify which functions are uniquely important for regulating emotions. In addition, although, in theory, associations between hypothetical use of display rules (as measured using story vignettes) and actual use of display rules (i.e., emotion regulation) would be expected, this needs to be confirmed empirically.

The current study addresses these gaps in the literature.

2.1.1.1. Theory of mind. ToM is the ability to reason about others' mental states (like desires, emotions, and beliefs), even when these conflict with reality (Perner, 1999). A link between ToM and emotional competence makes sense in that understanding how one's behaviors affect others' mental states should encourage compliance with social rules by way of emotion regulation. For example, in the disappointing gift paradigm, children who understand that the experimenter may feel sad if they show disappointment upon receiving the gift may be more inclined to hide their true emotions than children who cannot anticipate the experimenter's mental state. Additionally, according to Underwood and Moore (1982) and Vaish, Carpenter, and Tomasello (2009), perspective taking, or ToM, is related to socially competent behaviors, such as empathy and connectedness to peers, which might draw upon emotion regulation.

ToM emerges and matures over a time course that co-occurs with significant advances in emotion regulation. Whereas 3-year-olds respond incorrectly on standard first-order false-belief ToM tasks (Clements & Perner, 1994), 4-year-olds accurately interpret the contents of others' minds (including beliefs; Astington & Gopnik, 1991; Perner, 1991; Wellman, 1990). Similarly, successful suppression of negativity and generation of positive affect in the disappointing gift paradigm has been observed in some children in the late preschool years (Cole, Zahn-Waxler, & Smith, 1994; Garner & Power, 1996). However, Liebermann, Giesbrecht, and Müller (2007) failed to find a relation between performance on ToM tasks that required reasoning about other people's beliefs and emotion regulation on the disappointing gift paradigm. This may be due to the age-range at which *first-order* false-belief tasks are passed, or to the fact that the researchers assessed understanding of beliefs, not emotions (or both).

Instead, it was predicted that performance on advanced mental state tasks, or *second-order*

ToM tasks (tasks that require reasoning about the understanding that others have about the mental states of a third party), may be more strongly related with emotion regulation than first-order ToM, given that second-order ToM performance is linked to lie-telling abilities (Talwar, Murphy, & Lee, 2007). Because concealing true emotions and feigning alternative expressions is, in essence, a form of lying, a relation between second-order ToM and emotion regulation was expected. Moreover, reasoning about others' beliefs may be insufficient to instigate emotion regulation. A more likely driving force for regulating emotions may be children's understanding of others' emotions, or affective ToM. In theory, individuals may draw upon affective ToM and emotion regulatory abilities for Machiavellian purposes, such as manipulation or self-promotion. However, the ability to reason about others' emotions may generally support emotion regulation for prosocial or norm maintenance purposes. In fact, Leavitt and Power (1989) proposed that receptivity to others' emotions facilitates use of context-appropriate emotional displays. Thus, in the current study, a second-order ToM task that required reasoning about the *emotions* of others (Harris, Johnson, Hutton, Andrews, & Cook, 1989) was administered in addition to a second-order false-belief task.

2.1.1.2. Emotion knowledge. Another development that might influence children's abilities to hide negative emotional displays is the acquisition of knowledge about basic situation-specific emotions (Denham, Blair, DeMulder, Levitas, Sawyer, Auerbach-Major, et al., 2003; Lewis, Sullivan, & Vasen, 1987). That is, in addition to being a byproduct of physiological processes, emotions are also dictated by knowledge stores about situation-congruent responses and goal-outcome combinations (Levine, 1995; Mandler, 1990; Stein, Trabasso, & Liwag, 1993). For example, stored knowledge may help one identify winning as a positive experience and losing as a trigger for anger or sadness. Emotion regulation may require recognizing normative emotions associated with various situations before those emotions can be deemed inappropriate and altered (Leavitt &

Power, 1989). In fact, Garner and Power (1996) found that emotion knowledge positively related to children's control of negativity in the disappointing gift paradigm. Relatedly, knowledge of emotion expressions and labels has been shown to predict positive social behaviors in children at risk (Izard et al., 2001).

In short, theoretical and empirical evidence suggests that changes in emotion regulation in early-to-mid childhood could result from children's growing understanding of emotions, specifically children's familiarity with situation-congruent emotions. Thus, in the current study, children's emotion knowledge was assessed using an adaptation of the emotion knowledge task by Garner, Jones, and Miner (1994).

2.1.1.3. Display rule knowledge. Another form of emotion knowledge involves familiarity with social display rules. Display rules are conventions that determine when, where, and how expressive behaviors should be conveyed (Saarni, 1981). Display rule knowledge builds on basic situational emotion knowledge in that it integrates information about what one 'feels' in a given context with what one should 'show' in that situation (Denham, McKinley, & Couchoud, 1990; Garner et al., 1994). Given the added complexity of the knowledge involved, it is not surprising that display rule knowledge appears somewhat later in development than basic emotion knowledge. Harris (1993) determined that children understand disagreements between internal and external emotions at age 6. Fuchs and Thelen (1988) demonstrated that it is also at this age that children understand the costs and benefits of their emotional displays. However, in grade three, there is still substantial variability in levels of display rule familiarity, which has been attributed to different home environments (Jones, Abbey & Cumberland, 1998; McDowell & Parke, 2000), although there appears to be little in terms of developmental advances in display rule knowledge after grade five (Gnepp & Hess, 1986; Underwood, Coie, & Herbsman, 1992). Like the other abilities discussed to

date, the development of display rule knowledge coincides with developments in emotion regulation, suggesting that the two functions could be interrelated. For example, whereas even preschoolers are known to attempt to control their responses in the disappointing gift paradigm (Garner & Power, 1996; Liew et al., 2004), it is not until mid to late elementary school that they show convincing positive reactions, comparable to reactions shown when obtaining a desirable gift (Saarni, 1984; Simonds et al., 2007).

A link between emotion regulation and display rule knowledge was also anticipated given that awareness of emotion regulatory processes is a central feature of display rule understanding (Jones et al., 1998). Conversely, display rule knowledge should predict appropriate emotion regulation. Indirect support for this idea comes from the finding that display rule knowledge relates to social and emotional competence (Eisenberg et al., 1997; Liew et al., 2004; McDowell & Parke, 2000). Thus, one of the goals of the current study was to measure *understanding* of display rules and to assess its relation to observable *use* of display rules (i.e., emotion regulation). To do so, children were presented with a modified version of the display rule knowledge task by Jones et al. (1998).

2.1.1.4. Inhibitory control. Childhood not only represents a time of rapid emotional development (Zelazo & Cunningham, 2007), but is also marked by radical change in higher order cognitive functions, including executive functions. Of the executive functions, inhibitory control is thought to be particularly important for emotion regulation (Carlson & Wang, 2007). The notion that basic inhibitory control and control over emotional responses are related is in part due to the similar documented developmental trends. That is, marked advances in performance on inhibitory control paradigms appear between the third and fifth year of life (Carlson, 2005; Diamond, 2006; Garon, Bryson, & Smith, 2008; Reed, Pien, & Rothbart, 1984; Strommen, 1973), at roughly the same

time that changes in children's emotional behaviors have been noted (Kopp, 1989; Zelazo & Cunningham, 2007). Inhibitory control and emotion regulation also appear to share similar underlying neural mechanisms (Diamond, 2013; Ochsner & Gross, 2005). In addition, school success and prosocial behavior seem to rely on both children's inhibitory control skills and emotional competence/ regulation (Blair & Razza, 2007; Bull & Scerif, 2001; Durlak et al., 2011; Gumora & Arsenio, 2002), suggesting that some crossover between the two constructs could exist. Finally, both involve inhibition of a dominant response and substitution with a nondominant response (Rothbart, 1989; Rothbart & Bates, 1998).

In short, based on this overlap in emotion regulation and general inhibitory control demands, along with their shared neural underpinnings and developmental paths, the two processes are thought to be related. Indeed, Carlson & Wang (2007) investigated the link between inhibitory control (using a battery of behavioral tests) and regulation of emotional expression in the disappointing gift paradigm in 4- to 6-year-olds and found that the two constructs were significantly related. Relatedly, Liebermann et al. (2007) found a marginally significant correlation between inhibitory abilities on a gift delay task and displays of positive affect in 3- to 5-year-olds in the disappointing gift paradigm, and Kieras et al. (2005) reported that preschoolers who exhibited strong response inhibition on behavioral tasks responded to a disappointing gift in a way that resembled true positive responses to a desirable gift. Hence, the current study examined the relation between emotion regulation and performance on inhibitory go/no-go tasks in conjunction with performance on the socioemotional measures described above.

Whereas basic inhibitory control may be a good predictor of emotion regulation, it is anticipated that performance on an *affective* inhibitory control task might act as an even stronger predictor. For this reason, the current study not only examined the relation between emotion

regulation and performance on a standard inhibitory control task (the neutral go/no-go task), but also between emotion regulation and performance on a modified inhibitory control task that used emotional stimuli as signals to respond and inhibit responding (the affective go/no-go task). A positive relation between emotion regulation and the standard go/no-go task, and a stronger relation with the affective version, was expected.

2.1.1.5. Individual characteristics. Finally, substantial advances in regulatory abilities occur in the late preschool and early elementary years (Carlson & Wang, 2007; Simonds et al., 2007). Attempts to control negative displays in the disappointing gift paradigm emerge as early as age 3 and 4 (Cole, 1986; Garner & Power, 1996), but it is not until about age 10 that children are convincing in their emotional facades, easily summoning positive displays in the disappointing gift paradigm (Saarni, 1984; Simonds et al., 2007). Thus, as mentioned previously, age was expected to contribute significantly to the model. Moreover, sex differences in emotion regulation have been documented, in that girls are better at regulating emotions than boys (Cole, 1986; Feldman & White, 1980; Simonds et al., 2007). For instance, Cole (1986) studied emotion regulation in the disappointing gift paradigm in children aged 3 to 9 and found that girls engaged in more positive displays than boys. In fact, Saarni's original observations of children's emotional reactions to the disappointing gift included a sex by age interaction, in which first graders were poor at concealing disappointment, especially if they were boys, and fifth graders were accomplished at concealing disappointment, particularly if they were girls. Together these findings indicate that age and sex may be important predictors of emotion regulation, although it is not clear whether variance due to age and sex may be shared with the development of other related abilities that also vary by age and/or sex.

2.1.2. Predictions. Although empirical and theoretical work exists suggesting that

understanding of emotions and display rules, and inhibitory control may be linked to emerging emotion regulation in children, no study has examined them in combination, making it difficult to identify which of these interrelated skills best account for variation in emotion regulation on the disappointing gift task. In addition, age and sex were included as predictors of emotion regulation, as both have been linked to emotion regulation abilities (e.g., Cole, 1986; Saarni, 1984), and to the development of emotional understanding and inhibitory control.

All predictors were expected to relate to performance on the disappointing gift paradigm. However, because of shared variance between predictors, only a subset was expected to account for unique variance in emotion regulation. As noted, emotion regulation may dually require inhibition of the true emotional response and knowledge and activation of the socially desirable display. As such, inhibitory control and at least some aspects of socioemotional understanding (ToM, emotion knowledge, display rule knowledge) were expected to be unique predictors of children's regulatory abilities, above and beyond age and sex.

2.2. Method

2.2.1. Participants. One hundred and seven children participated in the current study, ranging from 60 to 96 months of age ($M = 80.86$ months, $SD = 8.64$; 64 girls). Children were recruited from schools and after-school programs across two communities, one urban (population approximately 300,000), and one rural (population approximately 14,000). Children were predominantly White, middle class, although aside from age and sex, demographic information was not systematically collected. Written consent was obtained from children's caregivers prior to testing, and verbal assent was obtained from children at the time of testing. All children were tested individually in a quiet location in their school, after-school program centre, or in a university laboratory.

2.2.2. Materials & design. The measures included neutral and affective ToM tasks, emotion understanding and display rule knowledge tasks, neutral and affective inhibitory control tasks (go/no-go), and the disappointing gift paradigm. The disappointing gift task was always presented last, but the order in which the other measures were administered was counterbalanced across participants in a manner that permitted equal exposure to each order. The emotion knowledge and display rule knowledge tasks appeared adjacently, but with the latter always succeeding the former due to its increased complexity. A measure of receptive vocabulary (the PPVT) and a parent questionnaire about social skills and emotions were also administered but these are not discussed as they did not relate to any of the outcome measures, nor do they change the findings described in the current thesis.

All computerized tasks (ToM, emotion understanding, display rule knowledge, and go/no-go tasks) were administered on a Compaq laptop computer. Tasks were programmed and children's responses were recorded with SuperLab Pro for Windows, Version 2.0.4.

2.2.3. Procedure. All testing sessions were videotaped. Initial scores for all measures except for the disappointing gift were recorded by the computer and then checked with videotapes to ensure accuracy. Reactions to the disappointing gift were coded by two independent coders using videotaped recordings (see Disappointing Gift Paradigm section).

2.2.3.1. Theory of mind tasks. Two neutral ToM tasks were administered to assess children's understanding of false belief. First- and second-order ToM stories (which assessed children's understanding of false beliefs and of false beliefs regarding a third party's knowledge/beliefs, respectively) were read to children while showing relevant pictures on a computer screen. The first-order task was always presented first and pending accurate responses to a reality-based and a false-belief question, the experimenter administered the second-order ToM

task. The first-order ToM story was a simple change-of-location false-belief task (Wimmer & Perner, 1983). After the story, children were asked a false-belief (*Where will Sally look for the apple?*) and reality (*Where is the apple really?*) question, and indicated the location by clicking on the appropriate picture (basket or box) using a mouse.

If they succeeded on this easier task (answered both questions correctly), children were given a more difficult, second-order false-belief story (Sullivan, Zaitchik, & Tager-Flusberg, 1994). Performance on this type of second-order false-belief measure has previously been associated with children's ability to deceive (Talwar et al., 2007). Given that emotion regulation can be framed as a form of deception, it was important to consider false-belief reasoning in relation to children's regulation of disappointment. In the second-order task, the experimenter also asked children two questions: a second-order false-belief (*Where does Simon think that Mary will look for the chocolate?*) and a reality question (*Where is the chocolate really?*). Children indicated the appropriate location for both questions by clicking on the appropriate picture on the computer screen with the mouse. Performance on these *neutral* ToM tasks was combined into a single second-order score.¹ That is, correct responses for reality and false-belief questions were required on both tasks to receive a score of 1. Otherwise, children were awarded a score of 0.

An affective ToM task that required reasoning about a character's beliefs and emotions was also administered (Harris et al., 1989). This task consisted of a story in which a monkey shared a snack with a bear, but surreptitiously changed the contents of the snack box so that the bear thought from the outward appearance of the container that it was receiving a preferred snack even though the container contained a disliked snack. The task included four control questions to assess

¹Given the age range of the sample and the desire to make the neutral and affective ToM comparable in terms of difficulty, only second-order scores were considered, as variability in first-order ToM reasoning is found primarily in preschoolers.

children's memory for story events: *What does Toby like to eat? What does Toby not like to eat? What is inside the box of cookies? What is inside the box of raisins?* Children answered these questions by clicking on the appropriate pictures on the computer screen using the mouse. They were then asked a series of questions, only some of which are relevant to the current study. Namely, after the monkey distributed the containers, but before the box was opened, children were asked a first-order false-belief question (*What does Toby think is in the box of cookies?*), and a second-order emotion question, dependent on correct understanding of the first-order false-belief question (*Is Toby happy when Mickey gives him the box of cookies?*).

Their performance on the affective ToM task was indicated by a single score. That is, if children erred on any of the four control questions, they received a 0. If they were correct on the first-order false-belief question, but erred on the second-order emotion question, they also received a 0. To receive a 1, correct responses were required for the control and false-belief questions, as well as the second-order emotion question.²

2.2.3.2. Emotion and display rule knowledge tasks. A slightly modified version of the emotion knowledge task by Garner et al. (1994) was employed to measure basic emotion understanding. This specific task was selected as it has previously been applied in research linking emotion knowledge and emotion regulation (Garner & Power, 1996). Children were read ten one-to-two sentences stories and shown pictures of the main character of each story with five possible facial expressions (happy; sad; angry; afraid; surprised).³ The story character and corresponding facial pictures were matched to the gender of the child. For instance, one story depicting fear read: *David/Mary walks through the woods and meets a hungry bear.* Children were asked to click on one

² This was scored in this manner to be consistent with the neutral ToM task.

³ Prior to the emotion knowledge and display rule tasks, pretests were conducted to verify that children could identify the requisite emotions used in the stories. Overall, accuracy on the pretest was high for the emotion knowledge task ($M = .94, SD = .15$) and for the display rule task ($M = .99, SD = .03$).

appropriate emotional expression for each story. Correct and incorrect responses were awarded 1s and 0s, respectively, and proportion correct was used as an overall emotion knowledge score.

Display rule knowledge was examined using a modified version of the display rule knowledge task by Jones et al. (1998). Previous work has associated children's performance on this measure with children's social competence (Jones et al., 1998) and thus it was deemed appropriate for use in our investigation of predictors of emotion regulation. In this task, children were read eight short stories, and were asked to select two emotion states: the appropriate external facial expression (happy; sad; angry; neutral) that the story character should display, as well as the true internal emotion (happy; sad; angry; neutral) the story character feels on the inside. For half of the stories, the external expression and internal emotion were the same (congruent feeling-expression stories; e.g., *Devin makes a painting for his/her parents. His/her parents think the painting is beautiful and give Devin his/her favorite treat to say thank-you.*), and for the other half of the stories, the external expression and internal emotion were incongruent (incongruent feeling-expression stories; e.g., *Sam and his/her friend are in a race at school. Everybody's parents are there to watch. Sam wins the race and Sam's friend comes in last. Everyone claps for Sam, but no one claps for his/her friend. Sam and his/her friend go back to the change room together to change their clothes.*). Internal feeling pictures (blank face, with the facial expression displayed over the heart) and external facial expression pictures were presented to children in a fixed order and children were asked to click on one appropriate feeling (e.g., *How does _____ feel on the inside?*) and one appropriate expression (e.g., *How should _____ look on the outside?*) for each story using a mouse. Again, the story character and pictures were gender-matched to the child. Correct and incorrect responses were given 1s and 0s, respectively. Separate proportions were calculated for internal feeling and external display questions. For the purpose of the current study, only

proportion of correct external display questions was used because this score was most likely to relate to children's emotion regulation.

2.2.3.3. Inhibitory control measures. Two go/no-go tasks were administered as measures of inhibitory control (Luria, 1959). Other measures of inhibitory control are commonly used with children (e.g., pictorial Stroop tasks). However, because these require verbal responses, results can be confounded by children's capacity to use word labels or the strength of semantic associations between pictures and words (see Lagattuta, Sayfan, & Monsour, 2011). In this way, the go/no-go task represents a purer measure of inhibitory control. In the neutral go/no-go task (which measured inhibitory control to neutral stimuli), participants were asked to sit in front of the computer where pictures of a sun or a moon were presented individually at the rate of one picture every 1000 ms (with each picture being displayed for 500 ms). The experimenter instructed participants to press a key as quickly as possible when they saw a sun, and to withhold pressing the key when they saw a moon (Figure 2.1a). The affective go/no-go task was similar to the sun and moon go/no-go task but in this version, pictures were emotional in nature (happy and sad faces), and children were instructed to press a key as quickly as possible when they saw a happy face, and to withhold pressing the key when they saw a sad face (Figure 2.1b). Happy and sad faces were represented by different ethnicities and genders. Both go/no-go tasks were divided into three blocks, which differed in the percentage of go trials. All children received a 50% go block first, and then half received a 25% go block and then a 75% go block, whereas the other half received these latter two blocks in the reverse order. All go trials for which a response was made were awarded a score of 1, whereas those trials for which children failed to respond were scored a 0. For the no-go trials, in contrast, a score of 1 was awarded if children withheld their response (correct inhibition) and a score of 0 was awarded if a response was made. Proportion of correct inhibitions on the 75% go

block was used as the measure of interest for both neutral and affective tasks because this block established a prepotent tendency to respond and thus required inhibition of a habitual response.

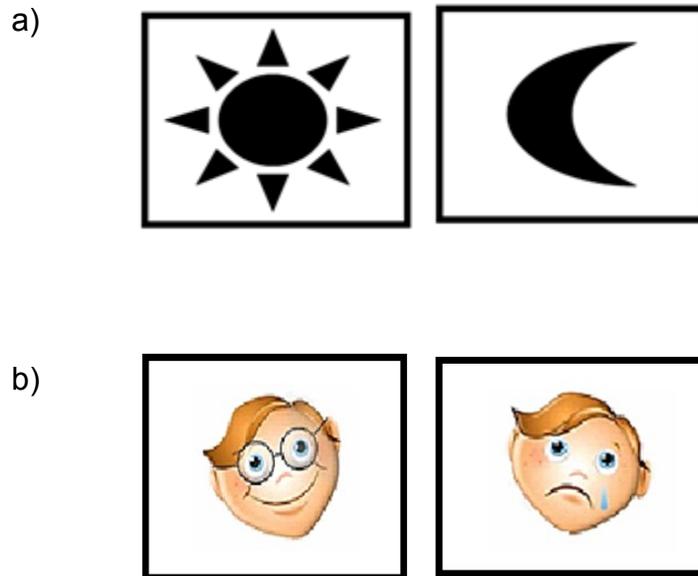


Figure 2.1. Stimuli used in (a) neutral go/no-go and (b) affective go/no-go tasks.

2.2.3.4. Disappointing gift paradigm. Once all other tasks were completed, the experimenter proceeded to the disappointing gift paradigm. That is, to thank them for participating in the study, children were presented with a gift bag in which a clothespin had been planted. Their emotional reactions to the gift were recorded. As per Liew et al. (2004), during the gift exchange, the experimenter maintained a neutral facial expression and eye contact with the child so as to not influence their emotional responses in any way. Once responses were sufficiently captured on video, the experimenter claimed to have made a mistake and given children the wrong gift. A fun gift (i.e., stickers) was then given to children. Thus, any disappointment elicited in children was short-lived and all children left the test session with a desirable gift. The duration of the gift response was tailored to give children adequate time to respond to the disappointing gift and thus varied across children, allowing for a more naturalistic gift exchange setting. Thus, some

methodological precision was sacrificed to obtain sufficient data for each child and for the purpose of creating a credible, ecologically relevant gift-giving scenario.

Note that children had not been primed to expect a desirable gift by giving them a desirable gift in an earlier test session or by asking them to indicate their most and least preferred gifts from an assortment of prizes, as has been done in some past studies (Cole, Zahn-Waxler, & Smith, 1994; Garner & Power, 1996; Liew et al., 2004). However, a clothespin has been used as a disappointing gift in this paradigm (Liew et al., 2004) and indeed most of the children showed some indication of disappointment upon opening the gift. Additionally, because the experimenter presented herself in a friendly and receptive way throughout the test session and gave the child an attractively packaged gift as a way to say *thank you* for their work, children were most likely expecting a positive reward.

Facial expressions, vocal intonations (i.e., *how* children spoke), verbal utterances (i.e., *what* children said), and overall behavioral responses to the gift were coded independently by two coders from video recordings. For each of these four response categories, coders gave children a -2 or -1 for negative displays depending on the intensity of children's reactions, 0 for equally mixed or neutral reactions, +1 or +2 for positive reactions (also depending on intensity; see Table 2.1). This coding scheme was selected as it captures both the valence and intensity of children's responses to the gift. A composite measure of emotion regulation on the disappointing gift paradigm was tabulated by averaging scores from the facial, vocal, verbal, and behavioral response components, which was appropriate given the significant interrelations between these scores, all $r_s(107) > .33$, $p < .01$.

Table 2.1

Examples of Negative (-2, -1), Neutral (0), and Positive (+1, +2) Responses for the Various Components of Children’s Responses to the Disappointing Gift

Component	Score Range				
	-2	-1	0	+1	+2
Facial	Full frown	Slight frown	Straight	Slight smile	Broad smile
	Eyebrows drawn together	Look of confusion or skepticism	mouth		Smiling eyes
	Nose wrinkling				
	Eye rolling				
	Teary eyes				
Vocal	Sarcastic/ forceful	Faint, hesitant Emitting negative noise	Clear, neutral tone	Pleasant Emitting positive noise	Excited Sing-song Emitting positive noise (ooh/aah)
	Sad/ wavering Emitting negative noise (snort/sigh)	(snort/sigh)		(ooh/aah)	noise (ooh/aah)
Verbal	<i>I don’t want this</i>	<i>Is this my gift? This?</i>	<i>A (<u>names gift</u>)</i>	<i>My mom could use this</i>	<i>Thank-you Cool</i>
	<i>Only this – nothing else?</i>		<i>What is this?</i>	<i>I will use it to...</i>	<i>I like it</i>
	<i>I don’t need this</i>		<i>What is it for?</i>		

Behavioral	Throws gift back in bag	Searching in bag for another present	Sitting neutrally with gift in hand or on table	Devotes some attention to gift	Play behavior Eye contact
	Gaze shifting or avoiding eye contact	Gaze shifting or avoiding eye contact		Some play-like behavior	
	Leaves before being dismissed	Shoulder shrug or slouch			
	Shoulder shrug or slouch				

Children's responses were also scored for effort to control emotion, that is, to what extent it appeared that they were regulating their emotional responses, with 0 indicating no effort to control, 1 indicating some effort to control, and 2 indicating strong effort to control emotion. A score of 0 on this measure was awarded if children appeared to be acting genuinely and letting their true emotions (be they positive or negative) show during the gift exchange. A score of 1 or 2 was awarded based on how much effort to control emotion was taking place, in terms of competing shows of emotion (e.g., initial disappointment, but subsequent positive display), and behaviors that hinted at deliberate regulation (self-soothing; fidgeting; see Table 2.2). This measure of effort to control emotion bears some similarities to active self-regulation in Cole and colleagues (1994), to transitional behaviors in Saarni (1984), and to adaptor behaviors in Ekman and Friesen (1969).

Table 2.2

Indicators of Effort to Control Emotion in the Disappointing Gift Paradigm

	No effort to control emotion (0)	Effort to control emotion (1-2, depending on amount)
Description	Unconcealed disappointment or genuine positive response	Attempt to mask disappointment and activate positive response
Mixed affect	Response is fully negative or positive, not mixed	Evidence of mixed affect within response component (i.e., initial frown followed by smile or vice versa) or across response components (looking sad despite saying thank-you)
Transitional/adaptor behaviors	No transitional or adaptor behaviors to indicate deliberate regulation	Behavioral indicators of uncertainty or intrapersonal conflict (self-soothing; fidgeting; nervous giggling; touching face; twirling hair; biting lip)

Intraclass correlations for coding facial, vocal, verbal, and behavioral response components were .93, .90, .98, and .90, respectively, and the intraclass correlation coefficient was .88 for effort to control emotion. Disagreements in coding were resolved by reviewing the given video recording

and discussing the point of disagreement until a consensus was reached.

2.3. Results

Descriptive statistics for all variables are presented in Table 2.3. Except for the ToM scores

Table 2.3

Descriptive Statistics for all Variables (N = 107)

Variable	Mean (SD)	Range	Skewness	Kurtosis
Age (mos.)	80.86 (8.64)	60-96	-.41	-.54
Neutral ToM	.42 (.49)	0-1	.34	-1.90
Affective ToM	.36 (.48)	0-1	.56	-1.71
Emotion Knowledge	.74 (.21)	.20-1	-.73	.11
Display Rules- External	.68 (.15)	.13-1	-.79	.90
Neutral Inhibitory Control	.73 (.20)	.13-1	-.99	.86
Affective Inhibitory Control	.65 (.22)	0-1	-.57	-.14
Gift – Composite	-.11 (.88)	-2+2	.49	-.19
Gift – Effort	.71 (.71)	0-2	.49	-.91

(which were dichotomous), data were relatively normal and not skewed based on skewness and kurtosis values that fell within an acceptable range. Data were missing for a few children for some of the computer tasks due to computer freezing, interruption of child testing, or accidental exclusion of the task (1 for affective go/no-go task; 2 for neutral go/no-go task; 2 for neutral ToM; 1 for affective ToM; 1 for display rule knowledge). Multiple imputations were used to deal with missing data using five imputations, as recommended by Tabachnick and Fidell (2007) and Rubbin

(1996). Analyses were conducted on pooled averaged data.⁴ As a first step, zero-order correlations were calculated to assess relations between socioemotional and inhibitory abilities and responses to the disappointing gift. These were followed up with regression analyses to provide a more stringent examination of links between variables.

2.3.1. Zero-order correlations. Zero-order correlations were calculated to examine simple relations between variables (Table 2.4). Notably, different aspects of the gift response itself (i.e., composite emotion regulation and effort to control emotion) were significantly related, revealing that children who expended effort in responding to the gift also summoned more positive responses. Despite this association, slightly different sets of variables related with these different aspects. That is, affective ToM, display rule knowledge, and neutral inhibitory control correlated with children's composite measure of emotion regulation in the disappointing gift paradigm, but age, emotion knowledge, and neutral inhibitory control significantly related with the amount of discernible effort children showed in regulating their emotions. Thus, only inhibitory control correlated with both children's emotional displays and with the apparent effort they needed to control these displays.

In addition, although no specific predictions were made, some significant correlations were observed between predictors themselves (see Table 2.4 again). For example, display rule knowledge was marginally correlated with age, illustrating that knowledge of appropriate social displays improved with age. Significant correlations were seen between inhibitory control and sex and between emotion knowledge and sex. A univariate ANOVA indicated that girls ($M = .76, SD = .17$) did better on the neutral inhibitory control task than boys ($M = .68, SD = .22, p = .02$). A similar analysis on emotion knowledge scores also revealed that girls ($M = .77, SD = .19$) outperformed

⁴ A similar pattern of results emerged, regardless of whether cases with missing values were excluded or if multiple imputations were used.

boys ($M = .69$, $SD = .23$, $p = .04$). Emotion knowledge and inhibitory control were also marginally interrelated. A marginally significant negative correlation emerged between neutral and affective ToM, suggesting that children who were best at reasoning about beliefs, or purely cognitive mental states, were less successful at reasoning about emotions, or affect-focused mental states. In addition, neutral and affective inhibitory control were significantly interrelated, signifying that the two tasks likely measured the same construct despite some differences in performance that could be attributed to the use of different kinds of stimuli.

2.3.2. Multiple regression analyses. After conducting initial correlational analyses, standard multiple regression analyses were conducted with emotion regulation and effort to control emotion scores as the dependent variables. Only variables with significant zero-order correlations with these gift response components were included as predictors in the regression models (Cohen & Cohen, 1983). Initial screening procedures revealed no multivariate or univariate outliers. Residual plots indicated that the assumptions of normality, linearity, and homoscedasticity were met, and did not expose any major outliers in the solutions. Absence of singularity/multicollinearity was confirmed using tolerance ($1 - \text{squared multiple correlations}$) as a collinearity diagnostic. Tolerance values were high (above .3), and thus overlap among variables was not problematic. To test for the assumption of independence of errors, Durbin-Watson test statistics were calculated. Values ranged from 1.8 to 2.1, suggesting no autocorrelation of errors.

Table 2.4

Zero-order Correlations among Variables ($N = 107$)

	Predictors							Emotion Regulation (ER) (Disappointing Gift)		
	Sex	Age	Neut ToM	Affect ToM	Emotion Knowledge	Display Rules	Neut Inh	Affect Inh	Composite ER Score	Effort to Control
Sex	1	.13	-.11	.02	.20*	.12	.22*	-.08	.15	.10
Age		1	.05	-.03	-.01	.18+	-.09	.03	.14	.26**
Neut ToM			1	-.17+	.12	.11	.13	-.05	.12	.03
Affect ToM				1	.03	-.10	.05	.05	.19*	.09
Emot. Know					1	.11	.18+	.004	.17+	.20*
Displ. Rules						1	-.01	-.08	.22*	.16
Neut Inh							1	.33**	.20*	.23*
Affect Inh								1	.09	-.04
Comp. ER									1	.43**

+ $p < .10$, * $p < .05$, ** $p < .01$

A standard multiple regression was conducted on children’s composite emotion regulation scores in the disappointing gift paradigm, with inhibitory control, affective ToM, and display rule knowledge entered, to determine whether these predictors accounted for unique variance in emotion regulation after controlling for other relevant abilities (Table 2.5). Performance on the Table 2.5

Standard Multiple Regression Analysis of the Unique Contributions of Affective ToM, Display Rule Knowledge, and Inhibitory Control to Composite Emotion Regulation Scores. Table Values Represent Squared Semipartial Correlations for Individual Variables and the Squared Multiple Correlation for the Model.

Variables	sr^2	R^2
1. Inhibitory control	.04*	
2. Affective ToM	.04*	.13*
3. Display Rules	.06*	

* $p < .05$

display rule knowledge task accounted for unique variance in emotion regulation, with successful reasoning of others’ emotions predicting more positive responses to the disappointing gift.

Inhibitory control and affective ToM also uniquely contributed to children’s regulation of emotions in the gift paradigm.

Finally, a standard multiple regression was conducted to determine if the three predictors with significant zero-order correlations to effort to control emotion (i.e., age, inhibitory control, and emotion knowledge) acted as unique predictors of effort to control, after controlling for the two others (Table 2.6). Although age and inhibitory control emerged as unique predictors of effort to control emotion, the contribution of emotion knowledge to effort to control emotion was only

marginally significant.

Table 2.6

Standard Multiple Regression Analysis of the Unique Contributions of Age, Inhibitory Control, and Emotion Knowledge to Effort to Control Emotion in Responding to the Disappointing Gift. Table Values Represent Squared Semipartial Correlations for Individual Variables and the Squared Multiple Correlation for the Model.

Step	Variables	sr ²	R ²
1.	Age	.08*	
2.	Inhibitory Control	.05*	.16*
3.	Emotion Knowledge	.03+	

+ $p < .10$, * $p < .05$

2.4. Discussion

The current study examined children's emotion regulation (as indexed by responses to a disappointing gift) in relation to its empirically and theoretically supported constituents (i.e., age, sex, ToM, emotion knowledge, display rule knowledge, and inhibitory control). By studying links between potentially contributing variables and emotion regulation, potential sources of individual variability in emotion regulation could be identified. Although previous empirical work has investigated links between emotion regulation and these variables, no studies have examined ToM, emotion knowledge, display rule knowledge, and inhibitory control concurrently. By doing so, the best predictors of children's emotion regulation could be identified.

In line with predictions, most predictors correlated with children's responses to the disappointing gift. When considered together in the regression models, relevant predictors accounted for a significant amount of variance in children's emotion regulation and effort to control

emotion. In fact, variance accounted for by the full model (with affective ToM, display rule knowledge, and neutral inhibitory control entered) was 13% for the emotion regulation measure, and 16% for effort to control emotion (with age, emotion knowledge, and neutral inhibitory control entered). Although these values may appear modest, they are close to those reported in related work (e.g., Carlson & Wang, 2007; Liebermann et al., 2007). Specifically, using linear regression with inhibitory composite scores (from a battery of behavioral tasks) as the predictor and emotion regulation composite scores (averaged responses from disappointing gift, secret keeping, and emotion understanding tasks) as the dependent measure, Carlson and Wang found that inhibitory control accounted for 24% of the variance in emotion regulation. Relatedly, Liebermann et al. included receptive vocabulary, inhibitory control, working memory, and shifting, as well as positive response scores to a desirable gift, as predictors, and found that the model predicted 19% of the variance in positive responses to a disappointing gift. Furthermore, our findings are consistent with empirical and theoretical work suggesting that individual characteristics (such as age), aspects of socioemotional reasoning, and inhibitory abilities may be important predictors of emotion regulatory success. These are discussed in turn.

2.4.1. Predictor variables and responses to the gift.

2.4.1.1. Age. Based on previous work (Carlson & Wang, 2007; Garner & Power, 1996; Saarni, 1984), emotion regulation in the gift paradigm was expected to improve with age. Indeed, age in months was significantly related with the level of effort to control emotion exhibited in the gift paradigm on its own and even after other variables were taken into account, although it did not relate with the composite measure of emotion regulation. Others have reported clearer age-related changes in emotion regulation using the disappointing gift, including Saarni (1984) who found that 6-year-olds showed overt negative responses whereas 10-year-olds exhibited convincing positive

responses. The lack of robust links between age and emotion regulation may have resulted from the current study's narrower, and relatively younger, age range.

It may come as a surprise that increases in age were associated with *more* effortful regulation of emotion, not less. Presumably, once a child has mastered the art of concealing disappointment, then doing so would appear effortless and responses would resemble genuine positive responses to desirable gifts. However, Simonds et al. (2007) found that it is not until age 10 that children respond to a disappointing gift in a manner that is indistinguishable from their responses to a desirable gift. Thus, the increase in effort to control with age may be attributable to the particular age group that was studied. The period from ages 5 to 7 may be one at which children are developing the ability to regulate their emotions, but their attempts to control their inappropriate emotional displays still show certain *give aways* (e.g., initial disappointment followed by recovery of appropriate displays; self-soothing behaviors to help maintain composure). Indications of competition between the true and the attempted display may exist and actually become more prevalent up until a certain point in development when emotions can be masked with ease. In fact, Liebermann et al. (2007) reported that older preschoolers demonstrated more positive affect during the disappointing gift paradigm than their younger peers, but both displayed similar negative affect. In other words, as children mature or gain general life experiences, they may first develop the ability to *activate* contrived affective displays, before they can fully master *hiding* their true emotions. Further studies should include effort to control emotion as a dependent measure and examine whether and at what age signs of effort diminish on this task.

2.4.1.2. Sex. There was no significant relation between emotion regulation measures and sex, unlike some previous work, which has found sex differences in the ability to mask emotions (e.g., Cole, 1986; Feldman & White, 1980; Simonds et al., 2007). However, links between sex and

emotion regulation are complex, and vary with age (Saarni, 1984), behavior problems (Cole, Zahn-Waxler, & Smith, 1994), the emotion being recorded (activation of positive vs. suppression of negative), and experimental context (Tobin & Graziano, 2011). Thus, the lack of association between emotion regulation and sex seen here may be due to the particular set of experimental parameters and sample characteristics. That said, there was a trend toward marginally better emotion regulation in girls than boys ($p = .11$), which is consistent with some of the literature.

2.4.1.3. Theory of mind. It was anticipated that children's second-order ToM might relate with their ability to regulate emotional displays in the gift paradigm. Understanding how one's behaviors affect others should encourage regulation of emotions to comply with social norms and fulfill prosocial responsibilities. Underwood and Moore (1982) have suggested that perspective taking is related to prosocial and socially normative behaviors. Thus, children who can effectively reason about the emotions of others may demonstrate superior emotion regulation in social contexts in which the feelings of others are at stake. In line with this notion, Leavitt and Power (1989) suggested that context-appropriate emotional responses are dependent on one's sensitivity to others' feelings. The current study's results are consistent with this idea that the ability to predict another's emotions supports the act of controlling one's own emotions.

In terms of the disappointing gift paradigm, children who recognize that acting disappointed might hurt the experimenter's feelings should mask disappointment and initiate positive displays. Thus, it was predicted that children's understanding of others' emotions might be a better predictor of emotion regulation than their more basic understanding of others' mental states. Indeed, performance on the affective ToM task predicted emotion regulation, with or without other variables taken into account. However, performance on the second-order false belief task did not predict emotion regulation. This finding is consistent with Liebermann et al. (2007)'s failure to find a

relation between performance on a first-order false belief ToM task and emotion regulation on the disappointing gift paradigm in preschoolers. Together, the results suggest that ToM relations with emotion regulation may be limited to children's understanding of other people's emotions, and not to their overall understanding of mental states.

2.4.1.4. Emotion knowledge. A link between children's understanding of situation-specific emotions and their ability to regulate emotional responses in the gift paradigm was expected to appear. Cognitive models of emotion generation suggest that emotions are not merely consequences of physiological responses, but are also largely determined by knowledge about normative situation-congruent responses (Levine, 1995; Stein et al., 1993). In turn, successfully regulating emotions may first require identifying which emotions should be associated with various situations. As Barrett, Gross, Christensen, and Benvenuto (2001) put it, emotion knowledge may set the stage for emotion regulation. Indeed, Garner and Power (1996) found that children's emotion knowledge on a story task similar to the one used in the current study was a unique predictor of positive displays in the disappointing gift paradigm, although they found that zero-order correlations between emotion knowledge and responses to the gift were not significant. The current study found the opposite, namely, zero-order correlations between emotion knowledge and aspects of children's responses to the gift (effort to control emotion) were significant, but these became marginal after age and inhibitory control predictors were considered.

2.4.1.5. Display rule knowledge. Links between emotion regulation and a more complex form of emotion knowledge were also anticipated. Given that display rule knowledge entails understanding when, where, and how expressive behaviors should be conveyed (Saarni, 1984), it was predicted that this knowledge would prompt attempted regulation of expressive behaviors in the gift paradigm. In other words, children's hypothetical use of display rules in the display rule

knowledge vignettes was expected to predict their actual application of display rules in the gift paradigm.

Indeed, performance on external display questions significantly related with the composite measure of emotion regulation from the disappointing gift paradigm. Children who identified appropriate external displays in the display rule knowledge task made the most positive responses after receiving the clothespin, even after other predictors had been entered. This seemingly represents the first empirical finding of a connection between children's hypothetical and actual use of display rules. Considered with the results from the affective ToM task, these results strongly suggest that knowledge of context-appropriate emotional displays elicited *by* the situation (as assessed in the display rule task) and emotions elicited *in* other people (as assessed in the affective ToM task) may be prerequisites for controlling one's emotional display. Obviously, given the current study's concurrent measurements, it is impossible to identify the causal direction of the effect. However, it makes sense that one needs to understand the consequences of one's emotional displays, as well as social norms regarding emotional displays, before one would consider controlling these. Further studies should examine these constructs longitudinally to begin to map potential causal directions. One question that arises is why ToM and display rule knowledge predicted emotion regulation, but not effort to control emotion. Because effort to control emotion (or observable effort in regulating emotions) can be thought of as an initial step in developing the ability to fully regulate emotions, it may be associated with rudimentary emotion skills (i.e., basic emotion knowledge). Conversely, mature emotion regulation may be associated with more advanced socioemotional developments (such as reasoning about another's emotions in false belief contexts and understanding normative display rules).

2.4.1.6. Inhibitory control. Inhibitory control, or the ability to suppress a response when

that response is or becomes inappropriate, was assessed using the proportion of correct inhibitions on the block from the neutral and affective go/no-go tasks with the greatest inhibitory demands (when 75% of trials required go responses). Because inhibitory control and emotion regulation share comparable inhibitory requirements, developmental trajectories, and neural underpinnings, a significant relation between inhibitory control and positive responses to the disappointing gift was anticipated (Carlson, 2005; Dias et al., 1997; Ochsner & Gross, 2005; Reed et al., 1984). Indeed, the proportion of correct inhibitions on the neutral go/no-go task was positively related with children's composite measure of emotion regulation. What is more, inhibitory performance remained a significant predictor of emotion regulatory success even after affective ToM and display rule knowledge were taken into account. Like age, inhibitory control on the neutral go/no-go task also predicted effort to control emotion during the disappointing gift paradigm, after controlling for other important predictors. Children who best controlled their responding on no-go trials showed the most effortful regulation of emotional responses to the gift. In fact, inhibitory control was the only construct to significantly predict both emotion regulation and effort to control emotion.

Others have investigated the link between inhibitory control and emotion regulation (Carlson & Wang, 2007; Kieras et al., 2005; Liebermann et al., 2007). For instance, Carlson and Wang found that performance on a composite measure of inhibitory control, which included performance on Simon says, forbidden toy, and gift delay tasks, related with 4- to 6-year-old's emotion regulation on the disappointing gift paradigm, after controlling for age and verbal ability. In a related study, Kieras et al. (2005) found that children (ages 3-5) with the strongest response inhibition demonstrated superior emotion regulation in terms of positive affect shown when receiving the disappointing gift, relative to when given a desirable gift, although inhibitory control was not predictive of negative displays. This can be compared with the finding that inhibitory

control predicted emotion regulation and effort to control emotion in response to the gift, which was partially defined in terms of mixed affect. Liebermann et al. also found that inhibitory control in children aged 3 to 5 years (in a gift delay task in which they had to avoid peeking while the gift was being wrapped) was related with their displays of positive affect to the disappointing gift. However, in their study, inhibitory control in the gift delay no longer predicted regulatory success once other measures were taken into account.

One issue that limits the conclusions by Carlson and Wang (2007) and Liebermann et al. (2007) pertains to the selected inhibitory control tasks. That is, some of the inhibitory control tasks that they used have emotional elements and thus may themselves require regulation of emotions. For example, forbidden toy and gift delay tasks activate positive feelings that need to be subdued to inhibit touching the toy and peeking at the gift. In this respect, the go/no-go task is advantageous in that it provides a purer measure of inhibitory control and allows us to draw links between two separate constructs (inhibitory control and emotion regulation). Nonetheless, the fact that similar links between inhibitory control and emotion regulation were found, but using a different task, indicates that inhibition, irrespective of task type, is an important contributor to children's regulation of emotional displays in the preschool and early elementary years. Future work will need to examine this link in older children and adolescents.

One question that arose from these findings is why links were seen between emotion regulation and the neutral inhibitory control task, but not the affective task. One potential explanation for discrepant findings between neutral and affective inhibitory control and emotion regulation is that children found the affective task more difficult and this increased difficulty may have masked relations between inhibitory control and emotion regulation. Inclusion of emotionally salient stimuli in standard go/no-go tasks has been recognized by others as a way to make the task

more challenging (Carlson & Zelazo, 2011). In fact, no-go performance on the 75% go block of the affective task ($M = .65$, $SD = .22$) was significantly worse than in the neutral task ($M = .73$, $SD = .20$), $F(1, 106) = 12.38$, $MSE = 0.03$, $p < .001$.

2.5. Conclusion

In summary, children between 5 and 7 years of age experienced some difficulty in controlling their negative responses in a situation that socially dictates that they feign positive affect. Moreover, several variables related to their responses in the disappointing gift paradigm, namely their age, affective ToM, knowledge of situation-specific emotions, understanding of display rules, and inhibitory control. After accounting for other predictors, reasoning about others' emotions, display rule knowledge, and inhibitory control remained significant predictors of children's regulatory success in terms of responding positively to the disappointing gift. In addition, their age and inhibitory control best predicted the amount of effort that they mustered to do so. It seems, then, that emotion regulation may require both (1) *knowledge of context-appropriate emotions elicited by the situation and elicited in other people* and (2) *inhibitory control* abilities to implement that knowledge effectively.

One pertinent research direction involves extending the investigations of emotion regulation to include regulation of positively valenced emotions to determine whether performance on positive and negative emotion regulation tasks follow similar developments and whether predictors of regulation of negative emotions (in the gift paradigm) are also relevant for regulation of positive emotions. Studies 2 and 3 were designed for this purpose.

CHAPTER 3 (STUDY 2)

3.1. Introduction

Emotion regulation has received increasing attention over recent years. However, the majority of this research has focused on children's ability to control negative emotions (e.g., Simonds, Kieras, Rueda, & Rothbart, 2007; Smith, Hubbard, & Laurenceau, 2011), and investigations of positive emotion regulation have been relatively lacking. Regulation of negative emotions has intuitive appeal, but at times it is also necessary to control positive displays. For instance, when interacting with a grieving peer, it is appropriate to avoid incompatible expressions and behaviors. Indeed, children who control displays of both positive and negative emotions are deemed to have superior social skills (McDowell & Parke, 2000).

3.1.1. Negative and positive emotion regulation. As discussed in Chapter 1, regulation of negative emotions is widely studied and several tasks have been developed to assess regulation of negatively valenced emotions (Hinshaw & Melnick, 1995; Melnick & Hinshaw, 2000; Smith et al., 2011; Stansbury & Sigman, 2000; Walcott & Landau, 2004; Zalewski et al., 2011; Zimmerman et al., 2009). Among these measures, the disappointing gift paradigm has been used in a variety of experimental contexts (Cole, 1986), with children ranging from 3 years of age to late childhood (Simonds et al., 2007). In the current study, the disappointing gift paradigm was used as a measure of negative emotion regulation. Thus, once children finished a positive emotion regulation task, which they invariably won, they received an attractive gift bag containing a plain plastic cup and their reactions to opening the gift were video recorded for later coding.

Also briefly discussed in Chapter 1, researchers have begun to devise methods to study children's regulation of positive emotions, although these remain wanting in some regards. For example, Rydell, Berlin, and Bohlin (2003) assessed regulation of positive emotions (i.e.,

exuberance) along with regulation of anger and fear in 5- to 8-year-olds using a parent questionnaire. However, subjective measures such as this have the inherent issue of respondent bias and hence may not provide valid assessments of children's regulatory abilities. Relatedly, children may regulate their feelings differently in the presence of their parents than in other contexts, such as in the classroom or on the playground (Zeman & Garber, 1996). For these reasons, it is important to supplement parental reports of emotion regulation with performance-based measures.

As mentioned, Carlson and Wang (2007) developed a behavioral measure of positive emotion regulation, the 'Secret Keeping' task, in which preschoolers were instructed to keep an exciting secret about a talking fish from an inquisitive experimenter. Although this protocol would presumably induce positive emotions and require their regulation, it is not strictly an emotion regulation task. That is, children were not only required to conceal emotional responses from the experimenter, but also to withhold information. Additionally, whether this task encourages socially appropriate emotion regulation is debatable, given that the experimenter is an authority figure and children might feel compelled to reveal the secret. Another behavioral task described in Chapter 1 that assesses regulation of positive affect is the puppet-tickling task, in which children witness a dialogue between two puppets who proceed to tickle the child (LAB—TAB; Goldsmith & Rothbart, 1993). Kochanska, Murray, and Harlan (2000) argue that in situations of excitement, children are expected to control their eagerness and enthusiasm, and thus children should modulate shows of joy in the puppet task. However, the optimal response is ambiguous. Moreover, both the secret keeping and puppet tickling tasks are only suitable for use with young children.

One goal of the current study was to develop a novel measure of positive emotion regulation for use with school-aged children. In the staged accident task, children competed with

the experimenter and were promised a prize for winning. To win, children had to press a lever to make their toy hippopotamus eat more marbles than the experimenter's. The game was rigged so that children were comfortably winning *throughout* the session to ensure that positive affect was induced. During the game, the experimenter staged an accident (spilling her own marbles on the floor), stimulating a need for children to regulate positive game-playing behaviors. Children's behavior during the staged accident was video recorded for later coding (detailed in the Method section).

3.1.2. Relating positive and negative emotion regulation. A second goal of Study 2 was to examine performance on the new positive emotion regulation task alongside performance on a negative emotion regulation task (the disappointing gift paradigm) to examine whether emotion regulation is a single, global ability or one that varies as a function of the specific valence of emotion that needs to be controlled.

Carlson and Wang (2007) examined relations between children's performance on their positive emotion regulation task (secret keeping) and the disappointing gift paradigm and found positive correlations between children's ability to withhold the secret and their ability to say they liked the gift when asked, although other aspects of responses to the disappointing gift (facial, verbal, body language) were unrelated to regulation of positive emotions in the secret keeping task. Relatedly, Rydell et al. (2003) found modest correlations between children's reported ability to regulate exuberance/ excitability and their capacity to control anger and fear, even though scores for regulation of same-valence emotions (i.e., anger and fear) showed stronger interrelations. Together, findings by Rydell et al. and Carlson and Wang suggest that emotion regulation may be a single relatively generic skill that is robust across emotion-evoking scenarios (with the qualification that interrelations are strongest for same-valence emotions).

In contrast, neurophysiological research with adults indicates that one's ability to regulate emotions in a positive emotion-eliciting situation may vary systematically from the ability to regulate in negative emotion-eliciting circumstances. Specifically, divergent neural pathways are believed to underlie the regulation of positive and negative emotions (Kim & Hamann, 2007; Mak, Hu, Xiao, & Lee, 2009), although current findings apply to regulation of affective experience, and not to the regulation of affective expression *per se*. For instance, Mak et al. found that regions of the prefrontal cortex were differentially affected by the type of emotion regulation (positive vs. negative emotion regulation), with significant increases in activation of the lateral prefrontal and superior medial prefrontal gyri corresponding to positive emotion regulation and slight decreases in these loci occurring with regulation of negative emotions. In fact, distinct cortical foci and hemispheric substrates have been linked with positive and negative emotion processing, positive and negative moods, and positive and negative temperaments (Davidson 1988, 1992; Dolcos, Labar, & Cabeza, 2004; Habel et al., 2005). Such contrasting activation patterns for negative and positive emotion experience and regulation would suggest that regulation of negative and positive emotions could be dissociable and perhaps even show opposing tendencies.

3.1.3. Current study. As noted in Study 1, there remains a need to study children's developing ability to regulate positive emotions along with, and in relation to, their ability to regulate negative emotions. Thus, the current study aimed to relate children's regulation of negative emotions (namely disappointment) with their ability to regulate positive emotions (happiness/excitement) to examine whether emotion regulation is robust across contexts, as suggested by Carlson and Wang (2007) and Rydell et al. (2003), or whether it varies depending on situational demands (i.e., regulation of positive vs. negative emotions), as implied by the neurophysiological research in adults. One of the limitations of the Rydell et al. study is that it relied

on parental reports of both positive and negative emotion regulation. It is unclear whether the shared variance obtained on this measure resulted from shared variance in emotion regulation or because of same-respondent effects. Likewise, the Carlson and Wang (2007) pertained to younger children: It is not clear whether the discrepant findings within neurophysiological literature might be due to age-related changes. That is, it is possible that differentiation of function (in this case, emotion regulation) emerges with age (cf. Wiebe, Espy, & Charak, 2008; Miyake et al., 2000). Moreover, Carlson and Wang only found a correlation with a subset of their variables, specifically only with responses that were prompted by the experimenter (by a series of questions in the secret keeping task and in the disappointing gift task).

Thus, the current study examined regulation of positive and negative emotions using more comparable behavioral measures. As described, previously devised positive emotion regulation measures have differed in important ways from standard protocols used to study negative emotion regulation (requiring concealment of information along with emotion, having ambiguous optimal responses, prompting responses in different ways). In the current study's staged accident task, as in the disappointing gift paradigm, emotions were induced and spontaneous regulation of those emotions was required according to the social context. A third objective of the current study was to relate negative and positive emotion regulation with relevant socioemotional and cognitive skills to determine whether similar processes contribute to successful regulation of both kinds of emotions. As described in Study 1, many correlates of negative emotion regulation have been identified (e.g., Carlson & Wang, 2007; Garner & Power, 1996; Liebermann et al., 2007), but correlates of positive emotion regulation remain largely unexplored.

In Study 1, after controlling for other predictors, negative emotion regulation in the disappointing gift paradigm significantly related with theory of mind (viz. reasoning about others'

emotions), display rule knowledge (familiarity with socially appropriate emotional displays), and inhibitory control (the ability to control one's behavior), and marginally related with basic emotion knowledge. Accordingly, the current study included measures of ToM (reasoning about beliefs and emotions of story characters), emotion and display rule knowledge (selecting appropriate emotional displays in story vignettes), and inhibitory control (neutral and affective go/no-go tasks) to determine whether these skills relate with regulation of positive versus negative emotions in the same way. As in Study 1, sex and age were also considered as these have been documented to affect emotion regulation (Cole, 1986; Saarni, 1984; Simonds et al., 2007). Due to conflicting evidence from the developmental and adult literature, no specific predictions about the direction of the relation between regulation of positive emotions (staged marble spill) and regulation of negative emotions (disappointing gift) were made, except that these should be related. In addition, although relations between socioemotional knowledge and cognitive variables for negative emotion regulation were expected based on previous work (Carlson and Wang, 2007; Garner & Power, 1996; Study 1), it was not clear whether these relations would be similar for positive emotion regulation. On the one hand, Carlson and Wang found that preschoolers' ability to predict characters' emotions in Gnepp and Chilamkurti's (1988) emotion knowledge task correlated with both positive and negative emotion regulation and that their inhibitory control was also associated with negative, as well as positive regulation (albeit less strongly and less reliably than with the negative measure). In the same way, Kochanska et al. (2000) found that toddlers' ability to modulate joy was predicted by their inhibitory control (referred to as effortful control by the authors) on a battery of behavioral tasks that involved delaying, slowing down, suppressing and initiating responses, effortful attention, and voice lowering. On the other hand, if the direction of the relation between negative and positive emotion regulation turned out to be negative, different patterns of results were expected.

3.2. Method

3.2.1. Participants. Forty-five children took part, ranging from 65 to 137 months of age ($M = 81.00$ mos., $SD = 21.17$; 20 girls). Children were recruited from schools in a predominantly white, middle class, rural community. Written consent was obtained from children's caregivers prior to testing, and verbal assent was obtained from children at the time of testing. All children were tested individually in a quiet room in their school.

3.2.2. Materials and design. As in Study 1, measures included a negative emotion regulation task (disappointing gift), as well as neutral and affective ToM tasks, the emotion knowledge and display rule knowledge tasks, and neutral and affective go/no-go tasks. A novel measure of positive emotion regulation (staged accident) was also included to permit an assessment of children's regulation of positively valenced emotions. The order of the ToM, emotion knowledge, display rule, and inhibitory control tasks were counterbalanced across participants to permit equal exposure to each possible task order. As in the previous study, the emotion knowledge task always preceded the display rule knowledge task due to its less difficult response requirements (i.e., selecting an emotion, rather than an emotion *and* a display). The staged accident positive emotion regulation task and the disappointing gift negative emotion regulation task were always presented after the other measures, in that order. Neutral and affective ToM, emotion and display rule knowledge, and neutral and affective go/no-go tasks were administered on a Fujitsu Touch Screen Laptop Computer. Tasks were programmed and children's responses were recorded using SuperLab 4.5.

3.2.3. Procedure.

3.2.3.1. Theory of mind (ToM) measures. ToM measures were identical to those used in Study 1.

3.2.3.2. Emotion knowledge task. This task assessed children's basic understanding of

emotions that correspond to different situations and was based on Garner, Jones, and Miner's (1994) emotion knowledge task. This task included more stories, and more facial expressions to choose from than the emotion knowledge task in Study 1. That is, children were read 17 short stories and shown pictures of the main character with seven possible facial expressions (happy; sad; angry; afraid; surprised; disgusted; embarrassed) on a computer screen. Children were asked to select the appropriate emotional expression for each story using the touch screen. An example of a story for which *disgusted* was the appropriate response was *Riley finds a bug in his sandwich*. Correct and incorrect responses were awarded 1s and 0s, accordingly, and proportion correct scores for the 17 stories were calculated.

3.2.3.3. Display rule knowledge task. To assess knowledge of social display rules, children were read eight short stories, adapted from the stories by Jones, Abbey, and Cumberland (1998) and similar to the stories used in Study 1, although different stories and more facial expression options were used. In addition, adults rated the expressed and felt emotions in a pilot study to ensure that adults agreed on the answers. Children were asked to select two emotion states: the appropriate external facial expression (happy; disgusted; angry; embarrassed; surprised; afraid; sad) that the story character should display, as well as the true internal emotion (happy; disgusted; angry; embarrassed; surprised; afraid; sad) that the story character feels on the inside. For half of the stories, the external expression and internal emotion were the same (congruent feeling-expression stories; e.g., *Lucas loves helping his Mother with the garden. Every spring Lucas and his Mother plant seeds in the garden and water it during the summer. Lucas' favorite part of gardening is helping his Mother pick the vegetables once they are ripe. It's the end of summer and time to pick the vegetables.*), and for the other half of the stories, the external expression and internal emotion were incongruent (incongruent feeling-expression stories; e.g., *William hates sharing his things.*

One day the teacher asked William to share his eraser with another student and he shares it because he does not want to get in trouble.). Internal feeling questions and external display questions were asked to children in a fixed order and children were required to select one appropriate feeling (e.g., *How does William feel on the inside?*) and one appropriate expression (e.g., *How should William look on the outside?*) for each story by touching their answers on the screen. Correct and incorrect responses were given 1s and 0s, respectively. Separate scores were calculated for internal feeling and external display questions. Given that children’s knowledge of external displays was deemed most relevant for effective emotion regulation, only the proportion of correct external display questions was considered in the analyses.

3.2.3.4. Inhibitory control measures. Go/no-go tasks were administered as measures of inhibitory control (see Figure 3.1 for task stimuli). The procedure was similar to Study 1, but

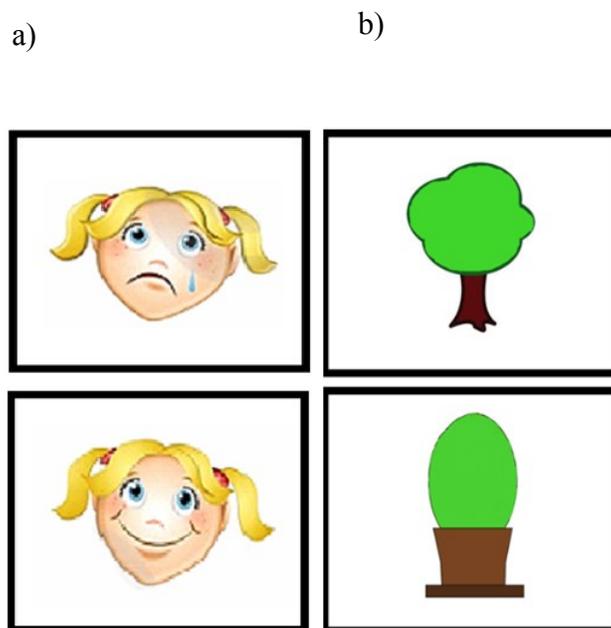


Figure 3.1. Stimuli used in the affective (a) and neutral (b) go/no-go tasks.

included different stimuli, counterbalanced ‘go’ and ‘no-go’ stimuli across participants, and included only two blocks of trials instead of three. In the neutral go/no-go task, for roughly half of the

participants ($n = 22$), a key press was to be made as quickly as possible when they saw a tree, and the key press was to be withheld when they saw a plant. For the remainder of participants, a key press was required when they saw a plant, and was discouraged when they saw a tree. The affective go/no-go task was similar to the tree and plant go/no-go task but included pictures of happy and sad faces. Roughly half of the children ($n = 22$) were instructed to press a key as quickly as possible when they saw a sad face, and to withhold pressing the key when they saw a happy face, whereas the reverse instructions were given for the other children. Go/no-go stimuli were counterbalanced across participants rather than within to avoid confusing children with instructions and to establish a prepotent response tendency for one specific stimulus. Both go/no-go tasks were divided into two blocks, which differed in the percentage of go trials. All children received a 50% go block first, which acted as a practice block, followed by a 75% go block, which served as the test block, requiring inhibitory control of prepotent responses on the 25% of trials in which no go stimuli appeared. A score of 1 was awarded if children withheld their responses on no-go trials (correct inhibition) and a score of 0 was awarded if an erroneous response was made. Proportion of correct inhibitions on the test block was used as the measure of interest for neutral and affective tasks.

3.2.3.5. Staged accident positive emotion regulation task. In this task, children competed with the experimenter to make their toy hippopotamus eat the most marbles and were told that the winner would receive a prize. The experimenter ensured that children were comfortably winning throughout the session so that positive affect was induced while playing the game. During the game, the experimenter staged an accident (spilling her own marbles on the floor), instigating a need for children to cease positive game-playing behaviors and help and/or wait for the experimenter. After the marbles had been collected (requiring approximately 10s), the game was resumed until all of the marbles were eaten. At this point, the experimenter counted the children's

marbles and her own and stated that children had won the game and would receive a prize. This acted as the segue into the disappointing gift paradigm.

Children's responses to the staged accident were video recorded and scored by two coders. A positive emotion regulation score was assigned to participants based on their responses to the staged accident. A positive emotion regulation score of -2 or -1 was awarded if children failed to regulate positive game-playing behaviors. More specifically, -2 reflected continued game playing in a way that took advantage of the experimenter's accident and -1 represented some continued attention to the game with no concern for the experimenter's accident. A score of 0 was assigned for neutral responses when children stopped playing the game but did not address the experimenter in any way. In cases in which children stopped playing and demonstrated some helping behaviors, a positive emotion regulation score of +1 or +2 was allotted, depending on the amount of assistance that was offered (See Table 3.1 for more details on positive emotion regulation coding). Children's responses were also scored for effort to control emotion, that is, to what extent it appeared that they were visibly attempting to regulate their affective behaviors. A score of 0 on this measure was awarded if children appeared to be acting spontaneously (be it to continue playing the game or to help the experimenter), without effort, during the staged accident. A score of 1 or 2 was awarded depending on the amount of effort being exhibited, indicated by the presence of mixed affective displays, and adaptor or transitional behaviors that hinted at deliberate regulation (self-soothing; fidgeting; see Table 3.2). In cases in which the coders disagreed about scoring, the point of disagreement was discussed until a consensus was reached. Inter-rater reliabilities were .90 and .78 for the positive emotion regulation score and effort to control emotion, respectively.

Table 3.1

Examples of Negative (-2, -1), Neutral (0), and Positive (+1, +2) Scores in the Staged Accident Task

Score Range				
-2	-1	0	+1	+2
Continued game playing	Fidgeted with or picked at game	Stopped playing and waited	Stopped playing and waited	Stopped playing and waited
Took advantage of accident	No concern for accident	Did not address accident in any way	Offered looks or words of encouragement	Helped pick up marbles and resumed playing game when both were ready
Made fun of accident (e.g., pointing and laughing)				

Table 3.2

Indicators of Effort to Control Emotion in the Staged Accident Positive Emotion Regulation Task

	Score Range	
Behavior	No effort to control emotion (0)	Effort to control emotion (1-2, depending on amount)
Affective Response	Continued game playing with no attempt to stop OR Helped pick up marbles without hesitation	Effortful attempt to cease playing game and help experimenter
Mixed Affect	No mixed responses – either played game or helped experimenter	Interspersion of game playing and waiting/helping
Transitional/Adaptor Responses	No transitional or adaptor behaviors to indicate deliberate regulation	Behavioral indicators of uncertainty or intrapersonal conflict (fidgeting with game; touching face; twirling hair; sitting on hands or clasping hands to help wait)

3.2.3.6. Disappointing gift negative emotion regulation task. The disappointing gift paradigm always followed the staged accident positive emotion regulation task (Saarni, 1984). After children were told that they had won the game by making the hippopotamus eat the most marbles,

the experimenter presented children with a gift bag with a plain plastic cup inside. During the gift exchange, the experimenter kept a neutral facial expression and made eye contact so as to not influence children's emotional responses. Once children had sufficient time to react to the gift, the experimenter claimed to have made a mistake and given children the wrong gift. A fun gift (e.g., stickers, toy car, costume jewelry) was presented to children in its place. As such, any negative emotions triggered by the disappointing gift were temporary and all children received an appealing gift before being dismissed. Children's responses during the disappointing gift paradigm were video recorded and later coded by two coders.

As in Study 1, facial expressions, vocal intonations (i.e., *how* children spoke), verbal utterances (i.e., *what* children said), and behavioral responses to the gift were scored ranging from -2 to +2, with -2 or -1 for negative displays depending on the intensity of children's reactions, 0 for equally mixed or neutral reactions, +1 or +2 for positive reactions (also depending on intensity; see Study 1 for coding details). As in Study 1, a composite measure of emotion regulation on the disappointing gift paradigm was tabulated by averaging scores from the facial, vocal, verbal, and behavioral response components. As with the positive emotion regulation task and the disappointing gift task in Study 1, children also received scores for effort to control emotion to indicate to what extent their emotion regulation appeared effortful or contrived. A score of 0 indicated no effort to control, 1 indicated some effort to control, and 2 indicated strong effort to control emotion, based on contradictory displays of emotion and adaptor or transitional behaviors that hinted at conflicting emotions (see Study 1 for coding details). Inter-rater reliability for the negative emotion regulation score was high ($\alpha = .89$). (Inter-rater reliabilities for facial, vocal, verbal, and behavioral response components were .80, .87, .94, and .62, respectively.) However, reliability was lower for the effort to control emotion ratings, due to the fact that one rater was

more sensitive to adaptor/transitional behaviors as signs of effort ($\alpha = .41$). Disagreements were resolved by discussion and consensus.

3.3. Results

Descriptive statistics for all variables are shown in Table 3.3. Except for ToM variables

Table 3.3

Descriptive Statistics for Age, ToM, Emotion Knowledge, Display Rule Knowledge, Inhibitory Control, and Emotion Regulation (ER) Variables

Variable	Mean (SD)	Range	Skewness	Kurtosis
Age (mos.)	81.00 (21.17)	65-137	1.97	2.46
Neutral ToM	.38 (.48)	0-1	.49	-1.80
Affective ToM	.60 (.50)	0-1	-.42	-1.91
Emotion knowledge	.55 (.17)	.18-.94	.07	-.25
Display Rules – External	.50 (.23)	0-1	.13	-.47
Neutral Go/NoGo	.68 (.20)	.25-1	-.35	-.99
Affective Go/NoGo	.63 (.27)	0-1	-.34	-.68
Positive ER – Score	-.58 (1.43)	-2-+2	.69	-.90
Positive ER – Effort to Control	.80 (.81)	0-2	.39	-1.38
DG Negative ER – Composite	-.11 (.87)	-1.75-+.175	.08	-.70
DG Negative ER – Effort to Control	1.08 (.75)	0-2	-.19	-1.17

(which were dichotomous) and age in months (which was positively skewed), data were roughly normal and not significantly skewed. Data were missing for a few children for some of the computer tasks due to computer issues or accidental omission of the task (4 for display rule knowledge; 2 for

neutral ToM). Multiple imputations (with five imputations) were used to deal with missing data, as per Tabachnick and Fidell (2007) and Rubin (1996). Analyses were conducted on pooled averaged data.⁵ First, correlations were calculated to examine links between and within emotion regulation tasks. Next, relations with socioemotional and inhibitory measures were calculated for positive and negative emotion regulation tasks separately.

Correlational analyses were conducted to determine whether children’s regulation of positive emotions in the staged accident task correlated with their regulation of negative emotions in the disappointing gift paradigm. Of particular significance, a significant negative correlation was observed between the composite measure of negative emotion regulation (average of facial, vocal, verbal, and behavioral response scores in the disappointing gift paradigm) and positive emotion regulation in the staged accident task (see Table 3.4). Children who controlled their negative displays and summoned overall positive responses to the disappointing gift were poor at controlling positive emotions (game-playing) during the staged accident, and vice versa.

Table 3.4

Correlations Between Socioemotional, Cognitive, and Emotion Regulation (ER) Variables (n = 45)

	Positive ER Task		Negative ER Task	
	ER Score	Effort	ER Score	Effort
Age	.01	.09	.01	.03
Sex	.11	-.28+	.26+	.15
Affect Go/No-Go				
Inhibit to happy	.49*	.22	-.40+	.22
Inhibit to sad	.07	-.18	.16	-.15

⁵ Findings were the same when multiple imputations were used as when cases with missing data were omitted.

emotion regulation scores for the staged accident task, $r(45) = .26, p = .09$. This was followed up with separate correlational analyses for children who had to inhibit responding to happy faces and for those who had to inhibit to sad faces in the affective go/no-go task. When data were analyzed separately for the two 'no-go stimulus' conditions, associations between inhibitory control and positive emotion regulation only emerged when inhibitions were required for happy faces, signifying that children who were best at inhibiting responses to happy faces were best at regulating positive emotions in the hungry hippo game. There was no significant link between inhibitions to sad faces and regulation of positive emotions in the staged accident task ($p = .75$).

No significant correlations emerged between performance on the ToM tasks and performance on the positive emotion regulation task. Knowledge of situation-congruent emotions in the emotion knowledge task and of appropriate external displays in the display rule knowledge task were not related with children's performance on the positive emotion regulation task ($p > .24$ for all correlations). Likewise, sex and age were not significantly related with children's positive emotion regulation scores or their effort to control emotion displayed during the staged accident ($p > .46$ for all correlations, but $p = .07$ for the correlation between sex and effort to control).

Correlations between regulation of negative emotions in the disappointing gift paradigm and inhibitory control, ToM, and emotion and display rule knowledge were also examined (see Table 3.4 again). As with the positive emotion regulation task, separate correlational analyses were done for the two 'no-go' conditions. There was no significant correlation between inhibition to sad faces and children's regulation of negative emotions ($p = .74$). However, for children who had to inhibit to happy faces, a marginally significant negative correlation appeared between the composite measure of negative emotion regulation and the proportion of correct inhibitions to happy faces. Thus, children who responded to happy faces when they should have inhibited such

responses were more likely to show positive responses to the disappointing gift. Note that this is opposite to the relation seen between inhibitory control and regulation of positive emotions in the staged accident task.

Significant correlations were observed between affective ToM (which assessed understanding of emotions), but not neutral ToM (which assessed understanding of beliefs), and the amount of effort to control emotion displayed after receiving the gift, meaning that children who were adept at reasoning about others' emotions made effortful attempts to regulate emotions in the disappointing gift paradigm (based on conflicting shows of emotion and behavioral indicators of effort). As with the positive emotion regulation findings, no significant links appeared between emotion knowledge or display rule knowledge and any aspect of emotion regulation in the disappointing gift task (all p s > .24). Age was not significantly related to either of the negative emotion regulation variables (p s > .84), although sex modestly correlated with averaged emotion regulation scores for the disappointing gift task ($M_{girls} = .14$, $SD_{girls} = .87$; $M_{boys} = -.31$, $SD_{boys} = .83$), with boys showing somewhat more negative reactions.

Finally, as expected, correlations were observed between age and affective ToM, $r(45) = .33$, $p = .01$, emotion knowledge $r(45) = .69$, $p < .001$, and display rule knowledge, $r(45) = .55$, $p < .001$, consistent with the literature (Carlson & Wang, 2007; Jones et al., 1998). Moreover, there was a moderate correlation between performance on the neutral go/no-go task and the affective go/no-go task, $r(45) = .36$, $p = .01$.

3.4. Discussion

The current study examined children's regulation of negative emotions (disappointment) in relation to their regulation of positive emotions (happiness/excitement) to examine whether emotion regulation abilities are consistent across contexts or whether they vary depending on the

valence of the emotion requiring regulation. Relations were also examined between children's performance on negative and positive emotion regulation tasks and their ToM (neutral and affective), emotion knowledge, display rule knowledge, and inhibitory control (neutral and affective) – variables that have previously been associated with emotion regulation (Carlson & Wang, 2007; Study 1). Due to contradictory evidence from the developmental and adult neurophysiological literature, no specific predictions were made about the direction of the relation between positive and negative emotion regulation, or in regard to whether socioemotional and cognitive variables would correlate differently with the two forms of emotion regulation. However, based on Study 1's results and earlier work (Carlson & Wang, 2007; Liebermann et al., 2007), significant relations between responses in the disappointing gift task and measures of inhibitory control, ToM, emotion knowledge, and display rule knowledge were anticipated.

Our results indicate that regulation of negative emotions in the disappointing gift paradigm negatively correlates with regulation of positive emotions in the staged accident task. Children's ability to regulate negative emotions (based on a composite of facial, vocal, verbal, and behavioral responses to the disappointing gift) was inversely related with their positive emotion regulation scores in the staged accident task. In other words, children who inhibited negative displays and responded in a positive manner to the disappointing gift struggled to control positive emotions (game-playing) during the staged accident, whereas those who failed to hide their disappointment after receiving the gift better controlled their game playing during the staged accident.

Based on these findings, emotion regulation does not appear to be a single skill that school-aged children apply consistently for different-valenced emotions. Rather, children who succeed in regulating negative emotions seem to struggle to control positive emotional behaviors, and vice versa. The finding that emotion regulation outcomes are valence-dependent fits nicely with the

adult neurophysiological literature. As discussed, recent studies have indicated that regulating negative and positive emotions recruits different, and sometimes opposing, neural activation patterns (Kim & Hamann, 2007; Mak et al., 2009).

Our finding that positive and negative emotion regulation were negatively related contrasts with that of Carlson and Wang (2007) who found that preschoolers who withheld excitement in their positive task controlled disappointment in a negative task, at least in some respects. The negative relation seen here also diverges from work by Rydell et al. (2003), which showed that 5- and 6-year-olds' positive and negative regulation (as indicated by parent report) were positively related. Discrepant results may be due to differences in the age of the samples examined or the nature of the emotion regulation tasks. Carlson and Wang (2007) required that children conceal exciting *information* whereas in the staged accident task children had to suppress exuberant and positive *behaviors*. Additionally, the secret keeping task offered children several opportunities to reveal the secret by having the experimenter prompt with strategic questions. In the staged accident task, children's enactment or absence of emotion regulation was completely self-dependent. In terms of the disappointing gift paradigm, Carlson and Wang (2007) asked children if they liked the gift, whereas, in the current study, children responded to the gift spontaneously. Such methodological variations may explain why positive and negative emotion regulation related differently to one another across studies.

Indirect support for our finding of opposing valence-dependent regulatory abilities can be seen in both the developmental and adult neurophysiological literature on temperament and affective style. More specifically, distinct appraisal styles or affective styles have been described (e.g., Davidson, 1992; Zalewski et al., 2011), such that children are inclined to interpret and experience things positively or negatively (Elliot & Thrash, 2002; Tellegen, 1985). Likewise, in the

adult neurophysiological literature, positive and negative dispositional affect and emotional reactivity have been linked with higher baseline activation in the left and right frontal cortices, respectively (Tomarken, Davidson, & Henriques, 1990; Tomarken, Davidson, Wheeler, & Doss, 1992).

Individual differences in overall affective style and or excitatory or inhibitory tone in different brain region might dictate which types of emotions children and adults find easier to regulate (be they positive or negative), and which are more difficult to suppress. That is, children (and adults) with a given affective style may also have a specific related emotion regulation style, successfully regulating one type of emotion but struggling with other emotions. Two plausible relations could exist. First children who are predisposed to react positively may better succeed at regulating negative emotions and summoning positive emotions, as this is their default response mode, but may fail to substitute positive displays with negative or neutral ones. At the same time, children who are inclined to react negatively may fail to regulate prevailing negative displays, but succeed at suppressing positive emotions. Indeed, Zalewski et al. (2011) found that pre-adolescents who demonstrated positive appraisal styles (appraised stressors in a positive light) were successful regulators of anxiety and frustration based on physiological, self-report, and behavioral measures, but those with negative appraisal styles (negatively evaluated self and others in stressful situations) showed unregulated emotions in the anxiety and frustration evoking tasks.

Alternatively, individuals may be better able to control their default affective style, as this is the emotion for which they have most practice. Future work is needed to confirm how affective styles relate with affective regulatory tendencies using positive and negative emotion regulation tasks, along with imaging technology if possible. In addition, researchers should combine behavioral measures of emotion regulation with measures of affective disposition or temperament (e.g., by

using affective scales from the Children's Behavior Questionnaire; Rothbart, Ahadi, Hershey, & Fisher, 2003) to test these possibilities. In studying how individual traits such as temperament or affective disposition influence emotion regulation, it would also be informative to consider social and cultural factors. According to Bronfenbrenner's bio-ecological model, both personal attributes as well as environmental factors are crucial in shaping children's socioemotional development (Bronfenbrenner, 2005; Bronfenbrenner & Ceci, 1994).

To address the secondary objective of comparing the socioemotional and cognitive correlates of positive and negative emotion regulation, correlations between measures of inhibitory control (affective and neutral), ToM (affective and neutral), emotion and display rule knowledge, and emotion regulation in the positive and negative emotion regulation tasks were examined. Children's familiarity with external display rules was not significantly related with their regulation of negative emotions (or positive emotions), which conflicts with findings from Study 1. One reason for these discrepant findings may be the wider age range in the current study (5- to 10-year-olds instead of 5- to 7-year-olds). In addition, because of the wider age range, new and potentially more difficult stories were developed (and piloted with adults). Indeed, despite the inclusion of older children, children in the current study selected the correct external display only half of the time compared to 70% in Study 1.

Our measure of emotion knowledge was also unrelated with children's regulation of positive and negative emotions. Previously, similar measures have been associated with children's performance on positive emotion regulation tasks (Carlson & Wang, 2007), and with the amount of effort to control emotion detected in children's responses to the disappointing gift (Study 1). Once again, the added complexity of the task may have limited the ability to find relations between emotion knowledge and emotion regulation. Children may have found the task too difficult, given

that the average score was just over 50% in this sample, compared to roughly 75% in Study 1 and in Carlson and Wang.

In contrast, the affective ToM task was differentially associated with regulation of positive and negative emotions. That is, performance on the affective ToM related with performance on the disappointing gift paradigm in the anticipated way in that children who reasoned about others' emotions made effortful attempts to regulate negative responses. This association between affective ToM and responding in the disappointing gift paradigm complements findings from Study 1, wherein emotion reasoning was associated with responses to the disappointing gift. No corresponding relation was detected between the affective ToM task and the positive emotion regulation task. It is important to note that the affective ToM task used in both of these studies required reasoning about a character's happiness and did not assess ToM for any other emotions. Thus, the ability to reason about another's happiness may be an important factor for controlling negative emotions, but not for regulating positive emotions. Although affective ToM was linked with negative emotion regulation, false belief reasoning on the neutral ToM task did not correlate. This replicates results from Study 1, as well as work by Liebermann et al. (2007).

As with affective ToM, inhibitory control was differentially associated with regulation of positive and negative emotions. The proportion of correct inhibitions on the affective go/no-go task was positively correlated with positive emotion regulation scores, but only when children had to inhibit responses to happy faces. This common tendency to respond impulsively to positive stimuli and to act in an uncontrolled way in positive emotional contexts parallels findings by Casey et al. (2011), wherein preschoolers with the poorest self-control in a delay of gratification task struggled to suppress responses to happy faces in a go/no-go task nearly four decades later as adults. Because delaying gratification can be seen as a form of positive emotion control, these results

indicate that inhibitory control to positive items is a reliable and persistent correlate of positive emotion control.

Performance on the affective inhibitory control task also correlated (marginally) with emotion regulation in the disappointing gift negative emotion regulation task, although the correlation was in the opposite direction. Thus, children who struggled to inhibit responses to happy faces were poor regulators of positive emotions, but could successfully suppress negative emotions and summon positive responses.

Once more, these findings fit with the concept of affective regulatory styles, in which positive emotional inclinations (manifested as approach tendencies to happy faces in the go/no-go) might contribute to difficulty controlling positive emotions but successful regulation of negative displays. The reverse would be true for those with negative emotional tendencies (seen as withheld responses to happy faces in the go/no-go), for whom regulating negative displays may be challenging, but positive behaviors may be easily controlled. This interpretation is consistent with the concept of positive and negative affective dispositions as conditions of approach and avoidance (Elliott & Thrash, 2002). Children with positive affective dispositions may be eager to approach positive stimuli, whereas those with negative affective dispositions may preferentially withdraw or inhibit responding to such stimuli.

The links between inhibitory control and emotion regulation seen here add to previous work on the relation between control of action and emotion (Carlson & Wang, 2007; Study 1). Carlson and Wang found that preschoolers with the best inhibitory control (on individual and composite behavioral measures) showed the fewest negative responses after receiving a disappointing gift. (Inhibitory control related with regulation of positive emotions less strongly and less reliably across measures.) Similarly, in Study 1, 5- to 7-year-olds who inhibited responding on a

neutral go/no-go task showed better control of negative reactions to the disappointing gift, although their performance on a more difficult affective go/no-go task did not predict emotion regulation outcomes. The lack of association between emotion regulation and affective go/no-go inhibitions was discussed in terms of go/no-go task complexity, which included happy and sad faces of male and female cartoons of different ethnicities. The simpler nature of the current study's affective stimuli may have enabled children to focus on task relevant stimulus features to respond and inhibit responding more consistently. In turn, this measure may have been more sensitive to inhibitory function and its links with emotion regulation. The fact that *impulsivity*, as opposed to *inhibition*, to happy faces corresponded with positive responses to the disappointing gift may reflect a common tendency to respond to positive items and react in a positive manner.

3.5. Conclusion

In short, children who best regulated positive emotions poorly regulated negative emotions, and vice versa. Results indicate that emotion regulation should be conceptualized as a valence-specific skill, at least during the period of development studied here. This conclusion is strengthened by the finding that the cognitive and social correlates of positive and negative emotion regulation differed, often in opposite directions. The finding that performance on the different-valenced emotion regulation tasks related (albeit, negatively) suggests that their developments are not independent, rather that children seem to fall on one or the other end of a continuum in terms of what emotion they may be skilled at regulating, suggesting a particular affective regulatory bias, or affective style for emotion regulation, much like the more general affective disposition discussed in the temperament literature. It remains to be seen whether children's affective regulation style corresponds to their affective disposition style. An important task for researchers in this field will involve devising more comparable measures of positive and

negative emotion regulation. Study 3 set out to do just that.

CHAPTER 4 (STUDY 3)

4.1. Introduction

Research on negative emotion regulation is abundant and includes a breadth of well-validated measures that are usable with a range of ages (Calkins & Dedmon, 2000; Dennis, 2006; Feldman et al., 1979; Melnick & Hinshaw, 2000; Zimmerman & Stansbury, 2003). Although most behavioral research has focused on children's ability to control negative emotions, some tasks have been devised to study positive emotion regulation (Carlson & Wang, 2007; Kochanska et al., 2000; Study 2). With the advent of positive emotion regulation measures, there has been increased interest in how regulation of positive emotions relates with more commonly administered measures of negative emotion regulation. Study 2 examined regulation of positive emotions on a staged accident task and regulation of negative emotions to a disappointing gift. However, the regulatory demands were different for these positive and negative emotion regulation measures in that the staged accident task demanded a suppression of positive emotional behaviors and the disappointing gift paradigm required a cessation of one emotion and activation of an opposing emotion. As such, the observed associations between positive and negative emotion regulation may be artifacts of the particular tasks that were used.

Based on existing research, firm conclusions about how positive and negative emotion regulation relate are limited. Ideally, in comparing negative and positive emotion regulation, tasks should be as similar as possible, save for a small manipulation that elicits positive or negative emotion and requires its regulation. As such, the current study's objective was to create a controlled procedure for studying regulation of positive and negative emotions using the original disappointing gift paradigm as inspiration. To induce emotions and instigate a need for their regulation, analogous positive and negative scenarios were created (winning a good/bad gift;

watching someone else win a good/bad gift). More precisely, the child and experimenter flipped cards from two separate decks. Children were told that when they flipped over a jack, they could open a gift and that when the experimenter flipped over a jack, she could open a gift. (Two identical looking gift bags were moved around the table several times, and set seemingly randomly in front of the child and experimenter). The decks were rigged so that the child won first and the experimenter won second, or vice versa, depending on the child's assigned condition. Within the two gift orders, there were two gift type conditions in which children won a good gift and the experimenter received a bad gift, or vice versa. As such, there were four possible rigged card game conditions:

(1) Receive Good First—Watch Bad Second: The child received a good gift first and then watched the experimenter receive the bad gift second.

(2) Watch Bad First—Receive Good Second: The experimenter received a bad gift first and then the child received the good gift second.

(3) Receive Bad First—Watch Good Second: The child received a bad gift first and then watched the experimenter receive the good gift second.

(4) Watch Good First—Receive Bad Second: The experimenter received a good gift first and then the child received the bad gift second.

Children's emotional displays were assessed both when they opened their own gift (*receive* segment), as well as when the experimenter opened her gift (*watch* segment). Table 4.1 summarizes the regulatory requirements for receive and watch segments for each condition. Specifically, in terms of emotion regulatory requirements, no emotion regulation is required during the receive segment for children who open the good gift first (i.e., Receive Good First—Watch Bad Second condition), given that they presumably feel pleased and it is socially appropriate to respond

Table 4.1

Emotion Regulation Requirements, Organized by Condition, for Segments of the Rigged Card Game in Which Children Received a Gift or Watched the Experimenter Receive a Gift

	Receive Gift	Watch Gift
Receive Good 1—Watch Bad 2	No emotion regulation required	Regulation of positive emotions to child’s gift and activation of positive emotions to experimenter’s gift
Watch Bad 1—Receive Good 2	Regulation of positive emotions to child’s gift	Regulation of negative emotions to experimenter’s gift
Receive Bad 1—Watch Good 2	Regulation of negative emotions to child’s gift	Regulation of negative emotions due to disparity of gifts
Watch Good 1—Receive Bad 2	Regulation of negative emotions to child’s gift <i>and</i> due to disparity of gifts	No emotion regulation required

positively after receiving a desirable gift. However, when the experimenter opens the bad gift in the watch segment of that condition, children should suppress residual positive feelings from the receipt of their own gift out of consideration for the experimenter and feign interest or positive responses to the experimenter’s gift. In the condition in which the experimenter opens a bad gift first (i.e., Watch Bad First—Receive Good Second), regulatory requirements entail concealing any

anticipatory negative affect in the watch segment (at the thought of receiving an equally undesirable gift when their turn came), or disapproval of the experimenter's gift. Thus, regulation of negative displays is required. When children's turn to open their good gift arrives in the receive segment, children likely feel happy about receiving a good gift and relief at not receiving the same gift as the experimenter. However, shows of happiness and relief should be controlled so as not to boast to the experimenter who has just received an unappealing gift. In the condition in which children receive the bad gift first (i.e., Receive Bad First—Watch Good Second condition), children should ideally suppress negative displays and summon positive responses during the receive segment (as in the original disappointing gift paradigm). Moreover, when the experimenter wins the good gift in the watch segment, children presumably feel persisting negative emotions from the receipt of their bad gift along with intensification of those emotions due to the superior value of the experimenter's gift. However, because gifts are distributed in a seemingly random way, according to social norms, children should be *good sports* and mask their negative emotions. Finally, in the condition in which the experimenter opens the good gift first (i.e., Watch Good First—Receive Bad Second condition), no regulation of emotion is required in the watch segment as anticipatory positive affect (based on the expectation of an equally desirable gift) is appropriate in this context. However, when children receive their bad gift in the subsequent receive segment, they likely feel strong disappointment (even more so than in the Receive Bad First context), because not only do they receive a bad gift, but this occurs after the expectation of a good gift is rooted. Thus, regulation of negative emotions is desirable, but challenging, in this condition.

Although the main objective was to design a well-controlled protocol for studying positive and negative emotion regulation, in keeping with recent research trends on emotion regulation and Studies 1 and 2 (Carlson & Wang, 2007; Garner & Power, 1996; Liebermann, Giesbrecht, & Muller,

2007), important correlates of positive and negative emotion regulation were also examined. As noted, inhibitory control skills and socioemotional understanding have emerged as important correlates of both positive and negative emotion regulation (Carlson & Wang, 2007; Garner & Power, 1996; Kochanska et al., 2000; Liebermann et al., 2007; Study 1; Study 2). Thus, in the current study, to parallel the first two studies, measures of inhibitory control (affective and neutral go/no-go tasks), theory of mind (reasoning about beliefs and emotions), emotion knowledge, and display rule knowledge were included to determine if previous associations between emotion regulatory function and these variables could be replicated using the rigged card game as a novel measure of emotion regulation. Age and sex were also considered given that emotion regulation has been reported to vary as a function of both variables (Cole, 1986; Saarni, 1984; Simonds et al., 2007).

4.2. Method

4.2.1. Participants. Eighty-seven children were tested, ranging from 4 to 10 years of age. Children were recruited from daycares and schools in a predominantly white urban location. All children were tested individually in their daycare or school. For the rigged card game, videos did not record properly for 3 children, and so data for these children were excluded from analyses. Thus, in all, 84 children were included in the analyses ($M = 81.95$ months, $SD = 23.51$; 43 girls). Written consent was obtained from children's caregivers prior to testing, and verbal assent was obtained from children at the time of testing.

4.2.2. Materials & design. Cognitive and socioemotional measures included neutral and affective go/no-go tasks, neutral and affective ToM tasks, and emotion and display rule knowledge tasks. The rigged card game was used as the measure of emotion regulation. The order of these tasks remained the same across participants, with the rigged card game always being played at the end of the test session. Computerized tasks were presented on a Fujitsu Touch Screen Laptop

Computer. Tasks were programmed and children's responses were recorded using SuperLab 4.5.

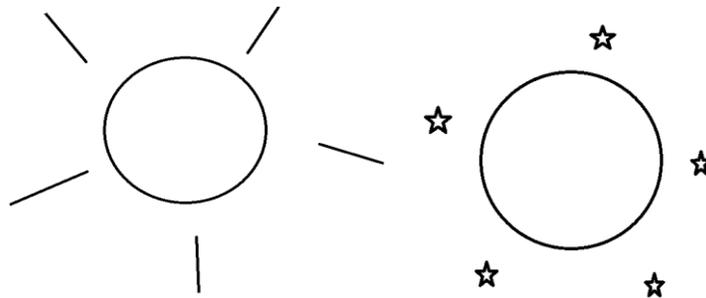
4.2.3. Procedure.

4.2.3.1. ToM tasks. Neutral and affective ToM tasks were identical to those administered in Studies 1 and 2.

4.2.3.2. Emotion knowledge and display rule knowledge tasks. Stories and scoring were the same as in Study 2.

4.2.3.3. Inhibitory control measures. This followed a procedure nearly identical to that in Study 2. However, for both neutral and affective tasks, stimuli were line drawings of similar complexities (see Figure 4.1). In the neutral task, roughly half of the participants ($n = 45$) had to

a)



b)

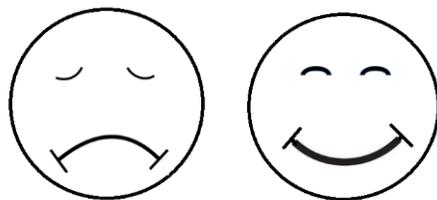


Figure 4.1. Stimuli used in (a) neutral go/no-go and (b) affective go/no-go tasks.

make a key press as quickly as possible when they saw a sun, and withhold pressing when they saw a moon. For the remainder of participants, a key press was required when they saw a moon and an inhibition was required when they saw a sun. The affective go/no-go task was similar to the neutral

go/no-go task in every way, except for the stimuli, which were happy and sad faces. Roughly half of the children ($n = 45$) had to press a key as quickly as possible when they saw a sad face, and withhold pressing when they saw a happy face, whereas the reverse was requested of the other children. As in Study 2, both go/no-go tasks were divided into two blocks, which differed in the percentage of go trials. All children received a 50% go block first, which acted as a practice block, followed by a 75% go block, which served as the test block, requiring inhibitory control of prepotent responses on the 25% of trials in which no-go stimuli appeared. A score of 1 was awarded if children withheld their responses on no-go trials (correct inhibition) and a score of 0 was awarded if an erroneous response was made. Proportion of correct inhibitions on the test block was used as the measure of inhibitory control for both tasks.

4.2.3.4. Rigged card game. The rigged card game was developed to assess regulation of positive and negative emotions and was inspired by the disappointing gift paradigm (Saarni, 1984). Children were told that they were going to play a card game in which they had to flip over cards from their designated deck of cards, while the experimenter flipped over cards from her deck. The decks were arranged so that the experimenter flipped over a jack either mid-way through the deck or at the bottom of the deck, and the child flipped over a jack at the complementary position. Prizes were promised for whoever flipped over a jack. Before beginning the game, the experimenter set out two gift bags and moved the bags around in a seemingly random way before placing one near the child (to open when he/she won) and one near herself (to open when she won). In reality, the bag designated for children was discretely marked, so that the child was given a pre-contrived gift based on the assigned counterbalancing condition. There were four conditions:

1. Child won first and received a good gift; experimenter won second and received a bad gift ($n = 21$)

2. Experimenter won first and received a bad gift; child won second and received a good gift ($n = 21$)
3. Child won first and received a bad gift; experimenter won second and received a good gift ($n = 21$)
4. Experimenter won first and received a good gift; child won second and received a bad gift ($n = 21$)

The conditions were counterbalanced across participants. Age was statistically equivalent across rigged card game conditions, $F(3, 84) = .28, p = .84$. Children who received the bad gift were given the good gift at the end of the test session on the grounds that the experimenter did not want it. This served the purpose of minimizing negative affect and ensuring all children received something desirable to thank them for their participation. All children accepted the good gift and a few even requested to keep the bad one (a plain plastic cup) too!

Children's responses to their own gift and to the experimenter receiving her gift were video recorded for later coding. As in the previous studies, four response categories were coded: (1) facial expressions, (2) vocal intonations (i.e., how children spoke), (3) verbal utterances (i.e., what children said), and (4) behavioral responses to the gift. Each category was scored ranging from -2 to +2, with -2 or -1 for negative displays depending on the intensity of children's reactions, 0 for equally mixed or neutral reactions, and +1 or +2 for positive reactions, again depending on intensity (see Study 1 for receive segment coding details; see Table 4.2 for watch segment information). Composite scores of emotion regulation were tabulated for both receive and watch segments of the card game by averaging scores from the facial, vocal, verbal, and behavioral response components. Children's responses to their own gift and to the experimenter's receipt of her gift were also coded for *effort to control emotion* defined in the same way as in Studies 1 and 2. Inter-rater reliabilities

for coding emotional responses and effort to control emotion in the receive and watch segments of the rigged card game were satisfactory ($\alpha > .78$), except for the effort to control ratings of the watch segment ($\alpha = .45$). More precisely, inter-rater reliabilities for the watch segment were .79, .94, .86, and .47 for facial, vocal, verbal, and behavioral responses, respectively. Corresponding alphas for the receive segment were .85, .93, .91, and .90. Lower reliability for the effort to control

Table 4.2

Coding Scheme for Emotional Responses to Watching the Experimenter Receive the Gift in the Rigged Card Game

	-2	-1	0	+1	+2
Facial	Full frown	Slight frown	Straight	Slight smile	Broad smile
	Eyebrows drawn together	Look of confusion or skepticism	mouth		Smiling eyes
	Nose wrinkling				
	Eye rolling				
	Teary eyes				
Vocal	Sarcastic/forceful	Faint, hesitant Emitting	Clear, neutral tone	Pleasant Emitting	Excited Sing-song
	Sad/wavering Emitting	negative noise (snort/sigh)		positive noise (ooh/aah)	Emitting positive noise
	negative noise (snort/sigh)				(ooh/aah)

Verbal	<i>Mine is better!</i>	<i>That's what</i>	<i>Oh, a ____</i>	<i>You can use it</i>	<i>Cool</i>
	<i>Yours is no</i>	<i>you got?</i>	<i>It's that</i>	<i>to...</i>	<i>I like it</i>
	<i>good</i>	<i>Why did you</i>			
	<i>That's all you</i>	<i>get that?</i>			
	<i>got?</i>				
Behavioral	Mocking gift by	Ignoring	Sitting	Devotes some	Appropriate
	pointing,	experimenter`s	neutrally	attention to gift	amount of
	Playing with or	gift, playing		Eye contact	attention to
	drawing	with own gift			gift
	attention to	instead,			Eye contact
	own gift and	shoulder shrug			
	ignoring				
	experimenter`s				
	gift				

emotion rating occurred because one rater was biased to award 0s or 1s for effort to control, and rarely assigned a rating of 2 (strong effort to control emotion). Disagreements in coding were resolved by reviewing the given video recording and discussing the point of disagreement until a consensus was reached.

4.3. Results

Data were approximately normal and not significantly skewed (based on skewness and kurtosis values that fell within an acceptable range), except for ToM variables, which were scored

binomially, and effort to control emotion in the receive segment of the rigged card game, which was somewhat peaked. Descriptives for all variables are presented in Table 4.3. Data were partially or completely missing for some of the computer tasks for some children due to computer issues, accidental omission of the task, time constraints, or because the child did not have the desire to do the task or had difficulty with the touchscreen (4 for affective go/no-go; 1 for neutral go/no-go; 13 for emotion knowledge/ display rule knowledge). As recommended by Tabachnick and Fidell (2007),

Table 4.3

Descriptive Statistics for Age, ToM, Emotion Knowledge, Display Rule Knowledge, Inhibitory Control, and Rigged Card Game Variables By Condition

Variable	Mean (SD)	Range	Skewness	Kurtosis
Age (mos.)	81.95 (23.51)	49-152	.55	-.45
Neutral ToM	.34 (.47)	0-1	.69	-1.55
Affective ToM	.39 (.49)	0-1	.45	-1.85
Emotion Knowledge	.54 (.19)	0-1	-0.03	.07
Display Rules	.51 (.19)	.13-1	.01	-0.33
Neutral GoNoGo	.28 (.30)	0-1	1.31	.69
Affective GoNoGo	.26 (.25)	0-1	1.05	.45
<i>Receive Good 1—Watch Bad 2</i>				
Receive Emotion	.76 (.70)	-.50-2.00	-.19	-.59
Receive Effort to Control	.48 (.75)	0-2	1.27	.17
Watch Emotion	.28 (.52)	-.50-1.25	.41	-.60
Watch Effort to Control	.52 (.81)	0-2	1.14	-.39
<i>Watch Bad 1—Receive Good 2</i>				
Receive Emotion	1.10 (.65)	-.75-2.00	-1.32	2.16
Receive Effort to Control	.10 (.30)	0-1	2.98	7.56
Watch Emotion	.21 (.60)	-1.25 – 1.25	-.41	.48
Watch Effort to Control	.33 (.48)	0-1	.76	-1.58
<i>Receive Bad 1—Watch Good 2</i>				
Receive Emotion	-.18 (.85)	-1.5-1.75	.49	-.33
Receive Effort to Control	.90 (.54)	0-2	-.11	.94
Watch Emotion	-.28 (.50)	-1.75-.50	-1.08	2.67
Watch Effort to Control	.93 (.64)	0-2	-.03	-.34
<i>Watch Good 1—Receive Bad 2</i>				
Receive Emotion	-.74 (.83)	-2.00-.75	-.03	-.75
Receive Effort to Control	.71 (.73)	0-2	.52	-.96
Watch Emotion	.23 (.56)	-.50-1.50	.74	-.41
Watch Effort to Control	.38 (.50)	0-1	.53	-1.91

missing values were imputed using multiple imputations with five imputations. Analyses were conducted on pooled averaged data.⁶ Initial analyses of variance were conducted to address the main objective of comparing emotional responses across rigged card game scenarios. Secondary analyses involved examining socioemotional and inhibitory correlates of emotional responses in the rigged card game, for each condition separately, to compare with overall findings from the first two studies.

4.3.1. Comparing emotion regulation conditions in the rigged card game. To determine whether emotion regulation differed across conditions in the rigged card game, a 4 (Condition: Receive Good First—Watch Bad Second, Watch Bad First—Receive Good Second, Receive Bad First—Watch Good Second, Watch Good First—Receive Bad Second) x 2 (Gift Segment: Receive vs. Watch) mixed-measures analysis of variance (ANOVA) was conducted on emotion composite scores with gift segment as the repeated measure. Emotional responses were not significantly different for receive and watch segments ($p = .20$). However, there was a main effect of condition, $F(3, 80) = 20.13$, $MSE = .49$, $p < .001$, partial $\eta^2 = .43$, with children in the Receive Bad First-Watch Good Second and Watch Good First – Receive Bad Second conditions responding negatively overall ($M_{Receive\ Bad\ 1 - Watch\ Good\ 2} = -.23$, $SD_{Receive\ Bad\ 1 - Watch\ Good\ 2} = .53$; $M_{Watch\ Good\ 1 - Receive\ Bad\ 2} = -.25$, $SD_{Watch\ Good\ 1 - Receive\ Bad\ 2} = .50$), and children in the Receive Good First – Watch Bad Second and Watch Bad First – Receive Good Second conditions responding positively overall ($M_{Receive\ Good\ 1 - Watch\ Bad\ 2} = .52$, $SD_{Receive\ Good\ 1 - Watch\ Bad\ 2} = .51$; $M_{Watch\ Bad\ 1 - Receive\ Good\ 2} = .65$, $SD_{Watch\ Bad\ 1 - Receive\ Good\ 2} = .42$). Children in both Receive Good conditions responded significantly more positively than children in the Receive Bad conditions, $ps = .001$. No other significant differences were detected, $p > .38$. There was also a

⁶ Findings were similar when multiple imputations were used as when cases with missing values were excluded.

two-way interaction between gift condition and segment, $F(3, 80) = 17.03$, $MSE = .39$, $p < .001$, partial $\eta^2 = .39$ (Figure 4.2).

The two-way interaction was followed up with separate ANOVAs on emotion composite scores for the receive and watch segments. For the ANOVA on emotion composite scores for when children received the gift, there was a main effect of gift condition, $F(3, 80) = 25.90$, $MSE = .58$, $p < .001$, partial $\eta^2 = .49$. Pairwise comparisons using Least Significant Difference (LSD) tests showed that children who received the good gift ($M_{\text{Receive Good 1 - Watch Bad 2}} = .76$, $SD_{\text{Receive Good 1 - Watch Bad 2}} = .70$; $M_{\text{Watch Bad 1 - Receive Good 2}} = 1.10$, $SD_{\text{Watch Bad 1 - Receive Good 2}} = .65$), responded more positively to their gift than children who received the bad gift ($M_{\text{Receive Bad 1 - Watch Good 2}} = -.18$, $SD_{\text{Receive Bad 1 - Watch Good 2}} = .85$; $M_{\text{Watch Good 1 - Receive Bad 2}} = -.74$, $SD_{\text{Watch Good 1 - Receive Bad 2}} = .83$), $ps = .001$. However, the receive segment composite scores were similar for children in the Receive Good First – Watch Bad Second and Watch Bad First – Receive Good Second conditions, $p = .15$. In contrast, children who opened the bad gift *after* the experimenter received the good gift reacted more negatively than children who opened the bad gift first, $p = .02$.

For the ANOVA on emotion composite scores for the watch segment, there was also a main effect of gift condition, $F(3, 80) = 4.81$, $MSE = .30$, $p = .004$, partial $\eta^2 = .15$. Children in the Receive Bad First – Watch Good Second condition who watched the experimenter open a good gift after having received a bad gift themselves responded negatively to the experimenter's gift ($M = -.28$, $SD = .50$), whereas children in the Receive Good First – Watch Bad Second ($M = .28$, $SD = .52$), Watch Bad First – Receive Good Second ($M = .21$, $SD = .60$), and Watch Good First – Receive Bad Second ($M = .23$, $SD = .56$) gift conditions were significantly more positive when watching the experimenter open her gift, all significant $ps < .01$. No significant differences in composite scores for the watch segment existed between these three conditions (all $ps > .67$).

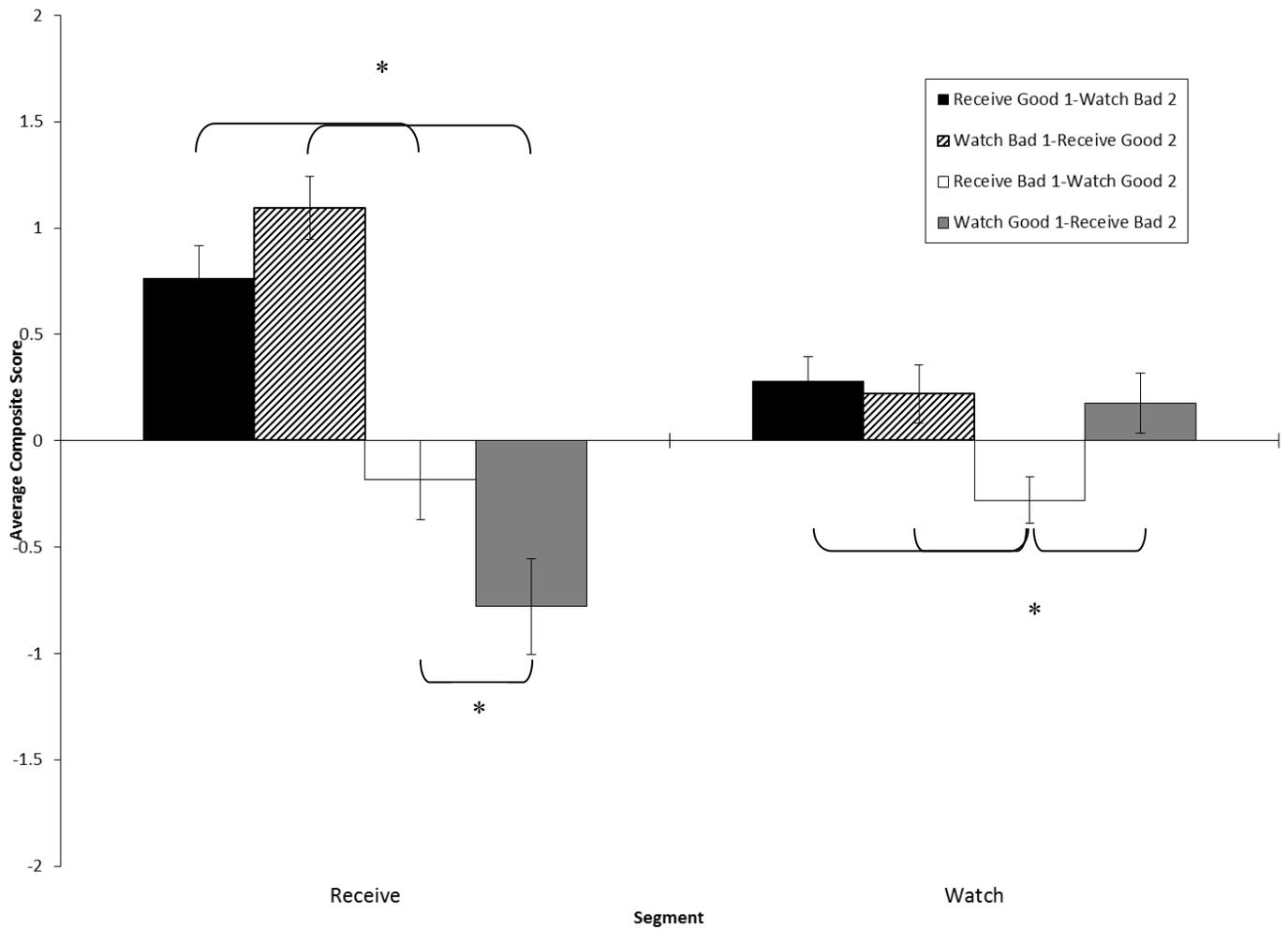


Figure 4.2. Emotion composite scores for children in the four rigged card game conditions when receiving their good or bad gift and when watching the experimenter receive her good or bad gift.

Next, to examine whether effort to control emotion differed across rigged card game conditions, a 4 (Condition: Receive Good First—Watch Bad Second, Watch Bad First—Receive Good Second, Receive Bad First—Watch Good Second, Watch Good First—Receive Bad Second) x 2 (Gift Segment: Receive vs. Watch) mixed-measures ANOVA on effort to control emotion scores was

conducted with gift segment as the repeated measure. There was no significant effect of segment ($p = .95$), nor was there a significant segment by gift condition interaction ($p = .21$). However, gift condition was found to significantly affect the amount of effort to control emotion, $F(3, 80) = 9.46$, $MSE = .37$, $p < .001$, partial $\eta^2 = .26$. Overall, children in the Receive Bad First – Watch Good Second condition exhibited more effort to control emotion ($M = .92$, $SD = .44$) than children in any other condition, all $ps < .01$. Children in the Watch Bad First – Receive Good Second condition exhibited the least effort in their emotional responses ($M = .21$, $SD = .30$), all $ps < .03$, whereas children in the Receive Good First – Watch Bad Second ($M = .50$, $SD = .52$) and Watch Good First – Receive Bad Second ($M = .55$, $SD = .42$) conditions did not differ in terms of effort to control emotion, $p = .72$.

4.3.2. Relating inhibitory and socioemotional variables with emotion regulation.

Correlational analyses were conducted to determine whether theory of mind (affective and neutral), emotion knowledge, display rule knowledge, and inhibitory control (affective and neutral), as well as age and sex ($F = 1$, $M = 2$), related with children's emotional responses in the different conditions of the rigged card game (Table 4.4). For the Receive Good First—Watch Bad Second, Watch Bad First—Receive Good Second, and Receive Bad First—Watch Good Second conditions, none of these variables related significantly with children's composite emotion ratings or the amount of effort to control emotion displayed when they received the good gift. In addition, there was a lack of significant correlations between cognitive and socioemotional measures and composite emotion scores and effort to control emotion when children watched the experimenter open the gift in these conditions, although a few marginally significant correlates were observed (Table 4.4).

Table 4.4

*Correlations Between Socioemotional Variables, Inhibitory Control, and Emotion Regulation Scores**in the Receive and Watch Segments By Condition*

Condition	Predictor	Receive Score	Receive Effort	Watch Score	Watch Effort
Receive Good 1—Watch Bad 2	Age	-.01	.10	.27	.14
	Sex	-.09	.03	-.36	.09
	Neutral ToM	.13	-.04	.23	.04
	Affective ToM	-.12	-.04	-.26	.16
	Emotion Knowledge	.03	.03	.35	.15
	Display Rules	-.11	.05	.08	.08
	Neutral Go/No-Go	-.26	.18	-.21	-.19
	Affective Go/No-Go	-.28	.19	-.13	-.12
Watch Bad 1—Receive Good 2	Age	-.13	.04	.30	.06
	Sex	.15	-.25	.01	-.14
	Neutral ToM	-.22	-.18	.11	-.16
	Affective ToM	-.13	.08	.27	.28
	Emotion Knowledge	-.11	-.10	.35	.08
	Display Rules	-.16	.13	-.25	.09
	Neutral Go/No-Go	.31	-.13	.04	-.01
	Affective Go/No-Go	.25	-.16	.13	.02
Receive Bad 1—Watch Good 2	Age	.15	-.33	.31	.14
	Sex	-.13	-.37+	-.18	-.20
	Neutral ToM	.09	.25	-.33	.09
	Affective ToM	.08	-.26	.20	-.41+
	Emotion Knowledge	.06	-.21	.37+	-.16
	Display Rules	.07	.14	.22	-.04
	Neutral Go/No-Go	-.15	.22	-.25	.14
	Affective Go/No-Go	-.23	-.04	-.18	-.37+
Watch Good 1—Receive Bad 2	Age	.45*	.10	-.06	-.37
	Sex	-.50*	-.80**	.02	.21
	Neutral ToM	.04	.07	-.02	-.34
	Affective ToM	.23	.14	-.06	.11
	Emotion Knowledge	.33	.19	.30	-.11
	Display Rules	.45*	.24	.13	-.11
	Neutral Go/No-Go	-.04	-.06	.39	.06
	Affective Go/No-Go	.01	-.06	.22	.06

+ $p < .10$, * $p < .05$, ** $p < .01$

Likewise, no significant correlates appeared for the analyses with children's responses to watching the experimenter open the good gift first in the Watch Good First – Receive Bad Second

condition. However, when children subsequently opened their own (bad) gift in this condition, display rule knowledge was found to significantly relate to their composite emotion scores. In other words, children who demonstrated a familiarity with social display rules exhibited the most positive responses when receiving the disappointing gift. In addition, significant relations were observed between age and sex and children's responses to receiving the bad gift, with older children and girls demonstrating less negative emotional displays ($M_{\text{girls}} = -0.22$, $SD_{\text{girls}} = .63$; $M_{\text{boys}} = -1.28$, $SD_{\text{boys}} = .87$). Sex was also found to correlate with effort to control, indicating that girls made more effortful attempts to regulate emotions than boys ($M_{\text{girls}} = 1.44$, $SD_{\text{girls}} = .50$; $M_{\text{boys}} = .22$, $SD_{\text{boys}} = .44$).

4.4 Discussion

In the current study, a novel measure of emotion regulation with a controlled protocol for examining children's ability to regulate positive and negative emotions was devised. The rigged card game was used to assess how children respond emotionally when receiving a good or bad gift, and when watching someone else receive a good or bad gift, in different contexts (i.e., opening the gift before or after the experimenter opened one of greater or lesser value). Results were mixed in that they did not fully support initial predictions. However, the pattern of results obtained suggests that performance in the various contexts permits a meaningful exploration of positive and negative emotion regulation. Indeed, the results illustrate that children could regulate emotions in some contexts but not in others.

The two conditions in which children received a good gift tended to require regulation of positive emotions. More precisely, in the condition in which children received the good gift first and the experimenter opened the bad gift second, no emotion regulation was necessary when children opened their own gift, given that they probably felt happy and there are no social constraints against responding positively after receiving a gift. However, when the experimenter opened the

bad gift, social niceties dictated that children suppress lingering positive displays directed at their own gift and simulate interest in the experimenter's gift. Indeed, children in the Receive Good First – Watch Bad Second condition responded to the experimenter's gift in a slightly positive way, similar to children in the Watch Good First – Receive Bad Second condition. This means that children in this condition successfully regulated exuberant feelings toward their own gift to attentively watch and encourage the experimenter when it was her turn to open the bad gift. Regulation of positive emotions was also required in the receive segment of the Watch Bad First – Receive Good Second condition. When these children opened their good gift, they were presumably pleased. However, regulation of positive displays was required so as not to brag to the experimenter who had just received a less desirable gift. Thus, if children who received the good gift second successfully controlled their positive emotions, they should have exhibited less positive affect than children who received the good gift first. In reality, children did not show restraint when receiving a good gift after the experimenter had received a bad one. In fact, children in the Watch Bad First – Receive Good Second condition tended to respond somewhat (although not significantly) more positively to their good gift than those in the Receive Good First – Watch Bad Second condition (Cohen's $d = 0.50$), indicating that positive emotions were largely unregulated in this context. In short, children could not regulate immediate positive responses to their good gift when required to do so, but could regulate residual positive affect from receiving a good gift when it was the experimenter's turn to open the bad gift.

The finding that children struggled to control positive emotions when opening a good gift after the experimenter had received a bad gift is consistent with the findings in Study 2 and with reports by Carlson and Wang (2007). Carlson and Wang found that 4- to 5-year-old children could only temporarily withhold an exciting secret. Relatedly, in Study 2, 5- to 10-year-olds continued to

engage in positive game-playing behaviors even when these should have been suppressed. Then again, there was evidence of positive emotion regulation when children responded to the experimenter's bad gift after having received a good gift. That is, children disengaged from their own gift and acted in an interested and supportive way to the experimenter while she was opening the bad gift. Thus, children's regulation of positive emotions may depend on several contextual factors including the intensity of the emotion and the timing of the regulatory demands.

With regards to the conditions in which children received a bad gift, regulation of negative emotions was required most of the time. Specifically, in the condition in which children received the bad gift first and the experimenter received the good gift second, children's negative response to their own gift needed to be regulated (as in the original disappointing gift paradigm). Similarly, when the experimenter opened the good gift, children presumably felt residual negative affect from their bad gift along with added disappointment due to the more attractive nature of the experimenter's gift. However, because gifts were distributed in a seemingly random way and the outcome was not perceived as the experimenter's fault, children should have controlled negative displays. In contrast, when the experimenter opened the good gift first, no regulation of emotion was needed given that anticipatory positive affect (based on the expectation of an equally desirable gift) or genuine interest in the experimenter's gift was appropriate. However, when children opened their bad gift, they likely felt strong disappointment, which needed to be controlled to comply with social norms about accepting gifts. Finally, negative emotion regulation was required in one of the good gift conditions, in which the experimenter opened a bad gift first and children received a good gift second. Specifically, regulatory requirements involved concealing any disapproval when the experimenter opened the gift or anticipatory negative affect (due to the expectation of an equally undesirable gift for themselves).

As with the positive emotion regulation outcomes, children had some difficulty controlling their negative displays in the rigged card game. That is, in the Receive Bad First – Watch Good Second condition, children’s responses to the experimenter’s gift differed significantly from the other three conditions. These children responded negatively to the experimenter’s gift, indicating that they could not regulate the negative emotions brought on by their bad gift and by the social comparison with the experimenter’s good gift. Thus, in the context of responding to someone opening a good gift after having personally received a bad gift, children’s regulation of negative emotions was reduced.

Nonetheless, some indication of negative emotion regulation was apparent in other rigged card game contexts. Children in the Watch Bad First – Receive Good Second condition who had to endure the anticipatory disappointment of the experimenter opening a bad gift responded in a similar positive way while watching the experimenter open the gift as children in the Receive Good First – Watch Bad Second and Watch Good First –Receive Bad Second conditions. This suggests that children had control over displays of negative affect under these circumstances. More subtle signs of negative emotion regulation were observed in the conditions in which children received bad gifts. Children who received the bad gift first responded less negatively than children who received the bad gift after the experimenter had opened the good gift. This could reflect some regulation of negative emotions when children opened the gift in the Receive Bad First—Watch Good Second condition, whereas the disappointment evoked in the Watch Good First—Receive Bad Second condition may have been too intense to dampen. Alternatively, children may have felt minimal negative affect when receiving a bad gift first, prior to knowing that the experimenter would receive something better. The second interpretation is less likely, given that previous studies using the disappointing gift paradigm have reported that this effectively induces disappointment and requires

its regulation (Cole, 1986).

The fact that children failed to hide the negative emotions they felt over receiving a bad gift when the experimenter received something better pinpoints difficulties in negative emotion regulation in this age range. However, evidence of successful negative emotion regulation was gleaned from other segments in the rigged card game. As mentioned, there was some downplay of negative emotions in the rigged card game segment that mimicked the disappointing gift paradigm (i.e., children received bad gift first), compared to the segment in which children received the bad gift second. Similarly, children reacted in a positive way when the experimenter opened the bad gift first, even though they presumably felt anticipatory disappointment that they would face a similar outcome. Therefore, children regulated negative affect in some contexts but not others.

The analyses on children's effort to control emotion in the receive and watch segments of the rigged card game were less informative. Overall, children in the Receive Bad First – Watch Good Second condition exhibited more effort to control emotion than those in any other condition. However, because no interaction between gift condition and segment was observed, this is not informative about the amount of effort drawn upon for different emotion regulatory scenarios in the rigged card game.

Another objective of the current study involved studying and comparing the relevant cognitive and socioemotional correlates of positive and negative emotion regulation. Beginning with the correlates of positive emotion regulation, unexpectedly, none of the variables (age, sex, inhibitory control, ToM, emotion, knowledge, display rule knowledge) significantly correlated with children's responses in rigged card game scenarios requiring positive emotion regulation. This diverges from previous work on the correlates of positive emotion regulation, in which inhibitory control and emotion knowledge were significantly positively related with children's ability to

control positive responses, such as telling an exciting secret or playing a fun game after an accident had occurred (Carlson & Wang, 2007; Study 2). Differences in the selected emotion regulation measures may explain the discrepant results. Whereas the secret-keeping task and staged accident task involve suppression of information and ongoing behaviors, respectively, the rigged card game requires control over a broader array of emotional responses (facial, vocal, verbal, gestural). Perhaps inhibitory control is more reliably associated with emotion regulation when motor responses, such as game-playing, are the main response component being regulated. In a similar way, assessments of emotion knowledge, which require language skills and verbal reasoning, may preferentially correlate with the ability to suppress spoken responses (as in the secret-keeping task).

As for the correlates of negative emotion regulation, emotion knowledge scores correlated with the ability to downplay negative responses when watching the experimenter open a good gift after receiving a bad one in the Receive Bad First – Watch Good Second condition, although this was marginally significant. Significant correlations appeared only for the receive segment of the Watch Good First—Receive Bad Second condition - the rigged card game scenario with the most rigorous emotion regulatory demands. Age, sex, and display rule knowledge all emerged as significant positive correlates of children's emotional responses to their bad gift. Consistent with previous reports, older children and girls were more successful in controlling their negative responses, as were children with a superior understanding of social display rules (Cole, 1986, Carlson & Wang, 2007, Saarni, 1984, Study 1). While girls were better at regulating negative displays, they required more effort to do so. It is unclear why significant correlations between socioemotional measures and responses to the bad gift emerged only when the bad gift was received after the experimenter opened a good gift. Previous work (Carlson & Wang, 2007; Study 1)

has revealed links between emotion and display rule knowledge and responses to a disappointing gift in contexts that resembled the receive segment of the Receive Bad First – Watch Good Second condition. Differences in the age distribution of the samples and the smaller sample size in each condition may explain why these correlates were only significant in the most stringent negative emotion regulation scenarios in the current study.

One matter that warrants discussion is the large number of correlations that were examined in the current study. In examining a large number of correlations, Type I errors can occur and significant findings can erroneously be reported. In these cases, it can be beneficial to correct the p-value to reduce the chance of finding false positive results (e.g., Bonferonni correction). However, we must also consider the problem of Type II error, or of obtaining false negative results. Sample sizes were quite small ($n = 21$ per condition) and thus power to detect significant findings was limited, which likely accounted for the fact that significant correlations were only obtained in the condition in which emotion regulation was most taxed. As such, no adjustments to p-values were employed as this may have overcorrected and made it impossible to detect associations between variables. Moreover, correlational analyses in this study were conducted primarily as a means of comparison with those from the first two studies. In this regard, the significant relations observed in Study 3 fit with the pattern of results in Studies 1 and 2, adding credence to their validity.

4.5. Conclusion

In conclusion, children succeeded in regulating positive and negative emotions in some contexts of the rigged card game, but not others. Children could not control positive emotions when opening a good gift after the experimenter had received a bad gift, but regulated displays of excitement toward their own gift when the experimenter received the bad gift second. In terms of negative emotion regulation, children struggled to regulate negative displays when the

experimenter received a good gift after they had received a bad gift. Nevertheless, children could regulate anticipatory disappointment brought on by the experimenter receiving the bad gift first. Children who received the bad gift reacted negatively regardless of whether they received it before or after the experimenter attained the good gift, but their negative displays were stronger when they opened the bad gift second, when social comparison with the experimenter's good gift was present. Even in this context, older children, children with strong display rule knowledge, and girls tended to be better at regulating negative emotions.

CHAPTER 5 DISCUSSION

5.1. Overview

In Study 1, the primary objective was to assess how relevant variables relate to and predict performance on a commonly used measure of negative emotion regulation – the disappointing gift paradigm. Studies 2 and 3 determined whether similar correlates were important for regulation of positive emotions. In addition, Study 2 served to relate children’s ability to control negative emotions with their capacity to regulate positive emotions to explore whether regulatory abilities vary by the type of emotion being regulated or remain constant across different emotion-eliciting scenarios. Study 3 supplemented Study 2 by devising an improved protocol for studying regulation of negative and positive emotions.

5.2. Children’s Emotion Regulatory Abilities

5.2.1. Positive emotion regulation. Previous work has suggested that young children have difficulty controlling their positive emotions. For instance, Carlson and Wang (2007) found that 4- and 5-year-olds could only temporarily withhold exciting information from an experimenter. Results from Studies 2 and 3 are consistent with this notion that positive emotion regulation is challenging for children to enact. In Study 2, 5- to 10-year-old children were poor at regulating positive emotions in the staged accident task. On average, children continued to interact with the game even though the appropriate response was to wait for the experimenter or to help the experimenter clean up the marble spill. Likewise, in Study 3, children failed to regulate positive emotions in some contexts. For example, children responded positively to their good gift, irrespective of whether the experimenter had opened the bad gift yet or not. Although responding positively to their gift in the Receive Good First—Watch Bad Second condition was acceptable, children in the Watch Bad First—Receive Good Second condition should have downplayed

excitement over their own gift out of consideration for the experimenter, which they failed to do. However, children had some regulatory success in the condition in which they received the good gift first and successfully regulated interest in their own gift to respond appropriately to the experimenter's gift. Thus, children's regulation of positive emotions may depend on several factors such as the timing and intensity of the to-be-regulated emotion.

5.2.2. Negative emotion regulation. As with the positive emotion regulation outcomes, children had some difficulty controlling their negative emotions. In Study 1, 5- to 7-year-olds struggled to mask their displeasure with the disappointing gift, and responded in a negative manner on average. In Study 2, mean responses to the disappointing gift were also negative, indicating that, in general, disappointment could not be fully suppressed, and positive displays were not achieved. Negative responses were seen despite the older age range included in this study (5- to 10-year-olds).

In Study 3, 4- to 10-year-olds reacted negatively when the experimenter opened her gift in the Receive Bad First – Watch Good Second condition, indicating that children could not regulate the negative emotions brought on by their bad gift and by the unjust social comparison with the experimenter's gift. Even so, some evidence of negative emotion regulation was observed in other rigged card game contexts. Children in the Watch Bad First – Receive Good Second condition, who had to endure the anticipatory disappointment of the experimenter opening a bad gift, summoned positive responses to the experimenter's gift. In addition, children who received the bad gift first (Receive Bad First – Watch Good Second) responded less negatively to their gift than children who received the bad gift after the experimenter had opened a good gift (Watch Good First – Receive Bad Second), suggesting that some regulation of negative emotions occurred in the rigged card game scenario that was most similar to the disappointing gift paradigm.

These findings bear similarities to those of Carlson and Wang (2007) who found that only about half of preschoolers said they liked the disappointing gift, and that many made negative comments or expressions. However, given the older age range in Studies 2 and 3, superior control of emotions was expected. Indeed, Saarni (1984) and Simonds et al. (2007) found that by 10 years of age, children could successfully summon positive responses to the disappointing gift. In Study 3, regulation of negative emotions in the most demanding rigged card game condition did improve with age, suggesting that children were making the anticipated regulatory gains as they approached the 10-year mark. However, no associations with age were apparent in Study 2. Because all children completed a positive emotion regulation task prior to the disappointing gift paradigm in this study, it is possible that children's regulatory efforts were especially taxed and that even the oldest children were poor at regulating negative emotions under these circumstances. Researchers have discussed self-regulatory behaviors in terms of cognitive and energy reserves (Gailliot et al., 2007; Muraven & Baumeister, 2000), so resource depletion is one plausible explanation for the lack of age-related improvements in Study 2.

5.3. Relating Positive and Negative Emotion Regulation

In Study 2, children's ability to regulate negative emotions in the disappointing gift paradigm was inversely related with their ability to control positive displays in the staged accident task. Hence, emotion regulation does not appear to be a single, global skill that children apply consistently for different-valenced emotions. Instead, children who are best at regulating negative emotions struggle to control positive emotions, and vice versa. These findings can be interpreted in terms of emotion regulatory styles. Just as there has been discussion of general affective styles or temperaments in the literature (e.g., Davidson, 1992; Zalewski et al., 2011), there may be particular emotion regulatory profiles in which children successfully regulate one type of emotion but fail to

regulate opposing emotions. These proposed emotion regulatory styles may correspond with children's affective styles such that children with positive affective styles or temperaments succeed at regulating negative emotions and summoning positive emotions, but fail to control positive emotional displays, as this is their default response mode. A complementary pattern of regulatory behaviors could be expected for children with negative affective styles. Alternatively, children with positive affective styles may succeed at regulating positive affect due to repeated practice with that type of emotion. Future work will need to administer concurrent measures of emotion regulation with measures of affective disposition to examine these possibilities. On a related note, it would be interesting to study how shy and socially withdrawn children perform on measures of positive and negative emotion regulation. Based on work by Kagan (1997) and Coplan, Wilson, Frohlick, and Zelenski (2006), we might expect these children to respond negatively when faced with stressful or novel scenarios but to display restraint in exuberant or exciting situations.

5.4. Correlates of Emotion Regulation

5.4.1. Age. Age in months predicted effort to control emotion in the gift paradigm in Study 1, even after controlling for inhibitory control and emotion knowledge, and was associated with children's emotional responses in the most demanding condition of the rigged card game in Study 3, consistent with previous research on this topic (Carlson & Wang, 2007; Saarni, 1984; Simonds et al., 2007). The finding that age was associated with more effort to control emotion in Study 1 may be due to the particular age range that was studied. Five- to 7-year-olds may show some ability to regulate their emotions, but may still exhibit certain indicators of their actual feelings (e.g., true emotional reactions interspersed with regulated displays; adaptor behaviors to help maintain composure). Children seem to first develop the ability to initiate artificial affective displays, before they can suppress their true emotions (see Liebermann et al., 2007), although, even older children

may have difficulty suppressing negative emotion in especially demanding contexts. Such an explanation would account well for why in Study 1 age related with effort to control emotion (indicated in part by competing emotional displays), but with overall emotion regulation in the most difficult condition of Study 3, which had the widest age range and oldest children. It is not clear why age failed to relate to responses to the disappointing gift in Study 2. Differences in the probable developmental courses (and in the defining features) of effort to control emotion and emotion regulation may also explain why these two dependent variables showed somewhat different associations with predictors across studies.

Interestingly, age was only associated with negative emotion regulation, and not with the measures of positive emotion regulation that were presented in Studies 2 and 3. Controlling negative displays may be a widespread social requirement, whereas occasions for positive emotion regulation may be more sparse or imprecise (e.g., see Underwood, 1997). Consequently, age-related improvements in regulation may be stronger for commonly regulated emotions, compared to emotions with more ambiguous social rules and less opportunity for regulatory rehearsal. Obviously, sample sizes for the different conditions in Study 3 were small, so the ability to detect correlations was limited.

5.4.2. Sex. A trend toward better emotion regulation in the disappointing gift paradigm was observed in Study 1, with girls outperforming boys. Girls were also better at controlling their responses to the disappointing gift in Study 3 in the Watch Good First – Receive Bad Second condition, the most trying of the conditions. These findings corroborate those of Cole (1986), Feldman and White (1980), and Simonds et al. (2007), who found that girls were more successful regulators of negative displays than boys. According to Saarni (1979), girls monitor social displays more than boys in order to prevent conflict and to please others. In fact, for girls, but not boys, the

ability to understand others' emotions is related with their sense of self (Bosacki, 2007).

Furthermore, in North American society, displaying certain negative emotions is more acceptable for boys than girls (Brody, 1984). The specific social considerations held by girls and the more lenient social rules for boys may explain why girls are consistently described as superior at managing emotions.

5.4.3. Theory of mind. Like Liebermann et al. (2007), no link between false belief reasoning and emotion regulation was observed in any of the studies. However, reasoning about emotions in the affective ToM task significantly predicted children's responses to the disappointing gift in Study 1, even after controlling for display rule knowledge and inhibitory control. This same measure of affective ToM was related with the amount of effort that went in to controlling responses to the disappointing gift in Study 2, and with the effort involved in regulating negative responses to the experimenter opening a good gift after children had received a bad gift in Study 3 (although this was only marginally significant, and in opposite directions). Thus, children's ability to reason about another's emotions may be more pertinent to emotion regulation than their ability to reason about purely cognitive states, such as beliefs. In fact, Leavitt and Power (1989) suggest that being attuned to others' emotions encourages use of socially appropriate affective displays.

Based on the presence of correlations between affective ToM and negative emotion regulation measures, and the absence of such correlations with measures of positive emotion regulation, this type of emotion reasoning appears to be most relevant for regulating negative emotions. However, the affective ToM task used in all three studies required reasoning about a character's happiness and did not assess ToM for other emotions. Reasoning about another's happiness may be an important factor for controlling negative emotions, but not for regulating positive emotions. Future work should include ToM stories that require reasoning about varied

emotions to determine whether links with positive emotion regulation exist under different conditions.

5.4.4. Emotion knowledge. Basic situational emotion knowledge may be crucial for understanding the nature of an emotion triggered by a given situation before it can be deemed inappropriate and altered (Leavitt & Power, 1989). In other words, emotion knowledge may be a prerequisite for emotion regulation (Barrett, Gross, Christensen, & Benvenuto, 2001). Such theoretical claims have been supported by the empirical literature. For instance, Garner and Power (1996) found that children's emotion knowledge on a story task was a unique predictor of positive displays in the disappointing gift paradigm. Carlson and Wang (2007) also found relations between emotion understanding and emotion regulation, particularly with their secret keeping measure of positive emotion regulation. Accordingly, performance on the emotion knowledge task was expected to correlate with children's emotion regulatory abilities.

As projected, emotion knowledge (marginally) predicted effort to control emotion to the disappointing gift, after controlling for other predictors in Study 1. In addition, significant zero-order correlations were seen between emotion knowledge and effortful responses to the disappointing gift. In Studies 2 and 3, emotion knowledge was not significantly related with children's responses in the negative or positive emotion regulation tasks.

One reason that results from Studies 2 and 3 did not match up with findings from Study 1 may be the broader age ranges that were tested. Moreover, due to the increased age range, additional and potentially more difficult stories were used in the emotion knowledge tasks in Studies 2 and 3. In fact, children answered only about half of the stories correctly, compared to roughly three quarters of the stories in Study 1. The enhanced task difficulty may have restricted the ability to detect relations between emotion knowledge and emotion regulation.

5.4.5. Display rule knowledge. A more complex form of emotion knowledge involves familiarity with socially appropriate emotional displays (Saarni, 1981). Display rule knowledge involves recognizing normative or desirable emotional expressions for various scenarios, and understanding that these may agree or disagree with one's true internal emotions (Denham, McKinley, & Couchoud, 1990; Garner et al., 1994). Thus, this form of social knowledge was expected to be linked to emotion regulation in the various regulatory tasks administered across the three studies.

Knowledge of appropriate external displays significantly related with the composite measure of emotion regulation from the disappointing gift paradigm in Study 1. Children with the best display rule knowledge made the most positive responses to the disappointing gift, even after all other predictors had been entered into the model. Significant associations between display rule knowledge and regulation of negative emotions also appeared in Study 3 in the rigged card game condition with the most stringent regulatory demands. That is, children with the strongest knowledge of appropriate external displays responded most positively when they received a bad gift, after the experimenter had opened a good one. These appear to be the first empirical results indicating a connection between children's *hypothetical* and *actual* use of display rules.

However, display rule knowledge was unrelated with children's responses to the disappointing gift and in the staged accident in Study 2, and in the condition most similar to the disappointing gift paradigm in Study 3. As noted, Studies 2 and 3 used more difficult display rule stories, which were first piloted with adults. Perhaps the added display rule task complexity meant that relations were only apparent with emotion regulation in the most demanding regulatory conditions (when children received a bad gift after being primed to receive a good one).

Overall, positive emotion regulation was less reliably associated with the socioemotional

measures studied here (i.e., ToM, emotion knowledge, display rule knowledge). Negative emotional displays may be discouraged more often than positive displays and children who regulate negative emotions but fail to regulate positive ones may be deemed more socially competent than those who regulate positive emotions but act out in a negative way. For instance, Underwood (1997) found that school-aged children reported that they endorsed hiding negative emotions, but approved of showing positive emotions around peers. Therefore, children who exhibit strong socioemotional knowledge may preferentially regulate negative emotions, but links between socioemotional competence and positive emotion regulation may be less clear.

5.4.6. Inhibitory control. Finally, suppressing true emotional displays and activating alternative ones may rely on children's inhibitory control, or their general ability to suppress inappropriate behaviors (Verbruggen & Logan, 2008). A variety of measures of inhibitory control have been found to correlate with and predict regulation of negative emotions in the disappointing gift paradigm (Carlson & Wang, 2007; Liebermann et al., 2007). Inhibitory control has also emerged as an important correlate of positive emotion regulation (Carlson & Wang, 2007; Kochanska et al., 2000). Thus, inhibitory performance on go/no-go tasks was expected to be associated with children's regulation of negative and positive displays in the three studies.

As anticipated, inhibitory control on the neutral go/no-go task related with children's ability to regulate emotions in Study 1 and remained a significant predictor of emotion regulatory success even after affective ToM and display rule knowledge were taken into account. Children who best controlled their responding on 'no-go' trials also showed more effortful regulation of emotional responses to the gift, after controlling for other relevant predictors. Although performance on the neutral go/no-go was associated with emotion regulatory abilities, no such links emerged for the affective go/no-go task. Discrepant findings may be due to the increased difficulty of the affective

task, which generated more errors than the neutral task. In addition, inhibitions were only required to negative stimuli in the affective task. Perhaps if children had been asked to inhibit to positive items, different findings would have emerged.

Impulsive responding rather than inhibited responding corresponded to better emotion regulation in disappointing gift task in Study 2 (although this was specific for positive stimuli). In contrast, strong inhibitory control to positive stimuli in the go/no-go task was associated with regulating positive emotions during the staged accident. This suggests that some children may have a common tendency to respond to positive items and to react in a positive manner. In the same way, children who inhibit to (or withdraw from) positive stimuli may be inclined to show subdued positive or enhanced negative affect. These possibilities are consistent with the concept of emotion regulation as an extension of affective style and fit with the idea of positive and negative affective dispositions as conditions of approach and avoidance (Elliott & Thrash, 2002).

Unlike Studies 1 and 2, inhibitory control was not associated with emotion regulation in Study 3. Inconsistencies across studies can be explained in terms of the stimuli that were selected as 'go' and 'no-go' cues. The chosen stimuli may have influenced inhibitory function (e.g., Todd, Lewis, Meusel, & Zelazo, 2008) and, in turn, affected how go/no-go performance correlated with measures of emotion regulation. Indeed, the stimuli used as 'go' and 'no-go' cues in Study 3 were less differentiated and potentially more difficult to discriminate, resulting in lower overall inhibitory performance. Admittedly, this may have taxed perceptual processes, as well as inhibitory processes, and provided a less direct measure of inhibitory control. Differences in the selected emotion regulation protocols might also explain dissimilar links between inhibitory control and emotion regulation across studies.

5.5. Limitations and Future Directions

Given the correlational nature of the three studies, no causal connection between emotion regulation and predictors can be established. While the findings, especially in Study 1, do support the hypothesis that both socioemotional and inhibitory skills are associated with successful emotion regulation, they do not provide evidence that strong socioemotional and inhibitory abilities actually lead to better emotion regulation. It is possible that children who regulate emotions most successfully and perhaps most frequently come to develop other socioemotional and self-regulatory skills as a result of their emotion regulation. In fact, recent research suggests that developments in cognitive control are predicted by earlier parental reports of emotion regulation (Blankson et al., 2013). Additional longitudinal studies will need to elaborate on links between cognitive and emotional variables across time. Such studies should also include a sample with more diverse and well-defined demographic information to increase the generalizability of findings. Recent work suggests that emotion regulation norms differ across cultures (Garrett-Peters & Fox, 2007). As such, conducting research with more culturally diverse samples would be informative.

Another important future research endeavor should involve manipulating relevant predictors to determine whether emotion regulation can be affected as a result. For instance, executive functions training is becoming a hot topic in developmental psychology (Diamond, 2012; Diamond, Barnett, Thomas, & Munro, 2007; Rueda, Rothbart, McCandliss, Saccomanno, & Posner, 2005) and researchers could focus on training inhibitory control in children to examine if improvements on emotion regulatory paradigms accompany gains in inhibitory control. Such research would help establish the causal directions of the relations discussed earlier and further our understanding of how to improve children's regulatory abilities. In the same way, it would be interesting to examine emotion regulatory abilities in children exposed to school curricula that

target socioemotional skills (e.g., *Roots of Empathy*, Gordon, 2005; *Promoting Alternative Thinking Strategies*, Kusche & Greenberg, 1994) relative to children in control programs to determine whether promoting socioemotional and moral reasoning improves emotion regulation.

On a related note, the present thesis' findings may be informative in developing educational tools or parenting strategies to improve children's emotional competence and self-control. As we saw across studies, aspects of socioemotional knowledge (affective ToM, emotion and display rule knowledge), basic inhibitory abilities, and emotion regulation appear to be interrelated. Theoretically, then, teaching children how their behaviors affect others' feelings and providing them with information on normative emotions and displays for different scenarios may encourage appropriate regulation of emotions. Likewise, providing children with strategies to help control behaviors (i.e., stopping and thinking before planning a response) may result in improved emotion regulation. Given the role of parents and teachers in children's socialization and moral development (Noddings, 1994; Nucci, 2001), it is important to provide them with evidence-based techniques to optimize children's emotional and self-regulatory outcomes.

Programs aimed at targeting emotion regulation abilities could benefit children in a number of ways. For one, bolstering children's ability to control emotions may positively affect their self-esteem or self-concept. According to Bussey and Bandura (2004) and Maccoby (1998), children's social competencies (including emotion regulation) undergo self-evaluation and can lead to self-approval or disapproval. As noted previously, emotion regulation is also implicated in forming social relationships, resolving conflicts, and obeying classroom rules. As such, programs that target emotion regulation may be most valuable when implemented in the middle childhood years, when these social and academic demands are encountered. Educational and parenting tools that aid emotion regulation may also be helpful in dealing with the persistent problem of school yard and

cyber bullying as bullying has previously been conceptualized in terms of emotion dysregulation (Shields & Cicchetti, 2001).

Another worthy area of research involves examining links between sociocultural factors, such as family structure and family socialization practices, and children's emotion regulation. Previous work has focused on how parental and family factors influence children's knowledge and use of emotion regulation (e.g., Dennis, 2006; Garner & Power, 1996; Jones et al., 1998). However, it would be informative to study these variables alongside socioemotional and inhibitory correlates of emotion regulation. Such research might help establish the mechanisms by which family influences children's capacity to control emotions (i.e., through teaching about social rules and emotions or through fostering self-control). Extending this line of research to address how peers and siblings affect children's emotion regulation would also be of interest.

Although the current thesis' positive emotion regulation tasks held some advantages over previous paradigms in that they required socially desirable regulation of positive emotional behaviors and were useable with a wider age range, they were not without limitations. In Study 2's staged accident task, separate response components (facial, vocal, verbal, behavioral) were not coded in the staged accident task as they were in the disappointing gift task. Because many children stopped to help the experimenter pick up the spilled marbles, their faces were occluded from the video camera rendering it difficult to judge their facial reactions. Relatedly, vocal and verbal responses could not be coded for a large number of children, because they did not speak during the staged accident task. Therefore, overall positive emotion regulation scores were calculated that reflected whether children stopped playing and helped the experimenter. Another discrepancy between the positive and negative emotion regulation tasks in Study 2 involves the extent of the regulatory demands. In the disappointing gift paradigm, it is desirable to mask negative responses

and summon positive reactions. In contrast, in the staged accident paradigm, positive/exuberant behaviors must be inhibited and patience/helping behaviors should be portrayed, but negative displays need not be activated. Thus, the disappointing gift paradigm requires substitution of the true emotional reaction with an opposing emotional display, whereas the staged accident demands control over exuberant positive behaviors, but only requires neutral or dampened positive emotions.

Study 3 created a more controlled procedure for studying regulation of positive and negative emotions, although there were also some issues with this measure. First, the rigged card game may have created a competitive setting, in which children perceived that they were playing cards against the experimenter rather than with the experimenter. Research on children's social development has revealed that children respond differently to someone attaining resources depending on whether they are perceived as an in-group or out-group member, a friend or non-friend, or in other terms, as a teammate or competitor (Fehr, Bernhard, & Rockenbach, 2008; Moore, 2009). Second, the rigged card game created a delay of gratification scenario by having the child complete a task before opening the gift. This delay might have caused children to feel more intense emotions, which were more difficult to regulate. Future research should aim to design similar emotion regulation protocols but with modifications to deal with these limitations. For instance, a teamwork context could be promoted in which both children and the experimenter work together to achieve the same goal. Additionally, gifts could be exchanged immediately, without requiring the delay of flipping cards from the deck. Nonetheless, the staged accident and rigged card game tasks add significantly to the small body of tasks assessing positive emotion regulation.

Another matter in Study 3 that should be noted is the number of correlations that were

examined. Type I errors, or false positive results, can occur when examining a large number of correlations. However, we must also consider the problem of Type II error or of obtaining false negative results. Sample sizes were quite small in Study 3 and thus power to detect significant findings was limited. Correlational analyses in this study were conducted primarily for the purpose of comparison with results from the first two studies. In this regard, the significant relations observed in Study 3 fit with the pattern of results in Studies 1 and 2, in that girls, older children, and children with strong display rule knowledge most successfully regulated emotions. Moreover, the correlational analyses were secondary to the main between-condition comparisons in Study 3, which were the analyses of primary interest.

One issue that arises when studying emotion regulation is that it can be difficult to determine whether behavioral data reflect regulation of an emotion or the emotional response itself (Cole, 1986; Cole et al., 1994). As with other research (Carlson & Wang, 2007; Garner & Power, 1996; Liew et al., 2004; Saarni, 1984), in the current studies shows of emotion were coded and emotion regulation was inferred. For instance, in Studies 1 and 2, receiving a bad gift was presumably disappointing and thus positive responses to the gift were taken as an indication of emotion regulation and negative responses to the gift as a sign of unregulated emotions. In the future, researchers should consider that the ability to display appropriate emotional responses may depend on both regulatory skills as well as the degree of emotional intensity elicited by a given situation in a particular individual (Eisenberg et al., 1996; Silvers et al., 2012).

Finally, future work should aim to revisit the measure of effort to control emotion to establish more consistent scoring guidelines. Although inter-coder reliability was satisfactory to high for the other measures, effort to control was coded less reliably (especially in Studies 2 and 3). Disagreements in coding arose due to differences in opinion of what constituted high versus

moderate effort, as well as differences in which aspects of children's responses were most diligently attended to in assigning the effort to control emotion scores. Additionally, it is difficult to conceptualize effort to control emotion in terms of emotion regulatory consequences. Shows of effort may be adaptive and part of normal development as children begin to acquire the ability to suppress true emotions and initiate alternative displays. Indeed, in Study 1, 5- to 7-year-olds who exhibited the most signs of effort also made the most positive responses to the disappointing gift. This relation was replicated in Study 2 with 5- to 10-year-olds. Yet, as children mature and their ability to regulate emotions becomes more convincing, less overt effort would be expected to be involved. Future studies should investigate at what point in development the relation between effort to control emotion and regulatory outcomes disappears or reverses. In addition, future work should examine whether effort to control emotion predicts emotion regulatory outcomes, controlling for other relevant variables. The fact that effort to control emotion and emotion regulation were coded from the same responses on the same task precluded inclusion of effort to control in Study 1's regression on emotion regulation. Follow-up work should use an independent measure of effort to control emotion so that it can be examined as a unique predictor of emotion regulatory success.

5.6. Conclusion

In summary, children struggled to regulate emotions in all three studies, although some regulatory success was observed in specific conditions of the rigged card game in Study 3. In Study 2, children who best regulated positive emotions poorly regulated negative emotions, and vice versa, indicating that emotion regulation may be a valence-dependent skill, at least during the period of development from 5 to 10 years of age. In general, older children and girls were best at regulating emotions, granted these findings were not replicated in every study. Although correlates

of emotion regulation were not fully consistent across studies, as a whole, both socioemotional knowledge and inhibitory control were significantly associated with regulatory outcomes. This suggests that emotion regulation requires (1) *knowledge* of context-appropriate emotions as well as (2) *inhibitory* abilities to use that knowledge and effectively control emotions.

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