Emotion
2010, Vol. 10, No. 4, 498–510

© 2010 American Psychological Association
1528-3542/10/$12.00 DOI: 10.1037/a0018428

Metacognitive Emotion Regulation: Children's Awareness That Changing Thoughts and Goals Can Alleviate Negative Emotions

Elizabeth L. Davis and Linda J. Levine
University of California, Irvine

Heather C. Lench
Texas A&M University

Jodi A. Quas
University of California, Irvine

Metacognitive emotion regulation strategies involve deliberately changing thoughts or goals to alleviate negative emotions. Adults commonly engage in this type of emotion regulation, but little is known about the developmental roots of this ability. Two studies were designed to assess whether 5- and 6-year-old children can generate such strategies and, if so, the types of metacognitive strategies they use. In Study 1, children described how story protagonists could alleviate negative emotions. In Study 2, children recalled times that they personally had felt sad, angry, and scared and described how they had regulated their emotions. In contrast to research suggesting that young children cannot use metacognitive regulation strategies, the majority of children in both studies described such strategies. Children were surprisingly sophisticated in their suggestions for how to cope with negative emotions and tailored their regulatory responses to specific emotional situations.

Keywords: metacognition, emotion regulation, childhood

Children, like adults, face emotional situations every day. Children may feel angry because a sibling stole a favorite toy, sad because their ice cream rolled off the cone at the first lick, or scared because there is almost certainly a monster hiding under the bed as they prepare to go to sleep. Upsetting events are impossible to avoid at any age. By early adulthood, people draw from an extensive toolbox of regulatory strategies to manage their emotions, but the developmental origins of some of these skills have not yet been fully investigated. Emotion regulation has been broadly defined as the heterogeneous set of processes by which individuals influence the timing, experience, and expression of their emotions (e.g., Gross, 1998, 2007).

Learning to regulate emotions has been identified as one of the most important tasks of early childhood (Cole, Martin, & Dennis, 2004; Eisenberg & Spinrad, 2004; Fox & Calkins, 2003; Thompson, 1994). Indeed, there are consequences of poor regulation, as young children who are less proficient frequently exhibit behavior problems later in childhood, including difficulty with peer relationships and school adjustment (Calkins, 1994; Eisenberg et al., 2004; Keane & Calkins, 2004; Stifter & Braungart, 1995). The more proficient children are at regulating their emotions, the less likely they are to experience these difficulties and the more likely they are to enjoy academic success in the long run (Graziano, Reavis, Keane, & Calkins, 2007). Given limitations in young children's reasoning abilities and knowledge, however, a critical question concerns the types of emotion regulation strategies they can use.

In the present investigation, we examined the types of strategies children report when asked how they or others could regulate negative emotions. We focused on negative emotions because they are more likely than positive emotions to motivate cognitive and behavioral attempts to return to a neutral state (e.g., Gross, 1998; see also Parrott, 1993). Of particular interest was young children's ability to generate metacognitive strategies to regulate emotion, that is, strategies that involve deliberately changing one's thoughts or goals to lessen the experience of negative emotion. We selected the term *metacognitive regulation* because it reflects the requisite awareness that goals, thoughts, and emotions are interrelated and that changing goals and thoughts can lead to changes in emotional experience. In contrast, other regulatory strategies involve changing behaviors (e.g., venting, suppressing outward expression of emotion), and some behavioral strategies may result in changes in cognitive states (e.g., engaging in a pleasant activity, seeking social support) but without deliberate intent to alter thoughts or goals as a means of alleviating negative emotions (for a detailed review of types of emotion regulation strategies, see Augustine & Hemenover, 2009). Thus, we assessed the types of strategies young children describe, whether they are aware of metacognitive regulation strategies, and the extent to which they report using different strategies depending on the specific emotion they intend to regulate.

Elizabeth L. Davis, Linda J. Levine, and Jodi A. Quas, Department of Psychology and Social Behavior, University of California, Irvine; and Heather C. Lench, Department of Psychology, Texas A&M University.

Study 2 was supported by Grant 1R03HD40870-01 to Jodi A. Quas from the National Institute of Child Health and Human Development.

Elizabeth L. Davis is now a postdoctoral scholar at the Department of Psychology, The Pennsylvania State University.

Correspondence concerning this article should be addressed to Linda J. Levine, Department of Psychology and Social Behavior, University of California, Irvine, 3340 Social Ecology Building II, Irvine, CA 92697-7085. E-mail: llevine@uci.edu

Are Young Children Aware of Metacognitive Regulation Strategies?

Findings are mixed with respect to the age at which children are aware of and able to generate metacognitive strategies to regulate emotions. Limited evidence indicates that children as young as 3 years of age possess a rudimentary understanding that thinking can influence feelings. Lagattuta, Wellman, and Flavell (1997) investigated 3- to 6-year-old children's knowledge of the relation between thinking and feeling. Of interest was whether children understand that environmental cues can prompt memories of past emotional events, thereby influencing people's current emotions. For instance, if a spotted dog had previously chased off a child protagonist's pet rabbit, would young children understand that seeing a spotted dog (the cue) would remind the protagonist of the lost rabbit and trigger sad feelings? Even the youngest children were able to understand these relationships. Moreover, the more familiar the cue, the more likely children were to understand that a person's current emotions could change as a result of being reminded of a past emotional experience. Similarly, Lagattuta and Wellman (2001) presented 3- to 7-year-old children and adults with stories in which a protagonist felt happy, sad, or angry after an event and felt the same emotion days later after encountering a reminder. By age 3, most children were able to explain why the protagonist felt a particular way by linking thoughts about past events with current feelings.

Pons, Harris, and de Rosnay (2004) also demonstrated young children's understanding that a reminder of a past event can influence one's current emotional state. Nearly half of the 3-year-olds in the study judged that viewing a picture of a lost pet would cause a story protagonist to feel sad. By age 5, more than 80% of children correctly linked a reminder about past events with the protagonist's current emotional state. In related work, Harris (1991) suggested that young children understand that emotional intensity wanes over time. More impressively, children are aware that one effective technique for alleviating negative emotions is to allow enough time to pass to forget about the upsetting event. Thus, an understanding that thoughts can influence subsequent feelings emerges in early childhood.

Despite mounting evidence of children's sophistication, other studies have revealed important limitations to young children's understanding of the link between thoughts and feelings. Children younger than 7 or 8 years do not appear to fully or consistently understand their own or others' mental states (e.g., Flavell, 2000; Flavell, Green, & Flavell, 1993, 1995). For instance, Flavell, Flavell, and Green (2001) assessed the ability of 5-year-olds, 8-year-olds, and adults to explain a sudden change in emotion that had no apparent external cause. In one scenario, children heard about a child protagonist lying in bed. The child felt okay but wanted to feel happy. Children and adults were asked to explain how the child could change his feelings without leaving the bed or doing anything. Adults explained this emotional shift in terms of the child's thoughts. Only 2 of 20 5-year-olds, however, correctly suggested thinking as the cause of changes in the protagonist's emotion; the rest described environmental changes. The authors concluded that 5-year-olds are generally unaware that thoughts accompany feelings and can cause changes in feelings without any external input; for example, they do not understand that a person feeling sad is probably also thinking sad thoughts or that people can make themselves feel happy simply by thinking about something happy, or reappraising a negative situation, with no further environmental contributions.

Other research findings also suggest that 5- and 6-year-olds have limited understanding of cognitive strategies to regulate emotion. McCoy and Masters (1985) showed that 5-year-olds produced a range of strategies for changing someone else's emotional state but primarily referred to changing the external environment. Eight- and 12-year-olds, in contrast, routinely described strategies to change mental states, such as forgetting about an aversive event to feel better. A similar pattern was found in a study of 6-, 11-, and 15-year-olds' ability to describe strategies to control emotion (Harris, Olthof, & Meerum Terwogt, 1981). Six-year-olds did not produce cognitive reframing strategies (e.g., thinking about something else or trying not to think of upsetting events), whereas older children often did. More recently, Pons and colleagues (Pons et al., 2004) asked 3- to 11-year-old children to select the best way for a protagonist to handle sad feelings: covering his eyes, going outside to do something else, thinking about something else, or doing nothing. Most children age 9 or older chose thinking about something else, but younger children suggested that changing the external environment would be best.

Taken together, these studies suggest that young children have very limited knowledge, both of the power that cognition can exert over some mental states (e.g., emotion) and of specific ways in which cognition can be changed to affect emotions. That is, children do not appear to understand when and how their cognitions may be used to influence emotion. Indeed, Flavell and Green (1999) argued that the understanding that mental states such as emotions can be controlled or affected by one's own thoughts only begins to emerge by age 7 and is not established until middle childhood. This line of research marshals strong evidence against young children's capabilities in this domain.

These studies may have underestimated young children's understanding of the links between thoughts and emotions, however, by assessing their awareness using tasks that were unfamiliar and abstract. Research utilizing a delayed gratification paradigm provides evidence that young children can use their knowledge of thoughts and goals to generate cognitive strategies designed to delay attainment of a familiar goal such as eating a treat (e.g., Metcalfe & Mischel, 1999; Mischel, 1996; Mischel & Mischel, 1983; Mischel, Shoda, & Rodriguez, 1989). In a now-classic study, Mischel and Mischel (1983) asked children between the ages of 3 and 8 to choose between an immediate reward (e.g., one marshmallow) and waiting for a delayed but larger reward (e.g., two marshmallows). When asked if they would prefer to wait with the single marshmallow sitting on the table in front of them or covered up, the youngest children expressed no clear preference and gave no justification for their choices. However, children as young as 5 and 6 years old preferred to wait with the marshmallow covered up. These children also offered explanations that referenced their understanding of the relationship between thoughts and emotions: Covering the treat would allow them to think about something else and avoid the frustration they would inevitably feel if they had to look at the marshmallow while waiting for the bigger prize. Thus, when given the familiar task of waiting to eat a

desired food, young children were better able to demonstrate their knowledge of cognitive strategies for regulating emotion.

These findings suggest that some of the methods that have been used to assess children's understanding of cognitive strategies may have underrepresented children's abilities. Previous experience with a situation is important for children's generation of regulation strategies (Aldwin, 1994; Altshuler & Ruble, 1989; Lagattuta et al., 1997; Meerum Terwogt & Stegge, 1998). Although children are familiar with bedtime routines, a protagonist lying in bed and deciding to change from feeling nothing to feeling happy may fall outside the range of children's typical experiences. Moreover, children were asked to give explanations for a character's behavior with no follow-up questions or chances to provide multiple explanations (e.g., Flavell, 2000; Flavell et al., 2001; Pons et al., 2004). Both children and adults prefer to change a troubling situation directly, rather than change the accompanying emotions, when such strategies are available (Heckhausen & Farruggia, 2003; Lazarus, 2000; Pons et al., 2004). Thus, both providing children with familiar scenarios and giving additional opportunities for children to suggest strategies may be necessary to reveal the extent of their metacognitive knowledge.

In summary, previous studies indicate that children as young as 3 recognize that thoughts can affect emotions (a prerequisite for metacognitive regulation). Around age 5 or 6, children can generate strategies to defer goal attainment by drawing on their knowledge of how thoughts affect feelings. Until age 7 or 8, however, children do not appear to fully understand or use cognitive strategies like reappraisal to manage emotions. On the basis of findings suggesting that the ability to use metacognitive strategies emerges around age 5 or 6, when children have direct experience with a familiar task (e.g., waiting to eat a treat), and findings documenting children's and adults' preference for regulatory strategies that change the situation rather than the emotion itself, we predicted that 5- and 6-year-olds would produce a range of emotion regulation strategies, including metacognitive regulation, when asked repeatedly about familiar events.

Are Young Children Flexible in Their Use of Metacognitive Strategies?

In addition to examining whether children can produce metacognitive regulation strategies, we were interested in the flexibility with which they might use such strategies. At least two distinct types of metacognitive strategies can be used to alleviate negative emotions: changing goals (e.g., deciding not to want something unattainable) or changing thoughts (e.g., deciding not to think about something unattainable). Flexibility in regulation would be demonstrated if children use different emotion regulation strategies to manage discrete emotional experiences such as anger, sadness, or fear. Little empirical work exists on the topic of flexibility, but predictions can be made on the basis of theoretical accounts of emotion.

According to functionalist models of emotion, people experience emotions when the status of a goal has changed. For example, people feel angry when a goal is obstructed but they believe that they may have the power to reinstate it. Anger motivates a focus on the agents responsible for goal failure to eliminate obstacles to goal attainment. In contrast, sadness and fear are associated with feelings of powerlessness, lack of control, and uncertainty. Sadness is experienced when people believe that goal failure is irrevocable; fear is experienced when people believe that goal failure is threatened but has not yet occurred (e.g., Ellsworth & Scherer, 2003; Frijda, 1986; Levine, 1996; Roseman, Antoniou, & Jose, 1996; Smith & Lazarus, 1993). Past research indicates that young children are sensitive to these distinctions between emotions (e.g., Levine, 1995; Stein & Levine, 1989; Stein, Trabasso, & Liwag, 2000). Therefore, we expected children to describe nonmetacognitive strategies focused on goal reinstatement and retribution to alleviate anger more frequently than to alleviate sadness or fear. In contrast, we expected children to report metacognitive strategies more frequently to alleviate sadness and fear than to alleviate anger.

Children may also describe different types of metacognitive strategies for alleviating different emotions. Because sadness is experienced when goal failure is irrevocable, the most effective metacognitive strategy to alleviate sadness would be to change goals. When children face sad events, such as the death of a pet, they cannot reinstate their goal (e.g., playing with that pet). Children were thus expected to describe changing goals more often to alleviate sadness than to alleviate anger or fear. When children confront frightening events, ranging from the nurse's inoculation needle to the monster that appears to be hiding under the bed, often there is nothing they can do to change the situation, yet they cannot afford to relinquish their goal of safety. Thus, children may attempt to change their thoughts (e.g., thinking about ice cream instead of monsters) more often to alleviate fear than anger or sadness.

The Present Investigation

The present research examined the types of strategies that 5- and 6-year-old children can generate to alleviate sadness, anger, and fear. We chose to examine the emotion regulation strategies described by 5- and 6-year-olds because previous research on this issue has led to conflicting views of the capabilities of children of this age, and because methodological issues may have led to underestimation of young children's ability to produce metacognitive regulation strategies. We were also interested in this age group because of research illustrating the academic benefits of regulatory skill among school-age children (Graziano et al., 2007). Investigating the repertoire of emotion regulation strategies that children have available at the age of school entry, then, serves two important functions. First, it allows us to examine the developmental origins of metacognitive regulation; and second, educators may benefit from understanding the emotion regulation competence children possess when beginning formal education.

In Study 1, children heard stories about a child protagonist's experience of negative events and suggested how the protagonist could make himself or herself feel better. These stories described common events, and multiple probe questions were asked to give children ample opportunity to display their regulatory knowledge. When responding to hypothetical situations in Study 1, children were not constrained by situational realities and could bring all of their knowledge about emotion regulation to bear. Furthermore, all children were asked about the same hypothetical scenarios, allowing us considerable control over the emotional context. Thus, Study 1 assessed whether 5- and

6-year-old children can articulate metacognitive emotion regulation strategies. In Study 2, children recalled autobiographical events that had caused them to feel sad, angry, or scared and reported how they had alleviated their negative feelings. Relative to hypothetical scenarios, these autobiographical situations were rich in representational detail. Children could draw on their representations to answer questions about what they actually did to alleviate their negative feelings. Thus, Study 2 allowed us to investigate how flexibly children use metacognitive regulation in response to situations that evoked discrete emotions. Together, the two studies provide insight into children's emerging knowledge of how to regulate emotions.

Study 1

Method

Participants. Eighty kindergarten children participated in the study. The children ranged in age from 5 years, 1 month to 6 years, 5 months (M = 5 years, 9 months; SD = 3.8 months). Forty-one participants were female, and 39 were male. The children were recruited from two schools near Chicago that serve predominantly middle-class and upper-middle-class families. Children's ethnicities were as follows: Caucasian (74%), African American (13%), Asian (5%), and multiethnic or other (8%). This study was part of a larger experiment concerning 5- and 6-year-old children's understanding of the causes and consequences of sadness and anger (Levine, 1995).

Stimulus materials. Each child heard four narratives in which a child failed to attain a goal. Each narrative was one paragraph long and described familiar situations such as being unable to play baseball because of a hurt leg, having to stay home instead of going out to play, having to eat a disliked food, or being unable to eat a favorite food.[1] After each story, children were asked whether the story protagonist would feel sad, mad, or both sad and mad. Children were also asked how the protagonist could make his or her negative feelings go away. Each child heard four stories that were identical in structure but varied in content.[2] Levine (1995) provides a detailed description of the structure and content of the stories and addresses the types of appraisals that led children to attribute sadness versus anger to story protagonists. In the present study, we were primarily interested in the types of emotion regulation strategies that children suggested the protagonists use to alleviate sadness and anger.

Procedure. Children were interviewed individually. Interviews were audiotaped and later transcribed. During the interview, children were read each narrative twice to promote comprehension and recall. After the second reading, children were asked a series of questions about the narrative. First, the child was asked whether the protagonist would feel sad, mad, or both sad and mad as a result of the narrative event (the order of asking about sadness and anger was counterbalanced). For each emotion identified by the child, four follow-up questions were asked: (a) What will make the child's sad/mad feelings go away? (b) Why will that make his or her sad/mad feelings go away? (c) If he or she couldn't do [the child's first strategy], then what would make his or her sad/mad feelings go away? (d) Why would that make his or her sad/mad feelings go away? Thus, across the four stories, the total number of prompts children received to suggest emotion regulation strategies ranged from 8 (i.e., two prompts per story for children who always selected one emotion) to 16 (i.e., four prompts per story for children who always selected both sadness and anger). If children suggested multiple emotion regulation strategies for a single prompt, each of these was included in coding and subsequent analyses. The total strategies generated for all four stories ranged from 2 to 24 strategies (M = 12).

Coding of general emotion regulation strategies. Two coders, unaware of the specific emotion being described, categorized children's emotion regulation strategies, with discrepancies resolved by a third coder. Reliability was established on 200 stories, which constituted approximately 25% of children's responses, κ = .88. Each strategy that children described was first coded as falling into one of 7 categories: goal reinstatement, goal substitution, goal forfeiture, primary social support, secondary social support, agent focused, and metacognitive. Goal reinstatement was defined as action directed toward achieving the initial goal (e.g., saying that the protagonist who hurt his leg could, "exercise his leg so he can play baseball again"). Goal substitution was defined as action directed toward attaining an alternative goal (e.g., "Jimmy could watch baseball on TV and read about it"). Goal forfeiture referred to ceasing goal-directed action (e.g., "he couldn't do anything"). Primary social support referred to recruiting the help of another person to reinstate the goal (e.g., saying that the protagonist who had to remain at home could, "get his mom to let him play outside"), whereas secondary social support referred to seeking emotional support (e.g., "talk to his mom cause she'll make him feel better"). Agent-focused strategies involved seeking revenge (e.g., "he'd hurt the [other] boy's leg because of what he did"). Metacognitive strategies, which are described in detail later, were

[1] Four separate narratives were constructed, each of which described a child's failure to attain a goal. The narratives described a child who (a) had to stay home or could not play baseball because he hurt his leg; (b) had to walk home or missed a party because her mother failed to pick her up after school; (c) had to read a boring book or was unable to read a favorite book because her favorite book was destroyed; and (d) had to eat asparagus or was not allowed to eat ice cream per a doctor's orders. Within each narrative, three aspects of failure were varied: (a) whether the failure consisted of the presence of an aversive state or the loss of a desired state, (b) whether the cause of the failure was accidental or intentional, and (c) whether the negative outcome was permanent or it was possible to reinstate the goal. For example, in one narrative, a child's leg was injured (accidentally or intentionally), and as a result, either he had to remain bored at home (aversive state) or refrain from playing baseball (loss); this outcome was depicted as inevitable (goal reinstatement not possible) or as changeable through exercise (reinstatement possible). Thus, eight versions of each of four stories were constructed. Participants were randomly assigned to one of these eight conditions and heard four narratives of the same type.

[2] As reported in Levine (1995), the frequency with which children attributed sadness, anger, or both emotions to protagonists did not vary significantly depending on the specific content of the narrative (e.g., not being able to play baseball, not being able to eat ice cream). For each child, a summary response score was computed based on whether they chose sadness, anger, or both emotions in response to the majority of the four narratives. The majority of children (65%) chose sadness in response to at least three of the four narratives, 11% chose anger in response to the majority of narratives, and 24% either chose both emotions the majority of the time, or chose sadness or anger equally often.

defined as explicit strategies to change one's thoughts or change one's goals to alleviate negative emotions (e.g., when a child is not allowed to eat ice cream or not allowed to play outside: "he can imagine he has some ice cream" or "he decided he didn't want to go outside and play"). A final category consisted of "don't know" or miscellaneous responses. Examples of the seven emotion regulation strategies are presented in Part A of Table 1. After children's responses were coded with these seven general emotion regulation categories, specific types of metacognitive regulation strategies were coded.

Coding of specific types of metacognitive strategies. We identified metacognitive strategies as those in which children explicitly referred to changing psychological states. Following Bartsch and Wellman (1995), we were conservative in identifying these strategies. For a strategy to be categorized as metacognitive, the child had to use mental state terms such as think, know, learn, imagine, pretend, want, and like. In addition, the child had to explicitly state that changes in one of these mental states would result in a reduction in negative feelings or an increase in positive feelings.

We subdivided children's metacognitive responses into two types depending upon whether children referred to changing thoughts or changing goals (Wellman, Cross, & Watson, 2001). Changing thoughts involved changing what children thought or knew about a situation or changing their mental state. These strategies included: forgetting; changing mental state by sleeping, fainting, or dreaming; pretending things are different; and positive reappraisal. Changing goals involved changing what children wanted, liked, or desired in a situation. These strategies included: learning to like a negative outcome; learning to like an alternative outcome; and deciding not to want the original desired outcome. Part B of Table 1 provides examples of each type of metacognitive strategy.

Calculation of proportion scores. In response to each of the four narratives, children could say that the protagonist felt sad, mad, or both. They were asked to generate emotion regulation strategies for each emotion they listed. As a result, the total number of emotions that children chose during the interview varied, and therefore the number of prompts they received to generate emotion regulation strategies over the course of the interview also varied (i.e., 8 prompts if they consistently identified a single emotion, and up to 16 total prompts if they identified multiple emotions). Because children who received more prompts were likely to report more strategies, we could not compare the frequency with which each strategy was mentioned. To correct for this, we computed proportion scores for each strategy for each child. These proportion scores reflected how often each emotion regulation strategy (e.g., goal forfeiture) was reported out of the total number of emotion regulation strategies the child reported. To compare children's strategies for sadness and anger, we also calculated proportion scores separately for the two emotions for all children who reported each emotion at least once during the interview ($n = 66$).

Results

Overview. The results are presented in three sections. First, we describe preliminary analyses of gender and age. Second, we present data showing how often children reported each general type of emotion regulation strategy and whether the proportions varied depending on whether children stated that the protagonist would feel sad or angry. Third, we examined children's metacognitive strategies in greater detail to determine whether children suggested changing thoughts or goals more often and whether the type of metacognitive strategy reported varied by emotion. Because children's emotion regulation strategies were calculated as

Table 1
Types of Emotion Regulation Strategies Reported by Children in Studies 1 and 2

Strategy	Examples
A. General regulation strategies	
Goal reinstatement	Exercising his leg so he can play baseball again.
Goal substitution	Jimmy could watch baseball on TV and read about it.
Goal forfeiture	He couldn't do anything.
Primary social support	Get his mom to let him play outside.
Secondary social support	Talk to his mom cause she'll make him feel better.
Agent-focused strategies	He'd hurt the boy's leg because of what he did.
Metacognitive strategies	He can imagine he has some ice cream.
B. Specific types of metacognitive strategies	
Change thoughts	
Forget	Forgetting about it.
Change mental state	Go to sleep. Because when you sleep you don't know if you have good days or bad.
Pretend outcome is different	He could have ice cream with no sugar in it, but there's no such thing. He can still think about it . . . he can imagine he has some ice cream.
Positive reappraisal	He'll eat the thing he doesn't like knowing that there's something else he likes coming on.
Change goals	
Learn to like negative outcome	By eating a little . . . If you thought that was a thing you didn't like and you ate a little, you might find you liked it.
Learn to like alternative outcome	If she could get interested in another thing.
Decide not to want desired outcome	He decided he didn't want to go outside and play.

proportion scores, we performed an arc sine transformation to correct for nonnormality of the variance inherent in proportion data (e.g., Milligan, 1987). All analyses with the transformed data resulted in the same pattern of results as the nontransformed data. Therefore, for ease of interpretation, we present findings from the nontransformed proportion scores.[3]

Preliminary analyses. Before undertaking our primary analyses, we examined gender and age differences. Research findings on gender differences in children's emotion regulation are mixed, as some studies have found differences (e.g., Eschenbeck, Kohlmann, & Lohaus, 2007) but others have not (e.g., Altshuler & Ruble, 1989). Because of this, we included gender as a between-participants factor in all analyses but did not hypothesize specific gender differences. No significant gender differences were found for any analysis.

Although children's ages ranged from 5 years, 1 month to 6 years, 5 months (*Mdn* = 6 years, 0 months), we did not hypothesize specific age-related changes in 5- and 6-year-old children's emotion regulatory abilities. To check for age differences, however, we performed a median split so that children younger than 6 years, 0 months ($n = 38$; $M = 5$ years, 7 months; $SD = 2.7$ months) were included in a younger age group, and children older than 6 years, 0 months were included in an older age group ($n = 42$; $M = 6$ years, 2 months; $SD = 1.5$ months). We then included age group as a between-participants factor in each of the primary analyses. This revealed the same pattern of findings as are reported later, with no significant age differences. Primary analyses are presented without age included.

General emotion regulation strategies. We examined whether children described different general emotion regulation strategies for situations that they perceived as having evoked sadness versus anger. A mixed analysis of variance (ANOVA) was conducted, with gender as the between-participants factor and emotion (sadness, anger) and emotion regulation strategy (goal reinstatement, goal substitution, goal forfeiture, primary social support seeking, secondary social support seeking, agent related, and metacognitive strategies) as nested repeated measures. This analysis allowed us to compare the proportion of times that children reported each type of emotion regulation strategy (reflected by a main effect of strategy) and to examine whether the strategies reported varied by whether the child identified the situation as evoking sadness or anger (reflected by an interaction effect between emotion and strategy).

This analysis included all children who attributed sadness and anger at least once during the interview ($n = 66$). The results showed that the proportion of different emotion regulation strategies varied, $F(6, 384) = 50.24$, $p < .001$, $\eta_p^2 = .44$; but that children's strategies did not differ by emotion, $F(1, 65) = 0.60$, *ns*; and no interaction between emotion and strategy was found. We also compared strategies reported by children who attributed only sadness to the protagonist ($n = 13$) with strategies reported by children who attributed both sadness and anger at least once during the interview ($n = 66$). These two groups of children did not differ in the proportions of strategies reported ($n = 66$), $F(1, 77) = 0.26$, *ns*. Thus, the strategies that children reported did not differ by emotion.

Because no emotion differences were found but the main effect of regulation strategy was significant, we proceeded to examine which strategies were reported most commonly by the entire sample ($N = 80$; one additional child, included here, identified only anger during the interview). The *t* tests were conducted comparing each of the seven emotion regulation strategies to the other six strategies. A Bonferroni correction was used to account for the inflated chance of a Type I error associated with conducting multiple *t* tests. We adjusted the α level from 0.05 to 0.05 divided by 6, or .008, meaning that we only considered comparisons with $p \leq .008$ to be significantly different. The results showed that goal reinstatement ($M = 0.28$; $SD = 0.20$) and goal substitution ($M = 0.34$; $SD = 0.23$) were the most commonly reported strategies, $ts(79) > 6.3$, $ps < .001$; and did not differ significantly from each other. Goal reinstatement and goal substitution were reported at least once by 91% and 94% of participants, respectively. Children's next most common strategies were metacognitive strategies ($M = 0.09$, $SD = 0.13$, reported by 52% of participants), goal forfeiture ($M = 0.07$, $SD = 0.10$, reported by 46% of participants), and primary social support seeking ($M = 0.07$, $SD = 0.08$, reported by 58% of participants), $ts(79) > 2.9$, $ps < .008$; which did not differ significantly from each other. Children's least commonly suggested strategies were seeking secondary social support ($M = 0.03$, $SD = 0.06$, reported by 23% of participants) and agent-related strategies ($M = 0.02$, $SD = 0.05$, reported by 18% of participants). Miscellaneous and "don't know" responses ($M = 0.10$, $SD = 0.19$) were not included in analyses. Thus, children reported a range of emotion regulation strategies, with some strategies being reported more commonly than others.[4]

Specific types of metacognitive strategies. More than half of the children in this study (52%) reported at least one metacognitive regulation strategy. Therefore, we examined the specific types of metacognitive strategies children reported in greater detail. We first calculated the proportion of each child's metacognitive strategies that consisted of changing thoughts versus changing goals. A

[3] We also conducted preliminary analyses to determine whether the type of narrative the children heard influenced the number or type of emotion regulation strategies they described. First, we conducted a three-factor ANOVA in which the dependent measure was the total number of strategies children suggested. The between-participants factors for this analysis were (a) whether harm was intentional or accidental, (b) whether the outcome was an aversive state or a loss state, and (c) whether goal reinstatement was possible. As a reminder, children heard only one of the eight possible combinations of these between-participants factors across the four different stories. The results showed no significant differences by experimental condition, $Fs < 1.50$, $ps > .22$. The second analysis was a multivariate analysis of variance (MANOVA) in which story dimensions were the between-participants factors and general emotion regulation strategy proportions were the seven dependent variables. The results showed that the proportions of strategies reported did not vary across the story dimensions, $Fs < 1.90$, $ps > .17$. Thus, the experimental manipulations across narrative conditions were not considered in our primary analyses.

[4] As noted earlier, the proportions of general emotion regulation strategies children reported in Study 1 did not differ by age group: goal reinstatement ($M_{younger} = 0.28$, $SD = 0.20$; $M_{older} = 0.28$, $SD = 0.20$), goal substitution ($M_{younger} = 0.38$, $SD = 0.24$; $M_{older} = 0.30$, $SD = 0.22$), goal forfeiture ($M_{younger} = 0.06$, $SD = 0.10$; $M_{older} = 0.07$, $SD = 0.11$), primary social support ($M_{younger} = 0.07$, $SD = 0.08$; $M_{older} = 0.07$, $SD = 0.09$), secondary social support ($M_{younger} = 0.04$, $SD = 0.07$; $M_{older} = 0.02$, $SD = 0.06$), agent focused ($M_{younger} = 0.02$, $SD = 0.04$; $M_{older} = 0.02$, $SD = 0.06$), and metacognitive strategies ($M_{younger} = 0.07$, $SD = 0.14$; $M_{older} = 0.11$, $SD = 0.13$).

mixed ANOVA was conducted with gender as the between-participants factor and emotion (sadness, anger) and metacognitive emotion regulation strategy (changing thoughts, changing goals) as nested repeated measures. The results indicated that children described changing thoughts ($M = 0.58$, $SD = 0.44$) more often than changing goals ($M = 0.42$, $SD = 0.44$), $F(1, 65) = 3.97$, $p = .05$, $\eta_p^2 = .06$. The likelihood of generating these two types of metacognitive strategies did not differ depending on whether children attributed sadness or anger to the protagonist, $F(1, 65) = .39$, *ns*. Changing thoughts consisted of forgetting ($M = 0.14$), changing mental state ($M = 0.11$), pretending things are different ($M = 0.20$), and positive reappraisal ($M = 0.12$). Changing goals consisted of learning to like a negative outcome ($M = 0.19$), learning to like an alternative outcome ($M = 0.19$), and deciding not to want a desirable outcome ($M = 0.05$).

Discussion

Study 1 demonstrated that, in response to simple, familiar situations and when given multiple opportunities to display their knowledge, young children described a variety of strategies for alleviating negative emotions. More than half of the children recommended metacognitive strategies at least once. Thus, by age 5 to 6, many children have knowledge of metacognitive emotion regulation strategies and recognize situations in which such strategies may be useful. With respect to specific types of metacognitive strategies generated, children described changing thoughts or mental states more often than changing goals in response to hypothetical sadness- and anger-eliciting situations. In summary, young children demonstrated knowledge of a wide range of emotion regulation strategies, including metacognitive regulation.

In Study 1, children reported how another child might cope with hypothetical situations. Children's responses to hypothetical situations, however, may not reflect what they would actually do if faced with a similar emotional situation. For example, we did not find, as we had predicted, that children suggested different emotion regulation strategies for a protagonist to use to alleviate sadness and anger, perhaps because of this hypothetical paradigm. Thus, the sophistication of children's emotion regulation may be even more evident when they have richer, more detailed autobiographical experience on which they can draw when discussing emotion regulation. In Study 2, we investigated whether children described actually having used metacognitive emotion regulation strategies to cope with emotion-eliciting situations. We hypothesized that children would report metacognitive emotion regulation strategies (e.g., changing thoughts or changing goals), but we expected them to report using these strategies more frequently to alleviate sadness and fear than to alleviate anger. We also expected children to demonstrate flexibility in their use of metacognitive strategies by describing changing goals most often to alleviate sadness and changing thoughts most often to alleviate fear.

Study 2

Method

Participants. Ninety-two children and 92 parents participated in Study 2. (Nine additional children were excluded from analyses because they did not complete the interview.) Children ranged in age from 5 years, 0 months to 6 years, 11 months ($M = 6$ years, 2 months; $SD = 6.3$ months). Fifty-five percent of the children were female; 45% were male. Children's ethnicities were Caucasian (55%), Hispanic American (8%), Asian American (7%), African American (4%), or multiethnic (24%). Most parents were married or in a long-term relationship (91%), made over $60,000 a year (70%), and were fairly well educated (50% had at least a 4-year college degree).

Families were recruited through a database of parents interested in research, advertisements at child facilities, and word of mouth. Parents received an honorarium for their participation, and children received small prizes. One child and parent per family participated. This study was part of a larger experiment concerning 5- and 6-year-old children's memory for salient personal experiences (see Lench, Quas, & Edelstein, 2006; Quas & Lench, 2007).

Interview procedure. Children were interviewed individually. Before the interview began, parents were asked to describe recent situations that had caused their child to feel sad, angry, and scared. Children first completed a series of tasks unrelated to the present study. The interviewer then asked the child to describe a sad experience (i.e., "Have you ever felt really sad? Tell me about it."). Then the child was asked, "What did you do to make your sad feelings go away?" followed by one additional follow-up prompt to elicit further details (e.g., "What else did you do?"). The same questions were repeated asking the child about a time that he or she felt mad and scared. The order of questioning about the three emotions was constant across interviews. When a child did not provide a specific situation that evoked the emotion of interest, the interviewer described the event the parent had mentioned and asked the child the same questions as those listed earlier about that experience.[5] Thus, during the interview, children were asked to identify situations that made them feel sad, angry, and afraid and were asked to describe the strategies they had used to cope with these situations.

Coding. Videotapes of children's interview sessions were transcribed verbatim by research assistants. Two other research assistants, who were unaware of the study hypotheses and the emotion prompt that children had been given, coded children's emotion regulation strategies. Children received two prompts to describe regulation strategies for each emotion. If children suggested more than one strategy per prompt, additional strategies also were coded. On average, children produced about two strategies per emotion, and no child produced more than five strategies for any emotion ($M_{sadness} = 1.9$, $SD_{sadness} = 0.90$; $M_{fear} = 1.8$, $SD_{fear} = 0.89$; $M_{anger} = 1.8$, $SD_{anger} = 0.93$). Children's responses were first coded into seven general emotion regulation strategies (using the categories described in Study 1; see Table 1). Next, we coded specific subtypes of metacognitive regulation strategies using the categories described in Study 1. Reliability was established on approximately 25% of the responses, $\kappa = .86$.

Analyses. In contrast to Study 1, in which children attributed sadness, anger, or both emotions to story protagonists, in Study 2

[5] Fifty-six participants were unable to produce a specific emotion-evoking event for at least one of the three emotions, so they were asked about the event their parent had described before the start of the interview with the child. Across these participants, 83 parent-nominated events were used; this represents 30% of the 276 total emotional events.

all children were asked about their responses to events that had elicited sadness, anger, and fear and thus received the same number of interview prompts. Therefore, we conducted analyses in Study 2 based on the total number of strategies children reported rather than on proportion scores.

Results

Overview. The results are organized in three sections. First, we conducted preliminary analyses of gender and age. Second, we examined the frequency with which children reported each general type of emotion regulation strategy and whether this frequency varied depending on whether the child was trying to alleviate sadness, anger, or fear. Third, we examined whether children suggested changing thoughts or goals more frequently to alleviate sadness, anger, or fear.

Preliminary analyses. Similar to Study 1, we first examined gender and age differences. There were no significant gender differences in any of our analyses, but gender is included as a between-participants factor in the results reported later. Although we did not hypothesize age-related changes in 5- and 6-year-old children's emotion regulatory abilities, participants' ages spanned a large range (5 years, 0 months to 6 years, 11 months; M = 6 years, 2 months; Mdn = 6 years, 2 months). Therefore, we conducted analyses based on a median split, with the younger group comprising children younger than 6 years, 2 months (n = 45; M = 5 years, 8 months, SD = 3.5 months) and the older group comprising children 6 years, 2 months or older (n = 47; M = 6 years, 7 months; SD = 2.9 months). Age group was included as a between-participants factor in each of the primary analyses. This revealed the same pattern of findings as are reported later, with no significant age differences. Primary analyses are presented without age included.

General emotion regulation strategies. To examine the frequency with which children used different types of emotion regulation strategies to alleviate discrete emotions, a mixed ANOVA was conducted with gender as the between-participants factor and emotion (sadness, anger, fear) and general emotion regulation strategy (goal reinstatement, goal substitution, goal forfeiture, primary social support seeking, secondary social support seeking, agent related, and metacognitive strategies) as nested repeated measures. This analysis allowed us to compare the frequency with which children reported each type of emotion regulation strategy (reflected by a main effect of strategy) and to examine whether the strategies children described varied by the discrete emotion to which the child responded (reflected by an interaction between emotion and strategy). The results showed significant main effects of emotion regulation strategy, $F(6, 540) = 17.26$, $p < .001$, $\eta_p^2 = .16$; and emotion, $F(2, 180) = 4.85$, $p < .01$, $\eta_p^2 = .05$; and an Emotion × Strategy interaction, $F(12, 1080) = 4.75$, $p < .001$, $\eta_p^2 = .05$.

Table 2 shows the mean frequency with which children reported using each general type of emotion regulation strategy, across two probes, to alleviate sadness, anger, and fear. Post hoc paired t tests, with a Bonferroni correction for multiple comparisons ($\alpha < 0.017$), showed that children attempted to reinstate their original goal more often to alleviate anger than sadness, $t(91) = 2.81$, $p < .01$. This is consistent with functional theories of emotion holding that anger is characterized by a motivation to overcome obstacles and reinstate one's goals, whereas sadness is associated with an irrevocably lost goal. Children reported agent-focused strategies more often to alleviate anger than fear, $t(91) = 2.53$, $p < .015$. In contrast, children sought secondary social support more often to alleviate fear than sadness, $t(91) = 3.57$, $p < .005$; or anger, $t(91) = 5.07$, $p < .001$; and more often to alleviate sadness than anger, $t(91) = 4.03$, $p < .001$. Secondary social support (i.e., seeking emotional reassurance from another person) is a sensible response to emotions such as sadness and fear, which are associated with low power or control, but would be less effective for managing anger. Instead, children who reported anger tended to focus on the agents responsible for their feelings. Finally, children reported using metacognitive emotion regulation strategies more often to alleviate sadness than anger, $t(91) = 3.25$, $p < .01$; and more often to alleviate fear than anger, $t(91) = 3.68$, $p < .001$. No other comparisons revealed significant differences. Thus, as predicted, children were more apt to use metacognitive regulation strategies when sad or scared than when angry.[6]

Specific types of metacognitive strategies. More than two thirds (69%) of the 5- to 6-year-old children in this study reported that they had used at least one metacognitive strategy to regulate emotion. Table 3 shows the mean frequencies with which children reported specific types of metacognitive strategies for each emotion. We analyzed these frequencies using a mixed ANOVA with gender as the between-particpants factor and emotion (sadness, anger, fear) and metacognitive strategy type (changing thoughts, changing goals) as nested repeated measures. Results showed significant effects of emotion, metacognitive strategy type, and their interaction. As described earlier, children reported metacognitive strategies more often to alleviate sadness and fear than to alleviate anger, $F(2, 180) = 7.42$, $p < .01$, $\eta_p^2 = .08$ (see aforementioned text for results of post hoc tests). Children reported changing thoughts more often than changing goals, $F(1, 90) = 18.58$, $p < .001$, $\eta_p^2 = .17$. Also, as predicted, the frequency with which children reported changing goals versus thoughts differed across emotions, $F(2, 180) = 7.62$, $p < .01$, $\eta_p^2 = .08$. As Table 3 shows, children reported changing goals more often to alleviate sadness than anger, $t(91) = 2.70$, $p < .01$; or fear, $t(91) = 2.58$, $p < .015$. Children reported changing thoughts more often to alleviate fear than anger, $t(91) = 3.83$, $p < .001$; or sadness, $t(91) = 2.40$, $p = .018$.

[6] The frequency with which children reported emotion regulation strategies in Study 2 did not differ by age group. As reported in the text, we found that children described metacognitive strategies more frequently to alleviate sadness ($M_{younger} = 0.54$, $SD = 0.64$; $M_{older} = 0.61$, $SD = 0.96$) and fear ($M_{younger} = 0.77$, $SD = 0.94$; $M_{older} = 0.61$, $SD = 0.91$) than to alleviate anger ($M_{younger} = 0.31$, $SD = 0.43$; $M_{older} = 0.29$, $SD = 0.49$). We also found that children reported the specific metacognitive strategy of changing goals more often to alleviate sadness ($M_{younger} = 0.20$, $SD = 0.38$; $M_{older} = 0.31$, $SD = 0.62$) than to alleviate anger ($M_{younger} = 0.06$, $SD = 0.21$; $M_{older} = 0.15$, $SD = 0.41$) or fear ($M_{younger} = 0.10$, $SD = 0.29$; $M_{older} = 0.11$, $SD = 0.31$). Children reported changing thoughts more often to alleviate fear ($M_{younger} = 0.67$, $SD = 0.96$; $M_{older} = 0.51$, $SD = 0.90$) than to alleviate sadness ($M_{younger} = 0.34$, $SD = 0.55$; $M_{older} = 0.30$, $SD = 0.71$) or anger ($M_{younger} = 0.25$, $SD = 0.41$; $M_{older} = 0.14$, $SD = 0.34$).

Table 2
Mean Frequency With Which Children Reported Different Types of Emotion Regulation Strategies to Alleviate Sadness, Anger, and Fear in Study 2 (N = 92)

Strategy	*M* (and *SD*) for: Sadness	Anger	Fear	%[a]
Goal reinstatement	0.16 (0.39)$_a$	0.38 (0.63)$_b$	0.21 (0.66)$_{a,b}$	53
Goal substitution	0.44 (0.65)$_a$	0.32 (0.63)$_a$	0.19 (0.76)$_a$	46
Goal forfeiture	0.09 (0.28)$_a$	0.06 (0.23)$_a$	0.16 (0.61)$_a$	19
Primary social support	0.25 (0.51)$_a$	0.43 (0.63)$_a$	0.24 (0.62)$_a$	49
Secondary social support	0.21 (0.39)$_a$	0.05 (0.20)$_b$	0.59 (0.98)$_c$	40
Agent focused strategies	0.07 (0.25)$_{a,b}$	0.17 (0.39)$_a$	0.05 (0.29)$_b$	17
Metacognitive strategies	0.58 (0.82)$_a$	0.30 (0.46)$_b$	0.69 (0.93)$_a$	69

Note. Means with different subscripts differ significantly based on *t* tests using the Bonferroni-corrected alpha level of $p < .017$. Children were prompted twice to give an emotion regulation strategy for each emotion (M = 5.1 across the three emotions) so columns do not sum to 1.0.
[a] Percentage of children who reported this strategy at least once in Study 2.

Discussion

Study 2 extends the findings of Study 1 by demonstrating that children report using a variety of emotion regulation strategies, including metacognitive strategies, when coping with negative emotions in their own lives. Indeed, 69% of children reported using a metacognitive strategy at least once. When children in Study 2 described their own experience, the specific type of metacognitive strategy reported differed depending on the emotional state that children were attempting to alleviate. Children reported changing goals most often to alleviate sadness, and they reported changing their thoughts or mental state most often to alleviate fear. These findings suggest that previous research may have underestimated 5- and 6-year-olds' awareness of these advanced cognitive means of regulating their emotions (e.g., Flavell, 2000; Flavell et al., 2001). When given adequate opportunity and familiar contexts, children described deliberately changing thoughts and goals to alleviate negative emotions.

General Discussion

Adults draw on a wide range of emotion regulation strategies, including metacognitive ones, to cope with sadness, anger, and fear. The developmental origins of these metacognitive emotion regulation capabilities, however, have not been established by previous work. We investigated children's knowledge of emotion regulation strategies across two contexts: hypothetical and autobiographical events. We were particularly interested in their ability to use metacognitive strategies such as changing thoughts (e.g., deciding to think about something else) and changing goals (e.g., deciding to want something else) to regulate negative emotions. We provided children with multiple opportunities to suggest strategies and demonstrate their knowledge of emotion regulation techniques. Our findings demonstrate that children as young as 5 and 6 years old can describe metacognitive regulation strategies, understand that these strategies can be used to reduce negative emotion, and understand that such strategies are more useful in response to some emotional situations than others.

Children's Awareness of Metacognitive Strategies

In response to both hypothetical and real-life emotional situations, children reported several types of emotion regulation strategies, including metacognitive strategies. In fact, in Study 2, metacognitive strategies were the single most frequent type of

Table 3
Mean Frequency With Which Children Reported Specific Types of Metacognitive Strategies to Alleviate Sadness, Anger, and Fear in Study 2 (N = 92)

Metacognitive strategy	*M* (and *SD*) for: Sadness	Anger	Fear
Changing goals			
Learn to like negative outcome	0.09 (0.38)	0.01 (0.10)	0.04 (0.18)
Learn to like alternative outcome	0.09 (0.27)	0.01 (0.10)	0.02 (0.15)
Decide not to want desired outcome	0.08 (0.27)	0.08 (0.30)	0.05 (0.20)
Total	0.26 (0.52)	0.10 (0.33)	0.11 (0.30)
Changing thoughts			
Forget	0.09 (0.28)	0.06 (0.23)	0.20 (0.55)
Change mental state	0.04 (0.18)	0.04 (0.18)	0.09 (0.28)
Pretend things are different	0.04 (0.23)	0.05 (0.20)	0.14 (0.58)
Positive reappraisal	0.15 (0.52)	0.05 (0.20)	0.15 (0.38)
Total	0.32 (0.63)	0.20 (0.38)	0.58 (0.93)

strategy that children reported. This finding is consistent with work showing that children are aware of and able to describe mental strategies they themselves use by age 6 (e.g., Estes, 1998) and studies showing that gains in emotion knowledge during middle childhood allow children increasingly to reflect on their emotional states and engage in flexible emotion regulation (e.g., Meerum Terwogt & Olthof, 1989; Stegge & Meerum Terwogt, 2007).

Our findings extend existing knowledge by demonstrating that young children's emerging metacognitive abilities include awareness of cognitive forms of emotion regulation that can be used by another person (a story protagonist), and those that they used to regulate their own previous emotional experiences. Moreover, our findings demonstrate that children can articulate a surprisingly wide range of metacognitive strategies and can do so at much younger ages than previously reported. Simple metacognitive regulation strategies that have been examined in earlier work, such as thinking about something else or forgetting about a negative event to stop feeling upset about it (e.g., Harris, 1991; Masters, Ford, & Arend, 1983; Pons, Harris, & de Rosnay, 2004), are clearly not the only ways that children utilize their thoughts to change their emotional state. Moreover, previous research has consistently suggested that even distraction and forgetting are not understood or articulated by 5- and 6-year-old children (Harris et al., 1981; McCoy & Masters, 1985). The present investigation broadens the boundaries of children's metacognitive capabilities to include additional strategies, such as changing thoughts (e.g., thinking about how something could turn out differently) and changing goals (e.g., deciding not to want something anymore). It is also the first investigation to provide evidence that children can describe these strategies as early as age 5. Thus, young children demonstrate far greater awareness of the effects that cognitions can have on their emotions than some previous research has suggested (e.g., Flavell, Green, & Flavell, 2000). Many describe sophisticated means of alleviating negative feelings using only their thoughts.

The Flexibility of Children's Use of Metacognitive Regulation

Developmental and conceptual gains during childhood provide children with a wider repertoire of emotion regulation strategies from which to choose when faced with negative situations (for reviews, see Brenner & Salovey, 1997; Saarni, 1999). Selecting an appropriate and effective tactic is a skill that has obvious implications for social adjustment (Calkins, 1994; Eisenberg et al., 2004), as well as academic outcomes (e.g., Graziano et al., 2007). In Study 1, children most frequently described actions directed toward attaining substitute goals or reinstating an original goal to regulate both sadness and anger. The metacognitive emotion regulation strategies children reported also did not vary depending on whether children attributed sadness or anger to the story protagonist.

The fact that children in Study 1 were describing emotion regulation strategies that a story protagonist might use may explain why their emotion regulation suggestions did not differ by emotion. The hypothetical situations presented in the narratives were familiar events for many 5- and 6-year-old children (e.g., getting hurt while playing, having to eat a disliked food). However, children may have drawn less on their personal knowledge when generating responses to these hypothetical situations than when reporting how they had responded to situations that had occurred in their own lives in Study 2. This explanation is consistent with research showing that previous experience with emotional situations is vital for children's generation of appropriate emotion regulation strategies (Aldwin, 1994; Altshuler & Ruble, 1989; Lagattuta et al., 1997; Meerum Terwogt & Stegge, 1998; Stegge & Meerum Terwogt, 2007). In Study 2, children's reports of emotion regulation strategies differed depending on whether they were describing their own experiences of sadness, anger, or fear. Thus, relative to Study 1, children seemed to benefit from memories of their actual experiences when they reported emotion regulation strategies associated with specific emotions (Niedenthal, Dalle, & Rohman, 2002).

It is also possible that the task in Study 1 was unintentionally challenging. In essence, we asked children to explain how someone else might regulate his or her emotions. This type of higher order perspective-taking can be difficult for children younger than 7 or 8 years of age (Bradmetz & Schneider, 1999; Harris, Johnson, Hutton, Andrews, & Cooke, 1989). Although research has shown that children are able to link a story character's thoughts to subsequent feelings (Lagattuta et al., 1997; Lagattuta & Wellman, 2001), our task required that children go beyond predicting feelings. They had to determine the best course of regulatory action for the story protagonist, which may have been difficult for children to do while concurrently maintaining the other story details, such as the protagonist's discrete emotional state, in memory.

A third possibility is that developmental differences between the two samples of children who participated in Studies 1 and 2 contributed to the flexibility of strategy use reported by children in Study 2. The average age of participants was approximately 5 months older in Study 2 than in Study 1. Older children, of course, have a wider and more flexible set of emotion regulatory responses to choose from when encountering negative emotion (e.g., Saarni, 1999; Stegge & Meerum Terwogt, 1007). The fact that we found no age differences in strategy use in either study, however, even though a wide span of ages participated (range of 16 months in Study 1 and 23 months in Study 2), suggests that this explanation does not fully account for the different pattern of results found when children were asked about hypothetical versus autobiographical events.

In Study 2, the regulatory responses that children used depended on the discrete emotion that they had experienced. As expected, children used metacognitive strategies less often when feeling angry than when feeling sad or scared. Instead, children reported using goal reinstatement and agent-focused tactics to manage their anger. With respect to the specific types of metacognitive strategy used, children reported changing their thoughts most frequently when they had encountered frightening events; they reported changing their goals most frequently when they encountered sad events. These patterns of responses are consistent with appraisal theories, which characterize discrete emotions as responses to different types of changes in the status of goals (Ellsworth & Scherer, 2003; Levine, 1995, 1996; Stein & Levine, 1989). As mentioned earlier, previous experience with an event or an emotional situation is extremely important for effective emotion regulation (e.g., Aldwin, 1994; Lagattuta et al., 1997; Niedenthal et al., 2002). When asked about autobiographical emotion events, children appeared to be sensitive to the strategies that are most effective for dealing with different types of changes in goal status:

taking action when a goal may yet be salvaged (anger), changing thoughts when a situation is rife with uncertainty (fear), and changing goals when an original goal has failed irrevocably (sadness).

Children's greater flexibility of metacognitive regulation when asked about the autobiographical events in Study 2 also may have been influenced by their awareness of normative scripts for responses to emotion or specifically by parents' help shaping their children's regulatory responses to the autobiographical emotional events. On some occasions, children may have recalled what their parents had suggested that they do or think about to alleviate their sad, angry, or scared feelings, rather than spontaneously generating these strategies on their own. For example, a child who recalled feeling angry about a playtime injustice might have been guided by a parent to stand up to the aggressor, whereas a child who recalled feeling scared about a monster under the bed might have been encouraged by a parent to think about pleasant things instead of monsters. However, children were also able to spontaneously generate metacognitive strategies in Study 1, so parental input does not fully account for children's abilities. What is most compelling about the findings from our second study, then, is that 5- and 6-year-olds report the judicious use of particular strategies to alleviate specific emotions; they are learning through their own experiences or parental shaping to tailor their metacognitive emotion regulation responses in ways that are appropriate for the situation at hand.

Although this research indicates that young children tailor their emotion regulation strategies to alleviate discrete emotions, future research must delineate the boundaries of children's knowledge. For example, whether an event is controllable or uncontrollable may influence the emotion regulation strategies that children select. Scary situations from which a child could escape by taking action (e.g., backing away from a barking dog) versus situations in which the child has no control over the event (e.g., enduring an inoculating needle at the doctor's office) would certainly require different kinds of emotion regulation. Metacognitive attempts to change one's thoughts about the situation would be appropriate in the latter situation but not in the former. Children's understanding of contextual factors that affect the utility of metacognitive emotion regulation represents a promising new avenue of investigation.

Limitations and Conclusions

The goal of the present investigation was to investigate early roots of metacognitive emotion regulation capabilities. Our findings contribute important insight into the sophistication and complexity of young children's emotion regulation repertoire. We found noteworthy competencies among 5- and 6-year-old children, especially when asked about their use of emotion regulation strategies when they personally encountered negative emotional experiences. We assessed only a narrow range of ages, however. In the future, studies should include children across a broader range of ages so that the developmental trajectory of these advanced metacognitive processes under various conditions can be delineated. Ideally, such studies will also include longitudinal investigations of children's developing ability to use strategies like changing thoughts and changing goals to regulate negative emotions. Following a group of children over time as they progress from talking about emotions, to understanding goals and thoughts, to understanding how goals and thoughts can influence emotions, would be an especially powerful way to illuminate the precise unfolding of these metacognitive regulation skills. In addition, research concerned with children's emotion regulation abilities should contrast children's capabilities when using cool cognition with what children actually do in the heat of the emotional moment (e.g., Reijntjes, Stegge, Meerum Terwogt, Kamphuis, & Telch, 2006).

Despite the focus on a single age group, the findings from this investigation contribute to our understanding of the development of metacognitive regulation by illustrating that children are able to describe these strategies at younger ages than previously thought. Our selection of this particular age group also allowed us to investigate the origins of this developmental skill among children at the age at which children typically enter formal schooling (i.e., kindergarten). Research has shown the importance of emotion regulation skill for children's academic achievement (e.g., Graziano et al., 2007), so this age was an especially important one to focus on as a first step toward understanding the developmental roots of metacognitive regulation.

In closing, exploring young children's ability to deliberately regulate their emotions remains a critical area of research inquiry, with implications for a range of cognitive, behavioral, and mental health outcomes (e.g., Cole et al., 2004; Eisenberg et al., 2004). School-based interventions designed to teach children effective emotion regulation techniques, for instance, would especially benefit from a more complete understanding of children's capabilities in this domain. Five- and 6-year-old children reveal considerable complexity in their understanding of mental states when they describe situations that matter to them, when they have previous experience with these situations, and when they are given ample opportunity to display the scope of their knowledge through the use of multiple, direct questions. Children were clearly aware of and able to describe advanced metacognitive emotion regulation strategies, such as changing thoughts or goals. The present investigation clarifies the competencies and limitations of children's metacognitive skills and provides new insight into the developing link between cognitions and emotions during early childhood.

References

Aldwin, C. (1994). *Stress, coping, and development.* New York: Guilford Press.

Altshuler, J., & Ruble, D. (1989). Developmental changes in children's awareness of strategies for coping with uncontrollable stress. *Child Development, 60,* 1337–1349.

Augustine, A. A., & Hemenover, S. H. (2009). On the relative effectiveness of affect regulation strategies: A meta-analysis. *Cognition and Emotion, 23,* 1181–1220.

Bartsch, K., & Wellman, H. M. (1995). *Children talk about the mind.* New York: Oxford University Press.

Bradmetz, J., & Schneider, R. (1999). Is Little Red Riding Hood afraid of her grandmother? Cognitive versus emotional response to a false belief. *British Journal of Developmental Psychology, 17,* 501–514.

Brenner, E. M., & Salovey, P. (1997). Emotion regulation during childhood: Developmental, interpersonal, and individual considerations. In P. Salovey & D. Sluyter (Eds.), *Emotional development and emotional intelligence: Educational implications* (pp. 168–195). New York: Basic Books.

Calkins, S. D. (1994). Origins and outcomes of individual differences in emotional regulation. In N. A. Fox (Ed.), Emotion regulation: Behav-

ioral and biological considerations. *Monographs of the Society for Research in Child Development, 59,* 53–72.

Cole, P., Martin, S., & Dennis, T. (2004). Emotion regulation as a scientific construct: Methodological challenges and directions for child development research. *Child Development, 75,* 317–333.

Eisenberg, N., & Spinrad, T. L. (2004). Emotion-related regulation: Sharpening the definition. *Child Development, 75,* 334–339.

Eisenberg, N., Spinrad, T. L., Fabes, R. A., Reiser, M., Cumberland, A., Shepard, S. A., Valiente, C., et al. (2004). The relations of effortful control and impulsivity to children's resiliency and control. *Child Development, 75,* 25–46.

Ellsworth, P. C., & Scherer, K. R. (2003). Appraisal processes in emotion. In R. J. Davidson, K. R. Scherer, & H. H. Goldsmith (Eds.), *Handbook of affective sciences* (pp. 572–595). New York: Oxford University Press.

Eschenbeck, H., Kohlmann, C.-W., & Lohaus, A. (2007). Gender differences in coping strategies in children and adolescents. *Journal of Individual Differences, 28,* 18–26.

Estes, D. (1998). Young children's awareness of their mental activity: The case of mental rotation. *Child Development, 69,* 1345–1360.

Flavell, J. H. (2000). Development of children's knowledge about the mental world. *International Journal of Behavioral Development, 24,* 15–23.

Flavell, J. H., Flavell, E. R., & Green, F. L. (2001). Development of children's understanding of connections between thinking and feeling. *Psychological Science, 12,* 430–432.

Flavell, J. H., & Green, F. L. (1999). Development of intuitions about the controllability of different mental states. *Cognitive Development, 14,* 133–146.

Flavell, J. H., Green, F. L., & Flavell, E. (1993). Children's understanding of the stream of consciousness. *Child Development, 64,* 387–398.

Flavell, J. H., Green, F. L., & Flavell, E. (1995). Young children's knowledge about thinking. *Monographs of the Society for Research in Child Development, 60,* (pp. 1–113, Serial No. 243).

Flavell, J. H., Green, F. L., & Flavell, E. R. (2000). Development of children's awareness of their own thoughts. *Journal of Cognition and Development, 1,* 97–112.

Fox, N. A., & Calkins, S. D. (2003). The development of self-control of emotion: Intrinsic and extrinsic influences. *Motivation and Emotion, 27,* 7–26.

Frijda, N. H. (1986). *The emotions.* Cambridge, United Kingdom: Cambridge University Press.

Graziano, P. A., Reavis, R. D., Keane, S. P., & Calkins, S. D. (2007). The role of emotion regulation in children's early academic success. *Journal of School Psychology, 45,* 3–19.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology, 2,* 271–299.

Gross, J. J. (2007). *Handbook of emotion regulation.* New York: Guilford Press.

Harris, P. L. (1991). *Children and emotion.* Malden, MA: Blackwell.

Harris, P. L., Johnson, C. N., Hutton, D., Andrews, G., & Cooke, T. (1989). Young children's theory of mind and emotion. *Cognition and Emotion, 3,* 379–400.

Harris, P. L., Olthof, T., & Meerum Terwogt, M. (1981). Children's knowledge of emotion. *Journal of Child Psychology and Psychiatry, 22,* 247–261.

Heckhausen, J., & Farruggia, S. P. (2003). Developmental regulation across the lifespan: A control-theory approach and implications for secondary education. *British Journal of Educational Psychology, Monograph Series II: Psychological Aspects of Education—Current Trends.* Leicester, United Kingdom: British Psychological Society.

Keane, S. P., & Calkins, S. D. (2004). Predicting kindergarten peer social status from toddler and preschool problem behavior. *Journal of Abnormal Child Psychology, 32,* 409–423.

Lagattuta, K. H., & Wellman, H. M. (2001). Thinking about the past: Early knowledge about links between prior experience, thinking, and emotion. *Child Development, 72,* 82–102.

Lagattuta, K. H., Wellman, H. M., & Flavell, J. H. (1997). Preschoolers' understanding of the link between thinking and feeling: Cognitive cuing and emotional change. *Child Development, 68,* 1081–1104.

Lazarus, R. S. (2000). Toward better research on stress and coping. *American Psychologist, 55,* 665–673.

Lench, H. C., Quas, J. A., & Edelstein, R. (2006). My child is better than average: The extension and restriction of unrealistic optimism. *Journal of Applied Social Psychology, 36,* 2963–2979.

Levine, L. J. (1995). Young children's understanding of the causes of anger and sadness. *Child Development, 66,* 697–709.

Levine, L. J. (1996). The anatomy of disappointment: A naturalistic test of appraisal models of sadness, anger, and hope. *Cognition and Emotion, 10,* 337–359.

Masters, J. C., Ford, M. E., & Arend, R. A. (1983). Children's strategies for controlling affective responses to aversive social experience. *Motivation and Emotion, 7,* 103–116.

McCoy, C. L., & Masters, J. C. (1985). The development of children's strategies for the social control of emotion. *Child Development, 56,* 1214–1222.

Meerum Terwogt, M., & Olthof, T. (1989). Awareness and self-regulation of emotion in young children. In C. Saarni & P. L. Harris (Eds.), *Children's understanding of emotion* (pp. 209–239). New York: Cambridge University Press.

Meerum Terwogt, M., & Stegge, H. (1998). Children's perspective on the emotional process. In A. Campbell & S. Muncer (Eds.), *The social child* (pp. 249–269). Hove, United Kingdom: Psychology Ltd.

Metcalfe, J., & Mischel, W. (1999). A hot/cool-system analysis of delay of gratification: Dynamics of willpower. *Psychological Review, 106,* 3–19.

Milligan, G. W. (1987). The use of the arc-sine transformation in analysis of variance. *Educational and Psychological Measurement, 47,* 563–573.

Mischel, H. N., & Mischel, W. (1983). The development of children's knowledge of self-control strategies. *Child Development, 54,* 603–619.

Mischel, W. (1996). From good intentions to willpower. In P. Gollwitzer & J. Bargh (Eds.), *The psychology of action* (pp. 197–218). New York: Guilford Press.

Mischel, W., Shoda, Y., & Rodriguez, M. I. (1989). Delay of gratification in children. *Science, 244,* 933–938.

Niedenthal, P. M., Dalle, N., & Rohman, A. (2002). Emotional response categorization as emotionally intelligent behavior. In L. Feldman Barrett & P. Salovey (Eds.), *The wisdom in feeling: Psychological processes in emotional intelligence* (pp. 167–190). New York: Guilford Press.

Parrott, W. G. (1993). Beyond hedonism: Motives for inhibiting good moods and for maintaining bad moods. In D. M. Wegner & J. W. Pennebaker (Eds.), *Handbook of mental control* (pp. 278–308). Englewood Cliffs, NJ: Prentice Hall.

Pons, F., Harris, P. L., & de Rosnay, M. (2004). Emotion comprehension between 3 and 11 years: Developmental periods and hierarchical organization. *European Journal of Developmental Psychology, 1,* 127–152.

Quas, J. A., & Lench, H. C. (2007). Arousal at encoding, arousal at retrieval, interviewer support, and children's memory for a mild stressor. *Applied Cognitive Psychology, 21,* 289–305.

Reijntjes, A., Stegge, H., Meerum Terwogt, M., Kamphuis, J. H., & Telch, M. J. (2006). Emotion regulation and its effects on mood improvement in response to an in vivo peer rejection challenge. *Emotion, 6,* 543–552.

Roseman, I. J., Antoniou, A. A., & Jose, P. E. (1996). Appraisal determinants of emotions: Constructing a more accurate and comprehensive theory. *Cognition & Emotion, 10,* 241–277.

Saarni, C. (1999). *The development of emotional competence.* New York: Guilford Press.

Smith, C. A., & Lazarus, R. S. (1993). Appraisal components, core relational themes, and the emotions. *Cognition & Emotion, 7,* 233–269.

Stegge, H., & Meerum Terwogt, M. (2007). Awareness and regulation of

emotion in typical and atypical development. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 269–286).

Stein, N. L., & Levine, L. J. (1989). The causal organization of emotional knowledge: A developmental study. *Cognition and Emotion, 3,* 343–378.

Stein, N. L., Trabasso, T., & Liwag, M. D. (2000). A goal appraisal theory of emotional understanding: Implications for development and learning. In M. Lewis & J. M. Haviland-Jones (Eds.), *Handbook of emotions* (2nd ed., pp. 436–457). New York: Guilford Press.

Stifter, C. A., & Braungart, J. M. (1995). The regulation of negative affectivity in infancy: Function and development. *Developmental Psychology, 31,* 448–455.

Thompson, R. A. (1994). Emotional regulation: A theme in search of definition. In N. A. Fox (Ed.), The development of emotion regulation and dysregulation: Biological and behavioral aspects. *Monographs of the Society for Research in Child Development, 59*(Serial No. 240), 25–52.

Wellman, H. M., Cross, D., & Watson, J. (2001). Meta-analysis of theory-of-mind development: The truth about false belief. *Child Development, 72,* 655–684.

Received January 29, 2009
Revision received September 24, 2009
Accepted October 19, 2009 ■