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Relations of Emotion Regulation, Negative and Positive Affect to Anxiety and Depression in Middle Childhood

Kristen Uhl¹ · Leslie F. Halpern² · Celia Tam³ · Jeremy K. Fox⁴ · Julie L. Ryan⁵

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Abstract

Objectives The associations between coping, emotion regulation, and child psychopathology have been the subject of extensive research. Many studies have focused on voluntary processes of emotion regulation. In addition to controlled regulatory processes, children's involuntary, automatic processes based in individual differences in temperament may also impact emotion regulation and children's psychological adjustment. The current study examined the relations of emotion regulation and temperament to children's symptoms of anxiety and depression in middle childhood.

Methods Study participants included 126 children (50% Male, 68.0% Caucasian; $M = 9.60$ years, $SD = 0.52$) recruited from a suburban school district. Participants completed self-report measures of emotion regulation, trait affect, and anxiety and depression severity.

Results Results showed that children reported using active self-regulatory strategies more than any other form of emotion regulation in response to anger, worry, fear, and sadness. Significant relationships were found between negative affect and poor emotion regulation or "dysregulation" ($r = 0.25$, $p < 0.01$) as well as positive affect and dysregulation ($r = -0.22$, $p < 0.05$). Furthermore, emotion dysregulation moderated the relation between trait negative affect and depression ($\Delta R^2 = 0.01$, $F(1117) = 4.78$, $p < 0.05$).

Conclusions This study provides further support for the well-established relations between temperament and internalizing disorders in children. It suggests that children in this age group tend to use active strategies to regulate to negative emotions. Additionally, it shows that children high in trait negative affect and emotion dysregulation may be at increased the risk for depression.

Keywords Emotion regulation · Negative affect · Positive affect · Anxiety · Depression

A growing body of research has shown that children with poor emotion regulation, namely, emotion dysregulation, experience greater vulnerability to internalizing and externalizing problems (Beauchaine 2015; Cole et al. 2017). In a recent review, Compas et al. (2017) highlighted the commonalities between the concepts of coping and emotion regulation, noting that, although coping occurs in response

to a stressor and emotion regulation in response to both positive and negative emotions, a unifying feature is the critical role of controlled (i.e., conscious and intentional) regulatory processes. For both coping and emotion regulation, similar controlled regulatory processes in the form of various cognitive and behavioral strategies are utilized to regulate emotion and respond to stress.

In addition to controlled strategies, children's involuntary, automatic processes based in individual differences in temperament also impact emotion regulation and children's psychological adjustment. Much of the research examining the associations between coping, emotion regulation, and child psychopathology has focused on voluntary processes for regulating emotions in young children (Compas et al. 2017). However, the relation between temperament and emotion regulation, as well as the contributions of both to psychopathology, warrants closer examination.

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Research on the lifetime prevalence of DSM-IV mental disorders in youth has found that internalizing problems, such as anxiety and depression, are among the most common mental health problems, with a median age of onset of 6 and 13 years, respectively (Merikangas et al. 2010). Studies investigating risk factors that increase the likelihood of children developing internalizing problems have consistently pointed to variations in temperament as a key factor (Muris and Ollendick 2005; Rettew and McKee 2005).

One model of temperament that has been used to investigate temperamental contributions to internalizing problems in older children and adolescents is Clark and Watson's (1991) tripartite model. In this model, there are two primary factors, negative affect (NA), which is the tendency to experience negative emotions, such as fear, sadness, and anger, and positive affect (PA), which reflects positive emotions, enthusiasm and excitement, and a third factor, physiological hyper-arousal. Research on the original two-factor model that included only NA and PA (Watson and Tellegen 1985) and the revised tripartite model (Clark and Watson 1991) has largely focused on the utility of NA and PA in discriminating between anxiety and depression. In this model, increased NA is expected for both anxiety and depression, and low PA is expected only for depression. Although the tripartite model was initially developed and used in research with adults, it has also been used extensively to study temperamental vulnerability in anxiety and depression of both community and clinic-referred samples of children and adolescents (e.g., Burgess and Nakamura 2014; Chorpita 2002; Chorpita et al. 2000; Fox et al. 2010; Jacques and Mash 2004; Lonigan et al. 1999; Lonigan et al. 2003). Research with children and adolescents shows that NA is a vulnerability that is associated with general internalizing symptoms (Lengua and Long 2002; Hankin et al. 2017), including increases in levels of depression in middle childhood (Anthony et al. 2002; De Boo and Spiering 2010) and anxiety in older children (Anthony et al. 2002; Phillips et al. 2002). Conversely, high levels of PA may be protective against certain types of psychopathology. For example, research has shown that PA is predictive of fewer internalizing problems during childhood (Lengua and Long 2002), and is associated with lower levels of depression (Anthony et al. 2002; Lengua et al. 1999; Phillips et al. 2002).

Thompson's (1994) widely cited definition of emotion regulation describes it as "the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals" (pp. 27–28). Essentially, difficulty in regulating one's emotional reaction successfully can negatively impact children's ability to form positive social relationships and learn, as well as increases vulnerability for child psychopathology (Beauchaine 2015;

Cole et al. 2017). Research on children's emotion regulation during middle childhood has primarily utilized parent or child self-report measures. These measures typically include scales that assess the overall ability to successfully regulate emotion or cope with negative emotions, and/or scales that assess emotion dysregulation or maladaptive responses, either regardless of the type of emotion experienced (e.g., Shields and Cicchetti 1997; Gratz and Roemer 2004) or in response to discrete emotions such as anger, sadness, and worry (e.g., Zeman et al. 2010, 2001).

Research on emotion regulation has found that during middle childhood, children begin relying more on cognitive and relaxation strategies to reduce physiological arousal. Although they are increasingly independent in emotion management, peer relationships play an important supportive role (Compas et al. 2017). Some studies have noted gender differences emotion regulation. For example, a study by Perry-Parrish and Zeman (2011) suggested that adolescent boys report inhibiting their expression of sadness more frequently than girls, whereas girls report displaying sadness more frequently than boys. Meanwhile, Chaplin and Aldao's (2013) meta-analysis of expressed emotion in children, revealed significant but small effects for gender overall, with girls in middle childhood expressing more positive emotion and internalizing symptoms (i.e., sadness and anxiety), and boys more externalizing emotions (i.e., anger). Research investigating the effect of gender on specific emotion regulatory strategies used during childhood has been mixed. For example, a study with a large sample of youth ages 9–16, found that girls report more overall difficulty regulating their emotions, less access to effective emotion regulation strategies, greater non-acceptance of negative emotions, and less emotional clarity than boys, whereas boys report more difficulties in emotional awareness (Bender et al. 2012). Alternatively, other research on emotion regulation strategies in 7th and 8th graders found no gender differences in self-reported cognitive reappraisal or emotional suppression (Chervonsky and Hunt 2018).

Studies that have examined children's global emotion regulation responses have generally found emotion dysregulation associated with increased psychopathology and successful emotion coping associated with lower levels of psychopathology. For example, Bender et al. (2012) found that children's total emotion dysregulation score was significantly associated with anxiety. In other research, less parent-reported problem focused and positive reframing coping strategies were associated with more self-reported depressive symptoms in preadolescents (Siener and Kerns 2012).

Research by Zeman and colleagues has examined children's regulation of discrete negative emotions in middle childhood (Zeman et al. 2001, 2010). They have found that dysregulation of anger and sadness was associated with higher levels of internalizing symptoms, whereas

constructive coping with anger was associated with lower levels of internalizing symptoms (Zeman et al. 2002). In a later study, children who reported greater dysregulation around worry had higher parent-reported anxiety/depressed syndrome scale and internalizing problem scores, whereas greater coping with worry was negatively associated with the anxiety/depressed, internalizing, and externalizing problem scale scores (Zeman et al. 2010). In a longitudinal study, Folk et al. (2014) found that children with greater anger and sadness dysregulation at time 1 (T1), and worry inhibition at T1, reported increased anxiety symptoms two years later (T2). Whereas, more worry coping at the T1 was associated with fewer depressive symptoms at T2. When scale scores were aggregated across emotions, higher levels of global dysregulation at T1 predicted increased self-reported anxious symptoms and caregiver-reported depressive symptoms at T2, whereas increased coping at T1 predicted fewer depressive symptoms at T2. Therefore, adaptive coping with emotions appears to be related to fewer internalizing concerns during childhood whereas emotional dysregulation is linked to increased symptoms of anxiety and depression.

Meta-analyses on the associations between emotion regulation and psychopathology report similar patterns of findings. A meta-analysis conducted by Aldao et al. (2010) on the relation between emotion-regulation strategies and psychopathology in youth and adults found that maladaptive strategies (e.g., rumination, avoidance) were positively associated with psychopathology, with medium to large effect sizes, whereas adaptive strategies, such as those used in engagement coping (e.g., problem solving, reappraisal), were negatively associated with psychopathology, with small to large effect sizes. Similar findings were recently reported by Compas et al. (2017) in a large meta-analysis investigating the relations between emotion regulation, coping, and both internalizing and externalizing symptoms in children and adolescents. Their analysis of cross-sectional studies showed significant medium negative relations between the broad domain of emotion regulation and internalizing and externalizing symptoms. And with respect to specific strategies, they found that greater use of emotional suppression and denial was associated with higher levels of internalizing symptoms, and greater use of avoidance was associated with both greater internalizing and externalizing symptoms.

In contrast to the considerable literature on the relation between temperament and emotion regulation in early childhood (e.g., Santucci et al. 2008; Stifter et al. 2011; Tan et al. 2013), little is known about the relation between temperament and emotion regulation in middle childhood, and almost no research has examined how they together increase risk for internalizing problems. In one study that examined the association between regulation of discrete

emotions, temperament, and depression in middle childhood, Yap et al. (2011) found that preadolescents with more depressive symptoms reported higher inhibition of affect, more emotion dysregulation, and less emotion regulation coping responses when they experience sadness. In addition, this study showed that adaptive and maladaptive responses to sadness partially mediated relations between temperamental negative emotionality, or NA, and depressive symptoms.

Coping and temperament researchers have long suggested that variations in temperament likely affect children's adaptation to stressful events, noting that temperament influences what children view as stressful, coping strategy preference, as well as children's overall range of responses to stressors (Compas et al. 2004; Rueda and Rothbart 2009; Skinner and Zimmer-Gembeck 2007; Wachs 2006). For instance, children who are higher in NA may interpret situations as more stressful than children lower in NA or higher in PA. Hence, heightened NA may lead to the frequent use of a particular set of emotion regulation and coping strategies, limiting children from developing alternative regulatory strategies. Of note, there is evidence of significant positive correlations between NA and avoidant coping (De Boo and Spiering 2010; Lengua and Long 2002; Lengua et al. 1999), emotional venting, and aggressive responses (Eisenberg et al. 1997) in middle childhood. Alternatively, PA in middle childhood has been associated with active coping strategies, such as problem-solving and social support-seeking (De Boo and Spiering 2010; Lengua et al. 1999). Children higher in PA may be more likely to recognize beneficial outcomes from engaging directly with a stressor, and even when situations are out of their control, the ability to remain calmer in the face of stress may enable them to more easily access adaptive emotion regulation and coping strategies such as cognitive reappraisal (Lengua et al. 1999).

The current study sought to examine the relations of temperament and emotion regulation to internalizing problems in middle childhood to address the lack of current research in this area. First, we examined whether patterns of children's emotion regulation strategies differ in response to anger, sadness, fear, and worry. We expected that internalizing emotions, such as sadness, fear, or worry, would result in a similar pattern of strategy use, whereas anger regulation strategies would differ from those used in response to internalizing emotions. Next, the study examined the relations between NA, PA, and emotion regulation. Research supports the hypothesis that children high in NA would be more likely to report strategies that reflect disengagement and emotion dysregulation, whereas children high in PA would report engagement, or active, self-regulatory strategies. Finally, we examined the moderating effect of emotion regulation on the relation between

Table 1 Demographic differences between ERACQ responders and nonresponders

Demographic variable	ERACQ responders <i>M</i> (<i>SD</i>)	ERACQ nonresponders <i>M</i> (<i>SD</i>)	Statistic <i>t</i>	Significance <i>p</i>
Age	9.60 (.52)	9.49 (.64)	−1.20	0.23
	Freq. (%)	Freq. (%)	χ^2	<i>p</i>
Gender				
Male	63 (50.0%)	39 (60.0%)	1.72	0.19
Female	63 (50.0%)	26 (40.0%)		
Ethnicity ^a				
Caucasian	85 (68.0%)	53 (81.5%)	10.50	0.16
African American	4 (3.2%)	4 (6.15%)		
Hispanic/Latino	3 (2.4%)	2 (3.1%)		
Asian/Pacific Islander	13 (10.4%)	1 (1.5%)		
Native American	4 (3.2%)	0 (0.0%)		
Multiracial	15 (12.0%)	5 (7.7%)		
Other	1 (0.8%)	0 (0.0%)		

Total sample $N = 191$: Responders $n = 126$, Nonresponders $n = 65$

T-test performed for continuous variables. Chi-Square performed for categorical variables; Freq. = frequency of variable within category, % = percent of variable within category

M = mean, *SD* = standard deviation

^aMissing $n = 1$

temperament, and anxiety and depression. We expected that children high in NA who used more engagement strategies would have lower levels of internalizing symptoms in comparison to children high in NA who used fewer engagement strategies for emotion regulation. Children with high NA and increased disengagement or emotion dysregulation were expected to report more internalizing symptoms than children high in NA with less disengagement or emotion dysregulation. In contrast to the existing literature that has largely studied emotion regulation in broad strokes (namely, by investigating the strategies children use to manage general emotional arousal) the findings from this study will add to the literature by expanding our understanding of the children's use of emotion regulation strategies in relation to specific emotions. Moreover, whereas there has been considerable research on the role of temperament in the relations between emotion regulation, coping and psychopathology in younger children, the current study contributes to the literature by examining these processes in late middle childhood.

Method

Participants

The participants were 191 children ages 8–11 (M age = 9.57, $SD = 0.57$) from a suburban public school district in

Upstate New York who were recruited for a larger longitudinal study investigating risk and protective factors for the development of internalizing problems. The sample was primarily middle class (M income = 94,333 dollars/year, $SD = 44,812$) and comprised of 102 boys and 89 girls, who primarily self-identified as Caucasian (72.3%). Only children who completed the emotional regulation questionnaire are included in this study ($N = 126$). Analyses suggested that survey respondents did not differ from nonrespondents on demographic variables (Table 1).

Procedure

After the University's Office for Research Compliance approved this study, children were recruited from fourth and fifth grade classrooms from five elementary schools in a suburban school district. The study was announced in the classrooms, and an informational letter and study consent form were sent home with the children. Their parents provided informed consent, and the children provided written assent before participating in the study. Self-report questionnaires were administered in small groups at a time that did not interfere with children's classes, or individually for students who were absent on days of assessment, with research staff present to answer any questions. Study participants were eligible to win one of two prizes (a music player or \$20 gift card to an online store) raffled at each grade level at their respective schools. Only measures utilized in the current investigation are described.

Measures

Emotion response and coping questionnaire (ERACQ)

The ERACQ is a self-report measure that assesses the frequency and intensity of children's emotions, and their emotion regulation strategies in response to anger, worry, fear, sadness (Halpern and Brand 1998). Because children have difficulty thinking about emotion regulation strategies in the abstract, they are asked to first report the kinds of situations that elicit each of the negative emotions. Then they are asked to report the strategies they use to handle such situations and *...help yourself feel better when you are...* (each negative emotion). As noted by Compas et al. (2017), research on the specific strategies that children use to regulate emotion is limited; however, it appears that children use strategies for emotion regulation that are similar to those they use to cope with stressors. Subsequently, responses were coded into one of 12 emotion-regulation/coping strategies that are commonly reported in the coping literature or as an unrelated response (Table 2). Three graduate students were trained to code the children's responses using a coding rubric. Each coder reached above 85% agreement with a gold standard established by the first author. Once trained, 20% of the data were double-coded, and inter-rater reliability estimates yielded Cohen's kappa means of 0.79 and 0.97 for pairs of coders. Differences in strategies were discussed and resolved through consensus. Based on the coping and emotion regulation literatures, children's strategies (Table 2) were then grouped into

engagement, disengagement, dysregulation, and responses indicating lack of coping (i.e., "do nothing") or unrelated, "off-topic" answers. Because children were able to report multiple responses for each negative emotion, base rate frequencies within the four factors were recorded. Frequencies of children's responses to specific emotions varied from 0 to 12. To avoid error inflation, frequency responses were weighted. Accordingly, for each negative emotion, the number of responses generated in each of the four factors was divided by the child's overall number of responses. Thus, responses were turned into proportion scores that summed to 1 within each negative emotion (anger, sadness, fear, worry). Data was only analyzed for children who completed the entire questionnaire (i.e., responses to all 4 emotions, $n = 126$). A total of sixty-five children did not provide responses for all negative emotions and were excluded from further analyses (Missing response by category: Anger: $n = 14$, Sadness: $n = 42$, Fear: $n = 41$, Worry: $n = 23$).

Positive and negative affect scale for children (PANAS-C)

The PANAS-C is a self-report questionnaire, comprised of 30 emotion terms, and adapted from the adult Positive and Negative Affect Schedule—Expanded Form (PANAS-X; Watson and Clark 1994) that measures positive affect (PA) and negative affect (NA) (Laurent et al. 1999). In accordance with results from factor analyses presented by Laurent et al. (1999), only 27 items were used for scoring. Study participants were asked to indicate the extent to which they

Table 2 Emotion regulation factors and strategies

Factors	Strategies	Definitions
Engagement	Self-directed problem solving	Attempts to constructively modify the situation
	Assisted problem solving	Seeking assistance/information from peer or adult
	Cognitive coping	Thinking about the problem in a different way; self-talk
	Emotion-focused coping	Using cognitive/behavioral distraction to modify feeling
	Emotional support seeking	Sharing with or seeking comfort from peer or adult
	Passive acceptance	Acceptance of situation or emotion; "sticking it out"
	Talking to parent/adult	Speaking with parent without intent for support or assistance
Disengagement	Cognitive-behavioral escape	Leaving or not thinking about the situation
	Ignoring	Ignoring/avoiding the person involved in the situation
Dysregulation	Emotion venting	Crying and non-target verbal or physical aggression
	Aggressive actions	Seeking revenge or attempts to verbally/physically retaliate
	Self-injurious behavior	Cutting, pulling hair, hitting self
	Ruminating	Worrying about or dwelling on the problem
No coping/Unrelated response	Doing nothing	Stating intention to do nothing, not knowing how to respond
	Response unrelated to negative emotions	Stating what someone else would do, or providing unrelated response

Emotion regulation/coping strategies were defined and grouped into factors: Engagement, disengagement, dysregulation, no coping/unrelated response

usually feel specific emotions (i.e., sad, frightened, fearless, excited) on a Likert scale ranging from 1 (*very slightly or not at all*) to 5 (*extremely*). Cronbach's alpha coefficients for the NA and PA subscales were 0.91 and 0.81, respectively. NA subscale was log-transformed to meet assumptions of normality.

Revised child anxiety and depression scale

The RCADS is a self-report questionnaire that assesses symptoms of anxiety and depression in children (Chorpita et al. 2000). The scale is comprised of 47 items that are rated on a Likert scale, ranging from 0 (*never*) to 3 (*always*). These items form six subscales, including separation anxiety, social phobia, generalized anxiety, panic, obsessions/compulsions, and depression. A total anxiety scale is formed from summing the five anxiety subscales. The total anxiety scale and the depression subscale were used for this study. Clinically significant depression and anxiety scores were observed in 8.4% ($n = 16$) and 7.3% ($n = 14$) of the sample, respectively. Analyses yielded Cronbach's alpha coefficients of 0.90 for the anxiety scale and 0.80 for depression. The anxiety and depression scale scores were positively correlated ($r = 0.74$, $p < 0.001$). Log and square-root transformations were performed for the anxiety and depressive scales respectively to meet assumptions of normality.

Data Analyses

Analyses were completed using SPSS version 23.0 (IBM Corp., 2015). Correlational analyses and student t-tests were used to examine relationships among demographic and outcome variables. To determine whether patterns of engagement and disengagement regulation differed significantly across emotions, a 4×2 repeated measures ANOVA was performed using emotion regulation factor weighted proportion scores (see Table 4 for means and standard deviations). The 4-level fixed categorical repeated factor was the type of negative emotion (anger, sadness, worry, or fear), and the 2-level fixed categorical repeated

factor was the emotion regulation factor (engagement and disengagement). Emotion dysregulation was not examined in this analysis due to its low frequency across emotions. Examination of the Mauchly Test of Sphericity showed that correlations between the repeated factors were not independent for emotion (emotion: $\chi^2(5) = 14.68$, $p < 0.05$), hence the Huynh-Feldt corrected degrees of freedom was used for this variable. Multiple regression analyses were conducted using the Process Macro (Hayes 2013) to examine the extent to which emotion regulation moderates the relation between temperament and internalizing problems. Three sets of moderation models were tested. In each regression, the moderating effect of either engagement, disengagement, or dysregulation on the relation between NA and depression or anxiety symptoms was assessed. Due to high statistical correlation between both outcome variables ($r = 0.74$, $p < 0.01$), depression was entered as a covariate into models testing anxiety and anxiety was covaried out of those for depression. Because NA has been more consistently associated with internalizing problems than PA, analyses focused on NA, with PA entered as a covariate in all models.

Results

Preliminary Analyses

Descriptive statistics for the study questionnaires are presented in Table 3. Preliminary analyses were conducted to test for relations between demographic variables anxiety, and depression. Results showed that anxiety and depression scores did not differ by gender (Anxiety: $t(189) = 1.92$, $p = 0.06$; Depression: $t(189) = 0.78$, $p = 0.44$) and were not correlated with age.

Children's Regulation of Negative Emotions

Results revealed that children used engagement and disengagement regulation in response to each of the negative emotions. Engagement was reported by the largest number

Table 3 Descriptive statistics and correlations for age, temperament, and internalizing symptoms

	<i>M</i> (<i>SD</i>)	Range	1	2	3	4	5
1. Age	9.57 (0.57)	8–11	1				
2. Temperament: NA	29.77 (10.87)	15–66	0.03	1			
3. Temperament: PA	45.46 (7.55)	25–60	−0.02	−0.19**	1		
4. RCADS: Anxiety	49.88 (12.49)	28–91	−0.10	0.43**	−0.19**	1	
5. RCADS: Depression	51.02 (12.03)	30–90	−0.08	0.53**	−0.25**	0.74**	1

RCADS: Anxiety = total anxiety T-score, RCADS: Depression = total depression T-score

Temperament: NA negative affect, Temperament: PA positive affect, *M* mean, *SD* standard deviation

* $p < 0.05$ level, ** $p < 0.01$ level (two-tailed)

of children (59.5% to fear, 69.0% to worry, 69.8% to anger, 71.4% to sadness) followed by disengagement (26.2% to fear, 30.2% to worry, 31.7% to sadness, 53.2% to anger). Only 4.8% of children reported dysregulation to fear and worry, 14.3% to sadness, whereas 37.3% reported it in response to anger. No coping/unrelated responses were provided to each of the negative emotions, with 8.7% of children reporting a no coping/unrelated response to anger, 15.9% to worry and sadness, and 25.4% to fear. No Coping/unrelated responses were not analyzed further in this study.

Emotion Regulation in Response to Discrete Negative Emotions

ANOVA results from the within-subjects tests on the main effects of emotion and emotion regulation factor (engagement and disengagement), as well as the interaction between effects, were all significant ($p < 0.05$). For the significant main effect of emotion, $F(2.87, 359.61) = 3.20$, $p < 0.05$, Bonferroni contrasts revealed that emotion regulation was utilized more for worry than fear ($p < 0.05$). The significant main effect of type of emotion regulation factor ($F(1, 125) = 77.48$, $p < 0.01$) was also examined using Bonferroni contrasts. Results showed that engagement was reported significantly more than disengagement ($p < 0.001$).

The interaction effect between emotion and emotion regulation factor was significant, $F(3, 375) = 2.80$, $p < 0.05$. This indicated that type of emotion had different effects on children's emotion regulation (Fig. 1). Bonferroni contrasts showed that children reported using significantly more engagement than disengagement in response to anger ($p < 0.001$), worry ($p < 0.001$), sadness ($p < 0.001$), and fear ($p < 0.001$). Contrasts were also examined to determine if engagement and disengagement varied across negative emotions. Results were only significant for engagement, revealing that it was used more in response to worry than anger ($p < 0.01$).

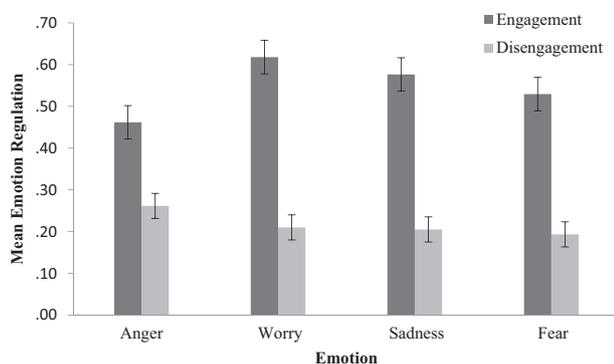


Fig. 1 Emotion regulation as a function of negative emotion. Mean emotion regulation scores (weighted proportions from 0 to 1) are represented on the y-axis. Emotion categories are represented on the x-axis. Error bars represent standard errors

Relations among Engagement and Disengagement Regulation, and Dysregulation

Kendall's tau correlations among engagement and disengagement regulation and dysregulation across emotions appear in Table 4. A significant negative relation was found between engagement and disengagement for all emotions. Results also showed consistency of emotion regulation across emotions. Reports of engagement to worry, sadness, and fear were all significantly inter-correlated, and children who reported engagement in response to anger also reported it in response to worry. Similarly, disengagement in response to anger was positively related to disengagement in response to worry and sadness, and disengagement in response to worry was positively associated with disengagement to sadness and fear. Also, dysregulation in response to anger was significantly correlated with dysregulation in response to worry, sadness, and fear.

Relations between Temperament and Emotion Regulation

Examination of the relation between NA and PA yielded a significant negative correlation ($r = -0.19$, $p < 0.01$). Due to the similar pattern observed between discrete emotions, the emotion regulation and dysregulation factor weighted proportion scores were combined across emotions and averaged to create summary scores for Engagement ($M = 0.55$, $SD = 0.28$), Disengagement ($M = 0.22$, $SD = 0.21$), and Dysregulation ($M = 0.07$, $SD = 0.10$). The summary scores were used in later correlational and regression analyses. Correlations were conducted to examine the relations between NA, PA and emotion regulation and dysregulation summary scores. Children with higher NA had higher emotion dysregulation summary scores ($r = 0.25$, $p < 0.01$), whereas children with higher PA had lower emotion dysregulation summary scores ($r = -0.22$, $p < 0.05$). No significant correlations were found between NA, PA and either engagement or disengagement summary regulation scores ($p > 0.05$).

Relations of Temperament and Emotion Regulation to Internalizing Symptoms

Pearson correlations were used to examine the relations of NA, PA, and emotion regulation to symptoms of anxiety and depression. Children with higher NA scores and lower PA scores had higher RCADS depression and anxiety scores (Table 3). Children with higher emotion dysregulation summary scores had higher RCADS depression scale scores ($r = 0.20$, $p < 0.05$). Surprisingly, no significant correlations were found between engagement or disengagement regulation summary scores and internalizing symptoms ($p > 0.05$).

Table 4 Descriptive statistics and correlations among weighted emotion regulation factors

	Mean (SD)	1	2	3	4	5	6	7	8	9	10	11
Anger												
Engagement (1)	0.46 (0.37)											
Disengagement (2)	0.26 (0.30)	−0.37**										
Dysregulation (3)	0.19 (0.30)	−0.34**	−0.14									
Worry												
Engagement (4)	0.62 (0.45)	0.18*	−0.12	0.04								
Disengagement (5)	0.21 (0.36)	−0.06	0.15*	0.02	−0.62**							
Dysregulation (6)	0.02 (0.07)	−0.05	−0.08	0.22**	−0.17*	0.11						
Sadness												
Engagement (7)	0.58 (0.42)	0.14	−0.10	−0.03	0.25**	−0.10	−0.03					
Disengagement (8)	0.21 (0.34)	−0.10	0.21**	0.10	−0.06	0.23*	0.04	−0.49**				
Dysregulation (9)	0.06 (0.15)	0.06	−0.14	0.26**	−0.04	0.06	0.10	−0.14	−0.15			
Fear												
Engagement (10)	0.53 (0.47)	0.14	−0.04	−0.02	0.36**	−0.09	−0.01	0.17*	0.07	0.01		
Disengagement (11)	0.19 (0.36)	0.02	0.13	0.05	−0.10	0.26**	0.03	−0.02	0.09	0.15	−0.43**	
Dysregulation (12)	0.02 (0.07)	−0.12	0.02	0.23**	−0.04	0.06	0.12	0.05	0.00	0.11	−0.06	−0.01

The mean, standard deviation (SD) and Kendall's tau correlations are listed for weighted emotion regulation factors (engagement, disengagement, and dysregulation) within each emotion (anger, worry, sadness, and fear)

* $p < 0.05$ (two-tailed); ** $p < 0.01$ (two-tailed)

Emotion Regulation as a Moderator of the Relation between Negative Affect and Symptoms of Anxiety and Depression

The first two regressions examined whether engagement regulation moderated the effect of NA on symptoms of depression and anxiety, respectively. The overall models were significant for both regressions (Depression: $R^2 = 0.54$, $F(5, 117) = 27.02$, $p < 0.01$; Anxiety: $R^2 = 0.64$, $F(5, 117) = 41.10$, $p < 0.01$), with NA contributing significant variance to the regression equation for anxiety ($B = 1.81$, $t = 5.02$, $p < 0.01$). Neither the main effect term for engagement regulation, nor the interaction term for NA and engagement, were significant in either regression.

The second set of regressions tested whether disengagement regulation moderated the effect of NA on symptoms of depression and anxiety. The overall model for depression was significant ($R^2 = 0.64$, $F(5, 117) = 41.52$, $p < 0.01$), as was as the overall model for anxiety ($R^2 = 0.55$, $F(5, 117) = 28.46$, $p < 0.01$). Only the main effect term for NA was significant in the regression model for depression ($B = 1.73$, $t = 4.74$, $p < 0.01$).

In a final set of regressions, dysregulation was examined as a moderator of the relation between NA and symptoms of anxiety and depression. The overall model predicting anxiety was significant (Anxiety: $R^2 = 0.54$, $F(5, 117) = 27.71$, $p < 0.01$). Results showed no significant main effect

term for NA or the interaction term for NA and dysregulation. As in the previous regression, the regression testing dysregulation as a moderator of the relation between NA and depression was also significant ($R^2 = 0.65$, $F(5, 117) = 43.04$, $p < 0.01$). However, the main effect of NA was significant ($B = 2.12$, $t = 5.47$, $p < 0.01$) as was the NA and dysregulation interaction term ($\Delta R^2 = 0.01$, $F(1, 117) = 4.78$, $p < 0.05$). Further exploration of the interaction through tests of simple slopes showed significant positive associations between NA and depression at low ($\beta = 2.59$, $p < 0.01$), medium ($\beta = 2.12$, $p < 0.01$), and high ($\beta = 1.45$, $p < 0.01$) levels of dysregulation (Fig. 2).

Figure 2 shows that at low, medium, and high levels of emotion dysregulation, children with high NA reported more symptoms of depression than children low in NA. Children with higher levels of emotion dysregulation and lower NA reported more symptoms of depression than children with lower levels of emotion dysregulation and lower NA. In contrast, children with higher levels of emotion dysregulation and higher NA reported few symptoms of depression than children with lower levels of emotion dysregulation and higher NA. Results suggest that greater emotion dysregulation increases the risk for children lower in NA to experience greater depression. Whereas, it appears that “dysregulated” responses, such as emotion venting, might provide children high in NA some relief from emotional distress.

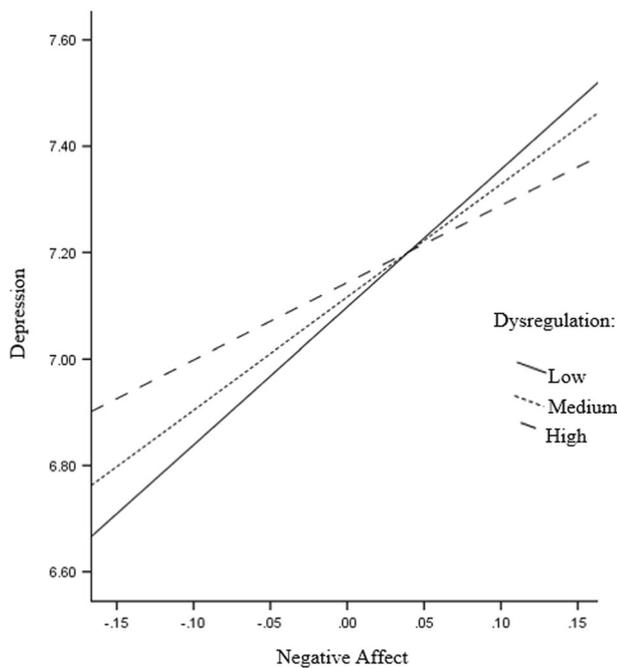


Fig. 2 Interaction of negative affect and emotion dysregulation as predictors of depression. The simple slopes of negative affect (log transformation) predicting depression (square root transformation of t-score) for 1 standard deviation below the mean (low), the mean (medium), and 1 standard deviation above the mean (high) of emotion dysregulation are represented

Discussion

The first aim of this study was to establish whether children's emotion regulation differed for anger, sadness, fear, or worry. It was predicted that the type of emotion regulation reported would be similar for internalizing emotions, such as sadness, fear, or worry, and would differ from the regulation of anger. Based on the study's findings, it appears that during middle childhood the type of emotion regulation reported generalizes across different negative emotions. Engagement regulation was the most common response to worry, sadness, and fear; however, contrary to expectations, it was also the most common response to anger. The only significant difference detected for type of regulation as a function of emotion was that engagement regulation was reported more in response to worry than anger. The high rate of engagement regulation is consistent with research findings in the coping literature with typically developing populations of children (Compas et al. 2017). Children may use engagement-type emotion regulation and coping strategies more than other strategies because they are often the most adaptive for this developmental group. For instance, middle childhood is marked by increased emotion regulation skills, which enable self-driven, problem-solving coping to be an effective method of resolving stressful situations (Losoya et al. 1998). Thus, disengagement-type

strategies are less necessary as children feel better equipped to address the sources of the emotional arousal.

Correlational analyses also revealed considerable consistency in emotion regulation across the negative emotions. Children who reported more engagement-type regulation strategies for worry also tended to use more engagement-type strategies in response to fear, sadness, and anger. Similarly, children who reported more disengagement in response to anger also reported doing so in response to worry and sadness. Thus, it appears that the children in this study tended to report a particular form of regulation irrespective of discrete emotion. It is possible, however, that even though children were asked to provide strategies in response to different negative emotions, the interviewing procedure was evocative of similar types of emotion regulation response. Or children simply found it easier to repeat a particular type of strategy for each of the emotions.

The second aim of this study was to examine how temperament related to emotion regulation. It was predicted that NA would be positively associated with disengagement regulation and emotion dysregulation, whereas PA would be associated with more engagement regulation. Surprisingly, results yielded significant relations only between temperament and emotion dysregulation. Specifically, children higher in PA reported less emotion dysregulation, whereas children higher in NA reported more emotion dysregulation. These results are consistent with studies which link NA with emotional venting and aggressive responses (Eisenberg et al. 1997). The failure to detect a significant relation between PA and engagement regulation was surprising given that it has been associated with problem-solving and social support-seeking coping in response to stress (De Boo and Spiering 2010; Lengua et al. 1999). Although high PA reflects a tendency to be positively engaged with the environment, this may not translate directly into being able to manage negative emotions with active strategies such as problem solving, cognitive coping, support seeking. Notably, research with younger children also failed to find significant relations between temperamental surgency (PA) and emotion regulation strategies, such as goal-directed behavior, social support seeking, and distraction that were assessed in a laboratory paradigm (Dollard and Stifter 2012).

Finally, the present study sought to examine the relations of temperament and emotion regulation to internalizing problems, and whether emotion regulation moderated the relation between temperament and internalizing symptoms. The findings pertaining to the relations between temperament and internalizing problems partially supported study hypotheses. As stipulated by the tripartite model, children with increased NA reported significantly increased levels of symptoms of anxiety and depression, with correlations showing moderate effect sizes. These findings are in line

with abundant research that has identified NA as a significant risk factor for anxiety and depression during childhood and adolescence (e.g., Anthony et al. 2002; De Boo and Spiering 2010; Fox et al. 2010; Phillips et al. 2002). However, the findings did not support the tripartite model's stipulation that PA would be associated primarily with depression. Results showed that children's PA scores were significantly negatively associated with both depression and anxiety symptoms with low effect sizes. However, the effect size for the relation between PA and depression was higher than that for PA and anxiety. Although this finding fails to fully support the tripartite model, other studies with children and adolescents that have utilized the PANAS (PANAS-C or PANAS-X) have similarly failed to find PA exclusively associated with depression in community samples (Fox et al. 2010; Jacques and Mash 2004; Lonigan et al. 2003) and clinical samples (Burgess and Nakamura 2014; Chorpita and Daleiden 2002). This finding may reflect the comorbid nature of internalizing disorders in middle childhood with better differentiation of anxiety and depression only emerging during adolescence. Of note, several studies have reported a generally better fit for the tripartite model with the adolescents than children in studies that have included both (e.g., Burgess and Nakamura 2014; Jacques and Mash 2004). On the other hand, the negative relationship between PA and anxiety may highlight the protective effect of high positive emotionality against all psychopathology (Lengua and Long 2002). Thus, children who lack this protective factor may be at risk for internalizing problems in general.

The hypothesis that emotion regulation would moderate the relation between temperament and symptoms of anxiety and depression was partially supported. Multiple regressions failed to detect a moderating effect for engagement and disengagement emotion regulation on NA and anxious or depressive symptomatology. However, regression analyses did reveal that emotion dysregulation was a significant moderator of the relation between NA and depressive symptomatology. Overall, as emotion dysregulation increases, the association between NA and symptom levels of depression also increases. Nevertheless, emotion dysregulation showed a different pattern of relation with symptoms levels of depression for children as a function of individual difference in temperament. Specifically, for children lower in temperamental NA, emotion dysregulation clearly confers increased risk for higher levels of depressive symptoms. Whereas for children higher in NA, unexpectedly, greater emotion dysregulation was associated with somewhat lower levels of symptoms of depression than for children who reported less emotion dysregulation. These findings are similar to those of other studies showing that temperamental NA is strongly associated with internalizing symptoms (Anthony et al. 2002; De Boo and

Spiering 2010; Lengua et al. 1999; Lengua and Long 2002) and that, for children low in NA, emotion dysregulation is a clearly a risk factor for depressive symptomatology. However, for children with high levels of NA, engaging in "dysregulated" behaviors, such as emotion venting, may in fact serve a different function than for children lower in NA. Notably, neither NA, emotional dysregulation, nor their interaction were predictive of anxiety. This could be due to a greater effect of environmental factors, such as parenting approaches and experience with uncontrollable events, on the development of childhood anxiety disorders (Chorpita and Barlow 1998; Fisak and Grills-Taquechel 2007).

Research on coping has found that rumination (Aldao et al. 2010) and other forms of maladaptive coping are associated with internalizing symptoms (Compas et al. 2017). In the current study, emotion dysregulation was associated with increased depressive symptoms. This relation may occur because strategies such as emotional venting, aggression, and rumination do not effectively resolve the emotion-eliciting stressor. The ineffective resolution of emotion-eliciting stressors may maintain distress, decrease self-efficacy, and increase subsequent rumination, leading to low mood or irritability. Additionally, such responses may also negatively influence interpersonal relationships, further predisposing one to psychopathology (Zeman et al. 2002). Interestingly, Thompson et al. (2010) also found that maladaptive coping was predictive of depressive symptoms but more so in the presence of lower levels of adaptive coping strategies.

Limitations and Future Research Directions

The findings of this study must be viewed in the context of its limitations. One limitation was that the measure used to assess children's emotion regulation, the ERACQ, is a theoretically-driven measure that has not been tested for validity and reliability in childhood samples. The semi-structured form of the questionnaire allows for a broad array of responses, hence providing considerable information about how children manage emotions. However, this format relies on children's ability to remember and report what they remember they do to manage their emotions. Their reported strategies may only represent a portion of the child's actual behavioral repertoire and may be influenced by children's biased recall. Moreover, children may be less likely to report regulation strategies that they deem socially undesirable, such as aggressive behaviors. Ideally, observational, child self-report, and parent-report measures should be used to examine emotion regulation from multiple perspectives. It is important to note that intensity of emotional response was not assessed, which may have also impacted the relationship between temperament, emotional regulation, and psychopathology. For instance, higher

intensities of emotional response (which is likely linked to temperament) may directly predict psychopathology, thereby reducing the effect of emotional dysregulation strategies. Also, because this study examined children's regulation of negative emotions without consideration of the types of stressors that caused their negative emotions, the controllability of events could not be investigated as a potential factor contributing to emotion regulatory responses.

Future research should continue to investigate the relations of temperament and emotion regulation to children's adjustment in both clinical and nonclinical samples of children. Understanding the role of emotion regulation in the association between reactive temperament and mental health is paramount to creating effective interventions. As a result, emotion regulation interventions may be tailored toward children with certain temperamental characteristics that may predispose them to psychopathology. Consequently, teaching at-risk children better ways to regulate their emotions may decrease their vulnerability to mood disorders later in childhood and adolescence.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in the study were in accordance with the ethical standards of the University at Albany—SUNY Institutional Review Board and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from children's caregivers and children provided written assent.

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