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Associations of Coping and Appraisal Styles with Emotion Regulation During Preadolescence

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Abstract

We investigated the associations of appraisal and coping styles with emotion regulation in a community sample of preadolescents ($N = 196$, 9–12 years), with appraisal, coping styles and emotion regulation measured at a single time point. In a previous study, we identified five frustration and four anxiety emotion regulation profiles based on children's physiological, behavioral and self-reported reactions to emotion eliciting tasks. In this study, preadolescents' self-reported appraisal and coping styles were associated with those emotion regulation profiles. Overall, findings revealed that children who were more effective at regulating their emotions during the emotion-eliciting tasks had higher levels of positive appraisal and active coping when dealing with their own problems. Conversely, children who regulated their emotions less effectively had higher levels of threat appraisal and avoidant coping.

Keywords

emotion regulation; appraisal; coping; preadolescents

A critical task for child researchers is to identify factors that predict the development of emotion regulation during preadolescence (Zeman, Cassano, Perry-Parrish, & Stegall, 2006), in part, because emotion regulation is an important basis for the emergence of affective and behavioral disorders during adolescence (Cole & Hall, 2008). Two factors that may shape how children regulate their emotions are the manner in which children generally appraise and cope with their problems. Children who are able to view stressful situations or life problems as something they can learn from or overcome and who are able to actively deal with these situations should be able to apply these approaches during an emotionally provoking situation, and therefore, be better able to regulate their emotions effectively. Despite the theoretical soundness of this statement, there is a surprising lack of research testing the relations between appraisal, coping and emotion regulation. Further, there is essentially no research examining these associations during the preadolescent period. Therefore, our research seeks to uncover associations of appraisal and coping strategies with children's regulation of emotions in frustrating and anxiety evoking contexts.

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Stressful events are determined in part by the individual's appraisal of the event as 'taxing or exceeding his or her resources and endangering his or her well-being' (Lazarus & Folkman, 1984, p. 19). Lazarus and Folkman proposed two appraisal processes. Primary appraisal involves the evaluation of consequences of the event, that is, either the harm or benefit of the event. It includes evaluations of risk to one's self-esteem, values or goals, or to the well being of a loved one (Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). A determining factor of response to a stressor is the appraisal of the situation as a threat or a challenge (Lazarus & Folkman, 1984). Threat refers to the anticipation of harm in the future. In contrast, challenge is the appraisal that, although stressful, the event can result in some positive outcome, that is, the potential for gain or growth. In secondary appraisal, the individual evaluates whether anything can be done to overcome or prevent harm or to improve the prospects for benefit. Secondary appraisal involves the appraisal of coping options, the potential effectiveness of coping options, and the individual's sense of efficacy in coping with the stressor (Folkman, Lazarus, Gruen, & DeLongis, 1986; Lazarus & Folkman, 1984). Thus, when an individual believes he or she lacks the resources or skills to cope with an event, the event may be perceived as stressful.

Coping is another important aspect of an individual's stress response and has been defined as the "cognitive and behavioral efforts to manage demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141). Appraisal and coping overlap in that both contain cognitive processes, yet coping is distinct from the appraisal process in other ways. Although coping efforts have been categorized in a variety of ways, within the current study, we categorize coping strategies to include those efforts that are active attempts to deal with the stressor, such as positive reappraisal and problem solving, or avoidance of the stressor, including escape or cognitive repression (e.g., Ayers, Sandler, West, & Roosa, 1996; Compas, 1998; Ebata, & Moos, 1991; Rudolph, Dennig, & Weisz, 1995).

Before moving on to discuss emotion regulation, we first must acknowledge that the conceptual distinction between coping and emotion regulation is not always clear (Watson & Sinha, 2008). The challenge with distinguishing these constructs arises when examining emotion regulation strategies as opposed to the question of whether an emotion response was regulated or not. In the latter case, physiological responses, emotional behaviors, or reports of having an emotional response can be assessed independently of the efforts employed to manage these responses. However, overlap between emotion regulation and coping is greatest when emotion regulation *strategies* are being measured. For instance, there are a host of studies that assess emotion regulation strategies that are nearly identical to coping strategies, such as positive reappraisal (Garber, Braafladt, & Weiss, 1995; Shipman & Zeman, 2001; Zeman, Shipman, & Suveg, 2002). In fact, some studies measuring emotion regulation strategies have made use of questionnaires originally devised for measuring coping, with modifications to the timing of the child's reporting and to what the child was asked to report about (i.e., how they respond to a particular emotion after it occurs rather than reporting what they do when they have problems; Silk, Steinberg, & Morris, 2003). Although by altering the timing and target (problem versus negative emotion) about which participants responded these authors shifted the measurement from coping to emotion regulation strategies, use of the same questionnaire to assess coping and emotion regulation hints at how similar the constructs are.

Perhaps the greatest conceptual overlap lies in the constructs of *emotion-focused coping* and strategies of *emotion regulation*, as each is defined as efforts to manage or modulate negative emotions (Losoya, Eisenberg, & Fabes, 1998). In fact, both often include efforts to appraise a situation in a manner that reduces negative emotional arousal. In John and Gross' (2009) attempt to articulate the differences between coping and emotion regulation, they

suggest that coping differs from emotion regulation in that coping involves more than regulating emotions. Coping also includes further analysis or reappraisal of the problem and problem-solving aimed at changing a situation or a behavioral response rather than just the emotional response. Another dimension along which coping is thought to differ from emotion regulation is that it specifically refers to an individual's response to stressful situations as opposed to emotion-eliciting situations more generally (John & Gross, 2007). Related to this, coping is thought to involve the management of negative emotions aroused in stressful situations, whereas emotion regulation can involve regulation of both positive and negative emotions (Gross, 1998). Therefore, to more clearly distinguish appraisal, coping and emotion regulation in this study, we assessed appraisal and coping as children's reportedly typical response to problems or stressful situations they had recently encountered, whereas emotion regulation was assessed as children's physiological, behavioral, and self-reported reactions to emotion-eliciting situations, thus distinguishing the constructs along two key dimensions: strategies vs. patterns of emotional response and response to self-identified stressors vs. response to emotion-eliciting situations.

Given the conceptual overlap, it is not surprising that studies of coping and emotion regulation strategies produce similar results regarding strategies that emerge as being adaptive or effective. Typically, avoidance and denial of either an emotion or a problem are associated with poorer psychological outcomes, whereas active, approach-orientation and acceptance of emotions or problems are associated with better psychological outcomes (Compas, Connor, Saltzman, Thomsen, & Wadsworth, 1999; Wadsworth & Compas, 2002).

Clarifying the relation of appraisal and coping styles to emotion regulation might enhance our understanding of the conceptual and functional relations among these constructs. Towards our aim of examining the associations of appraisal and coping with emotion regulation, we assessed appraisal and coping styles and emotion regulation using distinct methods.

Measuring emotion and emotion regulation during preadolescence

Studying emotion and emotion regulation in the preadolescent period poses several unique challenges while also permitting new facets of emotion to be assessed. One challenge inherent to studying emotions and emotion regulation during the preadolescent period is that during this developmental period children have increasingly sophisticated means of hiding or masking emotions in accordance with social norms. As such, observational assessment of emotion becomes difficult (Zeman, Klimes-Dougan, Cassano, & Adrian, 2007). Therefore, measuring different emotion indicators during this developmental period becomes imperative.

Measuring emotion regulation

We used guidelines set forth by Cole, Martin and Dennis (2004) in a Special Issue of *Child Development* (March/April 2004) to conceptualize emotion regulation. A core concern raised about the measurement of emotion regulation was that there must be evidence of regulation, and not just emotion responses occurring to infer whether the individual was regulating or not. To address this, Cole et al. (2004) suggest implementing procedures intended to elicit a particular emotion. Accordingly, we utilized anxiety- and frustration-eliciting tasks that each had a specific goal, so individual differences in regulation could be assessed. During these paradigms, children's physiological, behavioral, and subjective emotional responses were collected (see Methods section and Appendix A for detailed information). The use of multiple indicators allowed for a comprehensive assessment of emotion regulation (e.g., a person reported feeling frustrated but did not display frustrated behaviors; a person demonstrated a physiological response but did not report feeling

frustrated). Discrepancies in responses across systems, where one or two emotion indicators were elevated and others not, would be taken as indication of a *regulated emotional response*. Low responses on all three modalities would indicate that there was little responsiveness or the child was *well-regulated*. In most instances, minimal observable expression of emotional responding was conceptualized as regulation when either self-report or the physiological responding demonstrated the child had above average endorsement or responding.

Person-oriented methods were used, specifically latent profile analysis (LPA; Muthén, 2001), that captured profiles of emotion responses and regulation. For the frustration-eliciting task, 5 frustration regulation profiles emerged (see Figure 1), and we will briefly describe the profiles here (for more details, see Zalewski et al., in press). Frustration regulation profile 1 was characterized by being lower than the sample mean on observed frustration, having a slight increase in heart rate, and lower levels of child reported frustration as compared to other children. This profile might be considered a *low-responsive* or *well regulated group*. Profile 2 was characterized by lower observed frustration, a moderate increase in heart rate, and higher levels of child-reported frustration. This profile might reflect children who were *responsive but regulated*. Profile 3 was characterized by children observed as being more frustrated, having a moderately increased heart rate, and higher child-reported frustration. This profile might be considered a *moderately responsive* group. Profile 4 was characterized as having the highest levels compared to the sample mean on all three variables and was considered an *unregulated-response* group. Profile 5 was characterized by more observed frustration, average increased heart rate, and less self-reported frustration. This profile might reflect a *moderately responsive-expressive* group.

For the anxiety-eliciting task, 4 profiles emerged. Profile 1 was characterized by lower observed anxiety, large decreases in electrodermal responding, and moderate levels of child report of anxiety as compared to other children. This profile might reflect children who were *response regulated*. Profile 2 was characterized by lower observed anxiety, minimal change in electrodermal response, and lower reported anxiety and may reflect children who were *low responsive* or *well-regulated*. Profile 3 was characterized by greater observed anxiety, a small decrease in electrodermal response, and slightly higher than average levels of subjective anxiety, possibly reflecting children who were *responsive but regulated*. Profile 4 was characterized by higher levels of observed anxiety, increases in electrodermal response, and slightly higher levels of subjective anxiety. This profile might reflect children who had an *unregulated response*. Labels are provided in Figure 1.

With LPA, each individual receives an estimate of the probability of being a member of each profile. These probabilities can be linked to other variables that might predict or result from the particular styles of regulation. Further information for how to evaluate the LPAs is provided in the methods section below. Using probabilities, we were able to examine how appraisal and coping styles were related to emotion regulation profiles. Specifically, in this study, we examined the relation of appraisal and coping styles to frustration- and anxiety-eliciting task responses. The two hypotheses were:

- (1) *Appraisal and emotion regulation profiles.* We expected that positive appraisal styles would be associated with a greater likelihood of a low responsive or response regulated profile in response to the emotion-eliciting tasks. In contrast, we expected that threat appraisal styles would be associated with a greater likelihood of demonstrating an unregulated profile.
- (2) *Coping and emotion regulation profiles.* We expected that active coping styles would be associated with a greater likelihood of demonstrating a low responsive or response regulated

profile. In contrast, we expected that avoidant coping styles would be associated with a greater likelihood of demonstrating an unregulated profile.

This study advances the measurements of emotion and emotion regulation by demonstrating the utility of examining emotion regulation profiles in relation to preadolescents reported typical responses to stressful events. Profiles of physiological, behavioral, and self-reported responses to emotion-eliciting tasks uncover patterns of emotion regulation responses that might reflect children's deployment of appraisal and coping strategies. By utilizing distinct definitions and methods of assessment of appraisal, coping and, emotion regulation, we are able to draw more robust conclusions about the relations among these constructs.

Method

Participants

The participants used in the current study were part of a larger, longitudinal study that included 214 children in 4th – 6th grade (Time 2 of 3 assessments in the larger study) and their mothers. Participants were recruited through children's public school classrooms. Schools were selected to represent the range of sociodemographic characteristics of the urban area surrounding our Northwest university. Children with developmental disabilities and families not fluent in English were excluded from the study to ensure that questionnaires were understood fully. LPAs were conducted using the Time 2 emotion eliciting tasks because these were more consistent with emotion eliciting paradigms used in other studies (Cobham, Dadds, & Spence, 1999; Inderbitzen-Nolan et al., 2007; Dennis et al., 2009). Time 1 and Time 3 data were not used in this study. At Time 2, 196 families participated. Full Information Maximum Likelihood Estimation, that uses all available data, was used to account for missing data when there were data available on at least one emotion indicator. Therefore, all profile analyses were conducted with 196 cases.

For the sample of 196 cases, children's mean age at Time 2 was 10.5 years ($SD = 1.0$, range 9–13). The sample included 72 % European American or White children, 14% African American children, 6% children identified with multiple ethnic backgrounds, 3% Latino or Hispanic children, 3% Native American, and 2% Asian American children. Fifty-six percent of the children were female. Ninety-four percent of the female primary caregivers were biological mothers, 4% were adoptive mothers, and 2% were grandmothers. Seventy percent of children lived in households with two caregivers. Annual family income was distributed roughly evenly across sextiles of income: 11% less than \$20,000; 11.4% \$21,000 to \$40,000; 17.1% \$41,000 to \$60,000; 16.7% \$61,000 to \$80,000; 19% \$81,000 to \$100,000, and 15.7% over \$100,000. Mothers' average level of educational attainment was some college or technical/professional school.

Procedure

Data were collected using structured 2.5-hour interviews and tasks. After confidentiality was explained, mothers signed informed consent forms and children signed assent forms. The children were informed that their responses would not be shared with their mothers unless there was concern about child safety. Mothers and children were interviewed individually to ensure confidentiality of responses. Child tasks followed the individual interviews and were videotaped and coded at a later time. Families received \$50 for participating.

Measures

Appraisal styles—Threat appraisal style was measured using the 24-item 'What I Felt Scale' (Sheets, Sandler, & West, 1996). The scale assesses 6 aspects of threat perceptions, including negative self-evaluation, negative evaluation by others, rejection, criticism of

others, harm to others, and loss, each assessed with 4 items. For this study, children were prompted to think about their three 'biggest problems' during the previous month. Then children provided a single rating of how much they tended to think each thought when faced with those problems (0 = not at all to 3 = most of the time). To address missing item responses, scores were the mean-weighted sum of the 24 items (i.e., if <20% of the items were missing, scores were the mean of the non-missing items multiplied by the total possible number of items on the scale) with $\alpha = .88$.

Positive appraisal style was assessed using a measure of challenge and resource appraisals similar to the 'What I Felt Scale' (Lengua & Long, 2002). Seven items assessed challenge appraisals (e.g., 'You thought you would be able to figure the problem out'), and 6 items assessed resource appraisals (e.g., 'You thought about the people/things in your life that could help with the problem'). Children rated how much they thought each thought when faced with the same 3 'biggest problems' above (0= not at all to 3= most of the time). Scores were the mean-weighted sum of the 13 items. All study means, standard deviations, and alphas are reported in Table 1.

Coping styles—Coping styles were assessed using the Children's Coping Strategies Checklist (Ayers et al., 1996). Children rated how often they tended to use each coping behavior for the same 3 'biggest problems' noted above (0=not at all to 3= most of the time). Two categories of coping dimensions were assessed. Active coping dimensions included cognitive decision making (thinking about choices and solutions, planning), control (thinking about the aspects of the situation one can control), direct problem solving (changing the problem situation or environment), positive cognitive restructuring (rethinking the situation in a more positive way), optimism (thinking about the situation working out), and seeking understanding (finding meaning in the situation). Avoidant coping dimensions included cognitive avoidance (efforts to avoid thinking about the problem) and avoidant actions (behavioral efforts to avoid the problem situation). Scores were the mean weighted sum of the items on each dimension.

Emotion regulation—As stated in the introduction, emotion regulation during the preadolescent period can be challenging to measure. Although useful principles have been set forth for how to optimally study emotion regulation, no gold standard measurement exists, particularly outside the scope of questionnaire measures during the preadolescent period. Interestingly, observational measures of emotions used in studies of preadolescents have tended to utilize relational contexts, such as parent-child discussions, parent-child conflict discussions, and peer provocation tasks (Klimes-Dougan & Zeman, 2007). Few studies with preadolescents use emotion-eliciting tasks involving just the individual, which is more common in research with infants and young children. In the current study, we sought to measure the regulation of two emotions, anxiety and frustration, using individual vs. relational tasks.

Emotion regulation was assessed as children's responses to two emotion-eliciting tasks, a speech task and a bead-sorting task. When devising the tasks, the aim was to create a task that tapped the function of each emotion. The anxiety task was created to tap threat of social-evaluation or judgment. The frustration task was constructed such that a goal was blocked, as has been done with other similar tasks, such as a locked box. However, given that preadolescents most likely would not succumb to this experimental deception, the task was modified to be believable to this age group. Despite the topographical differences between the locked box and the bead sorting task used in the current study, the function of these tasks are parallel. Emotion regulation was assessed as the profile of response across children's physiological, behavioral, and self-rated responses as reported in a previous

manuscript (Zalewski, et al., *in press*). In addition, details of how these responses were assessed are included in Appendix A.

Latent Profile Analysis

The LPAs used here were identified in a previous publication (Zalewski et al., 2010). However, more information on how to evaluate LPAs is provided here. LPA differs from other traditional person-oriented methods, such as cluster analysis, in that it is model-based and has more rigorous criteria for identifying the number of profiles or clusters (Pastor, Barron, & Miller, 2007). Table 2 provides data on how the final profiles were selected. Specifically, information criterion statistics were used to determine class number including Bayesian information criterion (BIC; Schwarz, 1978), Adjusted Bayesian Information Criterion (Adjusted BIC; Sclove, 1987) and Akaike Information Criterion (AIC; Akaike, 1973). Entropy is reported as further evidence for our profile selection with values approaching 1 suggesting superior class identification (Celeux & Soromenho, 1996).

Analytic Plan

Correlations were examined among the study variables. Each participant receives a probability value for the likelihood of his or her inclusion in each profile (i.e., .00 very unlikely to belong to the profile to 1.0 very likely to belong to the profile). These probabilities for each child belonging to each profile were correlated with the measures of appraisal and coping.

Results

Correlations among study variables

Table 3 reports the correlations among the appraisal and coping variables. Appraisal and coping dimensions were moderately correlated with each other, indicating their potential to operate uniquely in relation to emotion regulation. Table 4 reports the correlations among the appraisal and coping variables with the emotion indicators. Appraisal and coping were minimally correlated with the emotion responses themselves, suggesting that a profile approach might be a useful way of understanding emotion regulation. In addition, the profiles were correlated with gender and age. Associations were minimal and therefore not considered.

Anxiety Regulation Profiles, Appraisal and Coping

The LPA probabilities of anxiety regulation profile membership were correlated with appraisal and coping styles (Table 5). Several significant associations emerged. Again, positive appraisals and active coping were hypothesized to be associated with low responsive and regulated responsive emotion regulation styles. Threat appraisals and avoidant coping were hypothesized to be associated with unregulated responsive emotion regulation styles. The *low responsive* profile (Profile 2), was associated with higher levels of viewing problems as a challenge, $r = .26, p < 0.05$, whereas the *response regulated* profile (Profile 3) was associated with lower levels of viewing problems as a challenge, $r = -.28, p < 0.05$. The *response regulated* (Profile 3) was associated with lower levels of viewing themselves as having resources to deal with a stressor, $r = -.16, p < 0.05$. The *unregulated responsive* profile (Profile 4) was associated with higher levels of negatively evaluating others as well as themselves, $r = .16$ and $r = .15, p < 0.05$, respectively.

For coping styles, children who were *response regulated*, in which children had lower electrodermal responding and observed anxiety but appeared slightly more anxious than other children, (Profile 1) were associated with higher levels of positive cognitive restructuring, $r = .15, p < 0.05$. The *low responsive* profile (Profile 2), was associated with

higher levels of positive cognitive restructuring, $r = .16, p < 0.05$. However, the *response regulated* profile, in which children responded slightly greater than average on all three emotion indicators (Profile 3), was associated with lower levels of positive cognitive restructuring, $r = -.16, p < 0.05$. The *low responsive* profile (Profile 2), was associated with higher levels of direct problem solving, $r = -.15, p < 0.05$ and the *response regulated* profile (Profile 3) had lower levels of direct problem solving, $r = -.16, p < 0.05$. Finally, the *low responsive* (Profile 2) was associated with a higher level of an optimistic coping style, $r = .17, p < 0.05$ and the *response regulated* profile (Profile 3), was associated with lower levels of an optimistic coping style $r = -.23, p < 0.05$.

Frustration Regulation Profiles, Appraisal and Coping

LPA probabilities of frustration regulation profile membership were correlated with appraisal and coping styles to identify styles that may contribute to particular emotion regulation profiles (Table 5). The *unregulated response* to the frustration eliciting task (Profile 4), was associated with an appraisal style in which they negatively evaluated others, $r = .16, p < 0.05$. The *moderately responsive expressive* profile (Profile 5) was associated with lower levels of negatively evaluating others, $r = -.20, p < 0.05$. The *moderately responsive expressive* profile was associated with lower levels of the appraisal of being rejected from others during, $r = -.14, p < 0.05$. There were no significant relations of coping styles to the frustration regulation profiles.

Discussion

Understanding how behaviorally and cognitively anchored appraisal and coping styles may relate to emotion regulation has important implications for theory and applied work. Although theory states that positive appraisals and active coping shapes effective emotion regulation, there is little empirical data in the preadolescent period to actually support these claims. Complicating this line of research further is the overlapping conceptualizations of appraisal and coping with emotion regulation. The current study aimed to advance the understanding of how coping and appraisal strategies relate to emotion regulation profiles in preadolescent children by conceptualizing and assessing these constructs distinctly.

In the current study, we examined the relations of appraisal and coping with preadolescent children's emotion regulation. To do this, we used previously identified emotion regulation profiles created using behavioral, physiological, and subjective indicators of emotions in response to emotion eliciting tasks, and examined whether self-reported appraisal and coping styles in response to stressors correlated with children's profile of responses to emotion eliciting situations. Indeed, how children tended to appraise and cope with stressful life events provided insights into how they responded to emotion-eliciting situations, facilitating conceptual links among appraisal, coping and emotion regulation. Current theories that subscribe to a functionalist view of emotions point to these conceptual relations, reminding us that emotions serve to alert an individual to respond to their environment rapidly and set the stage for a set of action ready behaviors (Dennis et al., 2009). However, such empirical tests delineating the relation of emotion, appraisal and coping in a preadolescent sample are scarce. An important contribution of this study is that emotion regulation was measured using distinct methods from those used to measure appraisal and coping, facilitating our ability to draw inferences about the relations among these constructs independent of method variance.

The relations of the appraisal and coping strategies to the frustration and anxiety regulation profiles that emerged offered information about what strategies children might be employing when they are regulating their emotions more or less effectively. Hypotheses that positive appraisals and active coping would be related to well regulated profiles and that threat

appraisals and avoidant coping would be related to unregulated profiles were substantially supported. However, there were no significant associations between the coping strategies and the frustration emotion regulation profiles.

Anxiety regulation, appraisal and coping

Children who demonstrated little emotional responding to the emotion-eliciting situations (Anxiety Profile 2 - "low responsive") reported higher levels of challenge appraisals, positive cognitive restructuring, problem-solving, and optimism when facing their self-identified biggest problems over the past month. These are the appraisal and coping styles most often associated with positive adaptation in the face of stress, and in this study, also potentially facilitated children remaining calm and unflustered by the emotion-eliciting situations. In contrast, children who demonstrated emotional responses, although with an indication of regulation given elevations in some but not all indicators of emotion (Anxiety Profile 3 - "response regulated") reported lower challenge and resource appraisals, and lower positive cognitive restructuring, problem-solving, and optimism coping. These children might have experienced the emotion-eliciting situations as more arousing given that they approached the situation with less positive appraisals, but regulated their arousal given their tendency to use more active efforts to manage challenges. These two profiles represented most of the participants ($n = 172/196$, or 88%), demonstrating that in a community sample, these are common responses.

In contrast, a sizable minority of youth ($n = 21/196$, or 11%) who were characterized as having an "unregulated response" (Anxiety Profile 4) reported higher negative evaluations of self and others, and had higher levels of a repressive coping style. The two anxiety profiles categorized as "regulated" could be best differentiated by the children's ratings of challenge appraisals; children in profile 2 had higher challenge ratings than those in profile 3. When assessing the profiles, children in Profile 2 regulated the observed expression of anxiety more effectively compared to children in Profile 3. These differences may suggest that appraising a stressor as a challenge contributes to children's regulation of emotion expression. Another prominent difference was the apparent links to so-called active coping styles (e.g., problem-solving). In contrast, children in the profile characterized by unregulated emotional responding (i.e., profile 4) had higher levels of avoidant coping responses (repression) and negative evaluations of self and others. This result is consistent with findings from a study conducted by Eisenberg and colleagues (1998) that found school aged children who were shy often used more avoidant coping strategies. These authors also point out that shyness is typically associated with moderate to high emotional intensity, as was similar to children in anxiety regulation Profile 4, the unregulated style.

Frustration Regulation

Children in frustration regulation profile 2 ('unregulated responsive') had higher levels of negative evaluations of others. Children in profile 5 ('moderately responsive-expressive') had lower levels of feeling rejected and negative evaluations of others. Children who were unregulated during the frustration-eliciting task had higher levels of negative evaluations of others when experiencing their biggest problems. These children may be more likely to attribute hostile intentions to ambiguous situations and believe that aggressive actions may help them achieve their goals (Dodge, 1991). It is possible that these children may have viewed the experimenter's mistakes in the bead task as having hostile intent. With such an interpersonal cognitive style, it is not surprising then that these unregulated children were also found to be higher in conduct problems at a later time point (Zalewski et al., in press). Conversely, children who exhibited a moderately-responsive expressive style had higher levels of negative evaluation of others or viewing situations as involving rejection. It is interesting to note, though, that similar to the unregulated children, both profiles were

observed to be frustrated. However, the moderately-responsive children did not report feeling angry and had a lower physiological reaction compared to other children. This may suggest that the moderately-responsive children, although they demonstrated some frustration, did not necessarily view or perceive the experimenter as threatening to them. In fact, this may suggest that being able to demonstrate frustration, without taking the challenge as a personal threat, may be an adaptive approach to frustrating situations.

There were fewer significant associations of appraisal and coping with the frustration regulation profiles than the anxiety regulation. Although it possible that the frustration paradigm did not serve to elicit the intended emotion as effectively as the anxiety task, this is unlikely, as the frustration regulation profiles were related to measures of temperament and adjustment as reported in another study using the same emotion regulation profiles (Zalewski, et al., in press). With that said, as stated earlier in this paper, observational assessments of frustration during the preadolescent period are typically measured in the context of peer provocation tasks (Hubbard et al., 2005) or parent-child conflict tasks (Gentzler, Contreras-Grau, Kerns, & Weimer, 2005). Perhaps measuring frustration in a more interpersonal context would have led to more associations between coping and frustration regulation. Another option for the lack of associations between frustration regulation and coping is possible. It may be that other unmeasured coping dimensions, such as expressing feelings or distracting actions, would be related to frustration regulation. These dimensions were not included due to the broader study concerns. However, these two coping dimensions may have been more relevant to the topic of frustration regulation. For instance, the moderately expressive-responsive profile may have been associated with the expressing feelings (allowing overt expression of emotion) that some children may have found effective in the past.

It is striking that one pattern of association of appraisal and coping styles with emotion regulation profiles emerged across both emotion-eliciting tasks. In both the anxiety and frustration regulation profiles, negative appraisal styles, such as the negative evaluation of others, were associated with unregulated profiles. Although speculative, negatively evaluating others when appraising a situation, which in the case of the emotion eliciting tasks, may have been directed at the experimenters who were actively involved in both tasks, may have led these children to have more pronounced emotional responses across all the emotion systems assessed.

Also speculative but worth noting is how the emotion regulation profiles and their associations with coping and appraisal appear to be consistent within a functionalist perspective of emotions. Izard and colleagues (2001) discuss the function of each emotion within a functionalist frame of emotion theory. Frustration or anger serves the function of mobilizing and sustaining goal-directed behavior and is associated with appraisal processes such as the appraisal that one is being treated unfairly (Kuppens et al., 2007). Anxiety or fear function to communicate that there is a threat and therefore, is associated with avoidance behaviors (Izard et al., 2001). Interestingly, the unregulated profiles were associated with appraisals that are commonly associated with either frustration or anxiety. Specifically, the unregulated frustration profile was associated with higher levels of negative evaluation of others, perhaps supporting that frustration is associated with appraisal processes of being treated unfairly. The unregulated anxiety profile was associated with higher levels of negative evaluation of self, perhaps communicating the perceived threatening nature of the task to the individual during the speech. Individuals who are better able to regulate their emotions are likely to have more flexibility in regards to emotion-behavior links and as our study suggests, regulated individuals were less likely to exhibit behaviors functionally related to their emotions. Future studies should examine how coping and appraisal processes predict the regulated or unregulated expression of discrete emotions.

Limitations

Caution should be used when drawing conclusions about what if any strategies or appraisals children used during the emotion eliciting tasks to assist them in managing their emotions. Even if a child had a particular style of coping or appraisal, we do not know that they were using particular strategies while engaged in the frustration and anxiety eliciting tasks. Unfortunately, we did not assess the strategies children used during the tasks. In addition, it is likely that children used forms of emotion regulation when reporting on their coping of their 'biggest problems.' As much as we attempted to disentangle the constructs of emotion regulation and coping, give the conceptual overlap, it must be acknowledged that the measurement tools used for each construct inherently share elements of the other. Also, the data are all from a single time point so we are unable to assess whether coping and appraisal predict emotion regulation. In addition, we are cautious about drawing conclusions with the anxiety profile that had only 3 members. However, when we examined either 3-class or 5-class solutions, a similar profile with few members continued to emerge (reported in Zalewski, et al., 2010). Therefore, we chose to maintain 4-class solution, and the information criterion statistics supported this.

Conclusions

Few studies have examined the relation of appraisal and coping to emotion regulation, despite the potential for conceptual links between them. The findings of this study suggest that children's appraisal and coping styles might play a role in their responses to emotion-evoking situations, as well as stressful events. These findings provide empirical support in a preadolescent sample for how a functional perspective on emotions relates to coping. A functionalist perspective on emotions posits that emotions serve an adaptive purpose and that adaptive coping is facilitated by individuals being able to accurately access their emotions (Cole, Martin, & Dennis, 2004). Overall, greater use of positive appraisals and active coping predicted children who were able to regulate more effectively during emotionally evoking situations. Conversely, greater use of threat appraisals and avoidant coping predicted children who were more likely to be unregulated. It appears that the strategies that children employ to get through stressful events are also relevant when they are faced with emotionally charged situations, and understanding the links among appraisals, coping and emotion regulation will advance our understanding of how children develop emotional and behavioral problems.

Applications

With increasing attention given to understanding behavioral and cognitive strategies to facilitate emotion regulation in clinical and intervention settings, children can be taught to appraise difficult events and to cope with them using empirically supported coping strategies may help them more successfully regulate their emotions. With adults, cognitive behavioral approaches that emphasize the regulation of emotions, such as Dialectical Behavior Therapy (Linehan, 1993) have been clinically examining how emotion regulation is facilitated by or inhibits effective appraisal and coping processes. More empirical tests will serve to inform therapeutic approaches that combine emotion, cognition and behavior.

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Appendix A: Emotion Task Descriptions

Context: Anxiety-provoking

Task: Speech Task

Description: For this task, children were asked to give a speech to an unfamiliar experimenter (experimenter who had been working with the parent). Children were told that the experimenter was an expert speaker and that they child's speech would be evaluated by this experimenter. To add to the intensity of the experience, children were instructed to speak in to a microphone and were told they were being videotaped. Children were instructed to speak for 2 minutes about their favorite subject in school. If they did not speak for the 2 minute period, up to three prompts were provided.

Physiology of Anxiety

Electrodermal response reactivity (EDR) has been used to measure anxiety (Beauchaine, 2005). EDR was measured with two sensors placed on the distal finger of the middle and pointer finger. EDR was sampled at 1000Hz. Positive scores indicate increasing slopes and negative scores indicate decreasing slopes. Greater absolute values indicate greater changes from the start to finish of the bead sorting.

Subjective Reports of Anxiety

After the speech, children were asked to report on a scale of 1(none), 2 (a little), 3 (some), and 4 (a lot) how much they experienced these four emotions:

1. Frustration/anger M = 1.52
2. Nervous/anxious M = 2.27
3. Happy M = 2.49
4. Shy/embarrassed M = 2.11

Observation of anxiety

Physical/Bodily Signs

- Shifting in seat
- Twitching/nervous movements

Facial Expressions

- Gaze aversion
- Widening eyes

Frustrated vocalizations to him/her self

- Cracking voice
- Shaking or trembling voice

Scoring

Intensity and frequency of these behaviors were scored. A global score was calculated that ranged from 0 (none at all), 1 (mild/typical), 2, (moderate/some), and 3 (high/a lot). Reliability: 10% of tasks recoded. Intraclass correlations = .83.

Context: Frustration provoking

Task: Bead Sorting

Description: The experimenter instructed the child to sort beads based on a set of instructions (i.e. colors, numbers). Children were told if they sorted beads in less than 2 minutes, they would receive \$1. Thirty seconds into the sorting, the experimenter told the child they had mistakenly been given the wrong sorting directions. Children were told that the timer would not be restarted as. The experimenter interrupted the child again after another 30 seconds, restating a similar mix-up with directions and rule about not starting the timer over. *All children were given the \$1 at the end of the task.

Physiology

Heart rate reactivity (HRR) is a non-specific indicator of arousal (Bernston, Cacioppo & Fieldstone, 1996) and has been used in studies measuring hostility and frustration (Panee & Ballard, 2006). Changes in HRR was measured. HRR was measured by attaching a photoelectric plethysmograph (Biopac Systems Inc. Santa Barbara, CA) to the distal finger of the child's ring finger. HR was sampled at 500Hz. Similar to EDR, for HR, positive scores indicate increasing slopes and negative scores indicate decreasing slopes. Greater absolute values indicate greater changes from the start to finish of the bead sorting.

Subjective Reports of Frustration

After the bead sorting but before the \$1 was given, children were asked to report on a scale of 1(none), 2 (a little), 3 (some), and 4 (a lot) how much they experienced these four emotions:

1. Frustration/anger M = 1.86
2. Nervous/anxious M = 1.88
3. Happy M = 2.22

4. Shy/embarrassed $M = 1.28$

Observational of Frustration

Four 30-second epochs were coded Physical/Bodily Signs

- Putting beads down hard
- Body/arm/hand tensing and/or stiffening
- Shrugging shoulders

Facial Expressions

- Furrowed brow
- Widened eyes
- Squinting eyes

Frustrated vocalizations to him/her self

- Sighs
- Mumbling

Frustrated vocalizations to the experimenter

- Words, phrases or questions the child posed to the experimenter indicating frustration, anger, annoyance

Scoring

Intensity and frequency of these behaviors were scored. All four epochs were summed to create a composite frustration/anger observed. This ranged from 0 (none at all), 1 (mild/typical), 2, (moderate/some), and 3 (high/a lot). Reliability: 15% of tasks recoded. Intraclass correlations = .89.

Figure 1. Standard deviations from the overall sample mean of each class for observed emotion, physiological response and child report of emotion for the (A) five-mixture model solution identified for frustration regulation and (B) four-mixture model solution identified for anxiety regulation.

Table 1

Means and Standard Deviations for Child Appraisal and Coping Styles

	M	SD	α
<i>Appraisal Styles</i>			
Challenge	7.22	3.22	.73
Resource	7.74	3.45	.75
Rejection	1.02	1.68	.70
Negative Evaluation of Others	3.58	3.60	.82
Negative Self Evaluation	2.02	2.07	.63
<i>Coping Styles</i>			
Cognitive Decision Making	6.32	2.76	.62
Positive Cognitive Restructuring	4.76	2.80	.70
Direct Problem Solving	6.67	2.88	.75
Optimism	4.85	2.39	.76
Avoidant Actions	6.03	2.71	.51
Wishful Thinking	6.20	2.94	.69
Repression	4.76	2.80	.60

Table 2

Summary of BIC and AIC measures for latent profile analyses of emotion responses to frustration and anxiety eliciting tasks

# of Classes	BIC	Adjusted BIC	AIC	Entropy
Frustration (Bead)				
Class 1	1572.02	1553.02	1552.36	--
Class 2	1543.63	1511.95	1510.85	.90
Class 3	1550.95	1506.60	1505.06	.87
Class 4	1553.52	1496.50	1494.52	.76
Class 5 ⁺	1563.07	1493.37	1490.95	.88
Anxiety (Speech)				
Class 1	1555.16	1532.99	1532.21	--
Class 2	1547.60	1512.75	1511.54	.93
Class 3	1555.16	1507.64	1505.99	.82
Class 4	1499.51	1439.33	1437.33	.95
Class 5	1524.24	1451.37	1448.84	.84

BIC= Bayesian Information Criterion; AIC= Akaike Information Criterion

⁺ Class 6 did not identify a fit

Table 3

Correlations among coping and appraisal dimensions

	Appraisal Dimensions					Coping Dimensions					
	Challenge	Resource	Rejection	Negative eval. of others	Negative eval. of self	Cog. Des. Making	Pos. Cog. Restruct.	Avoidant Action	Direct problem solving	Optimism	Wishful thinking
Appraisal											
Challenge	--	.75**	.21**	.14*	.20**	.62**	.22**	.30**	.59**	.58**	.42**
Resource	--	--	.18**	.02	.13	.56**	.27**	.26**	.41**	.55**	.42**
Rejection	--	--	--	.56**	.58**	.23**	.25**	.10	.11	-.01	.36**
Negative eval. of others	--	--	--	--	.71**	.20**	.39**	.33**	.17**	-.02	.49**
Negative eval. of self	--	--	--	--	--	.25**	.35**	.30**	.19**	.07	.49**
Coping											
Cog. Dec Making	--	--	--	--	--	--	.25**	.43**	.63**	.63**	.46**
Pos. Cog. Restruct.	--	--	--	--	--	--	--	.63**	.22**	.19**	.40**
Avoidant	--	--	--	--	--	--	--	--	.36**	.31**	.52**
Action Direct problem solving	--	--	--	--	--	--	--	--	--	.58**	.39**
Optimism	--	--	--	--	--	--	--	--	--	--	.42**

* p < .05;

** p < .01

Abbreviations: Negative eval of others = Negative evaluation of others; Negative eval. of self = Negative evaluation of self; Cog. Dec. Making = Cognitive Decision Making; Pos. Cog. Restruct. = Positive Cognitive Restructuring

Table 4

Correlations among the emotion indicators with appraisal and coping variables

	Appraisal Dimensions					Coping Dimensions					
	Challenge	Resource	Rejection	Negative eval. of others	Negative eval. of self	Cog Des Making	Pos. Cog. Restruct.	Avoidant Action	Direct problem solving	Optimism	Wishful thinking
Self report anxiety	.14	.10	.15*	.20**	.24**	.02	.21**	.17*	.03	.05	.20*
Behavioral Anxiety	-.16*	-.10	-.05	.08	.08	-.07	.12	.11	-.07	-.08	-.01
GSR slope	-.11	-.12	-.03	.03	.13	-.04	.04	-.05	-.12	-.01	-.07
Self report frustration	-.02	-.02	.07	.21**	.14*	-.01	.10	.16*	.05	-.08	.14
Behavioral frustration	.01	-.01	-.04	-.04	.00	.00	-.13	-.07	.03	.00	-.01
Heart rate slope	-.01	.03	.02	.02	.02	.04	.02	.09	.00	-.04	-.02

* p < .05;

** p < .01

Abbreviations: Negative eval of others = Negative evaluation of others; Negative eval. of self = Negative evaluation of self; Cog. Dec. Making = Cognitive Decision Making; Pos. Cog. Restruc. = Positive Cognitive Restructuring

Table 5

Correlations between emotion regulation probabilities and coping and appraisal styles

	Frustration Regulation Profiles					Anxiety Regulation Profiles			
	1	2	3	4	5	1	2	3	4
Appraisal									
Challenge	.07	-.06	.01	-.03	-.02	.09	.26*	-.28*	.02
Resource	.07	-.08	.03	-.01	-.03	.14 ^t	.13 ^t	-.16*	.01
Rejection	.06	.01	.10	.05	-.14*	.04	.05	-.06	.01
Negative eval. of others	.01	.08	.12 ^t	.16*	-.20*	.07	.01	-.12 ^t	.16*
Negative eval. of self	.03	.03	.07	.11	-.13 ^t	.11	-.05	-.07	.15*
Coping									
Cog. Dec Making	.06	-.05	-.01	-.06	.00	.04	.12 ^t	-.13 ^t	.01
Pos. Cog. Restruc.	.04	-.03	-.03	.03	-.02	.15*	.16*	-.16*	-.04
Direct problem solving	-.02	-.01	.08	-.03	.00	.04	.15*	-.16*	.00
Optimism	.04	-.03	-.06	-.14 ^t	.07	.06	.17*	-.23*	.08
Avoidant	.01	.09	.12 ^t	.01	-.14 ^t	.01	-.03	-.07	.16
Action									
Wishful thinking	.05	.04	.07	.06	-.14 ^t	.14 ^t	.05	-.14 ^t	.09
Repression	.04	.07	.05	-.01	-.11	.02	-.03	-.07	.16*

[^] Numbers in parentheses are the N's in each profile.

* $p < .05$;

$t = < .10$

Frustration regulation profile 1 = Low response or well-regulated; 2 = Response regulated; 3 = Moderately responsive; 4 = Unregulated responsive; 5 = Moderately responsive-expressive; Anxiety regulation profile 1 = Response regulated; 2 = Low responsive or well-regulated; 3 = Response regulated; 4 = Unregulated responsive