Laboratory and Self-Report Methods To Assess Reappraisal and Distraction in Youth

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Abstract

Objective: Coping and emotion regulation are central features of risk and resilience in childhood and adolescence but research on these constructs has relied on different methods of assessment. The current study aimed to bridge the gap between questionnaire and experimental methods of measuring secondary control coping strategies, specifically distraction and cognitive reappraisal, and examine associations with symptoms of anxiety and depression in youth.

Method: A community sample of 70 youth (ages 9–15) completed a novel experimental coping and emotion regulation paradigm and self-report measures of coping and emotion regulation and symptoms.

Results: Findings indicate that use of distraction and reappraisal during the laboratory paradigm was associated with lower levels of negative emotion during the task. Youth emotion ratings while implementing distraction, but not reappraisal, during the laboratory task were associated with youth self-reported use of secondary control coping in response to family stress. Youth symptoms of anxiety and depression were also significantly positively associated with negative emotion ratings during the laboratory task, and both laboratory task and self-reported coping and emotion regulation accounted for significant variance in symptoms in youth.

Conclusions.—Both questionnaire and laboratory methods to assess coping and emotion regulation in youth are important for understanding these processes as possible mechanisms of risk and resilience and continued integration of these methods is a priority for future research.

Exposure to acute stressful events and chronic adversity is a significant risk factor for psychopathology in youth (Evans, Li, & Whipple, 2013; Grant et al., 2003). However, there are large individual differences in the effects of stress, as some individuals develop symptoms of psychopathology while others do not. How youth cope with and regulate emotions in response to stress is a central feature for understanding individual differences in risk and resilience childhood and adolescence (Compas et al., 2017). Coping research has largely relied on questionnaire measures to obtain youth self-report and parent report of these processes, while emotion regulation research has expanded to include both questionnaire and laboratory based measurement (Belden et al., 2014; Ochsner et al., 2002, 2004). The current study aims to build upon previous research in coping and emotion

regulation by examining the convergence of self-report and laboratory methods to measure coping and emotion regulation in youth. In addition, the current study aims to explore associations between coping and emotion regulation with symptoms of anxiety and depression in youth utilizing self-report and laboratory methods.

Coping and emotion regulation can be defined as a set of conscious, controlled processes that aim to regulate emotions, thoughts, behaviors, and physiological responses in the face of stressors (Compas et al., 2017). The present study focused specifically on secondary control coping strategies, which include acceptance, cognitive reappraisal, positive thinking, and distraction (Connor-Smith et al., 2000). Secondary control coping encompasses those efforts that are intended to reduce stress by adapting to the source of stress, rather than directly acting upon or changing the stressor (Compas et al., 2001; Weisz et al., 1994). As such, secondary control coping strategies are considered most useful in response to stressors that are out of one's direct control, including some aspects of family stress (Compas et al., 2010). A large body of research supports the association between questionnaire measures of coping and emotion regulation and symptoms of psychopathology in children and adolescents (see Compas et al., 2017 for a review). More specifically, self- and parent-report measures of secondary control coping have demonstrated consistent significant negative associations with internalizing symptoms in youth (Compas et al., 2017), suggesting greater use of reappraisal, acceptance, and distraction is associated with lower levels of anxiety and depression. In addition, the specific strategies that encompass secondary control coping are a common target of interventions to prevent and treat internalizing psychopathology in youth (e.g., Compas et al., 2010; Garber et al., 2009; Tein et al., 2006). Thus, understanding this possible mechanism of prevention and treatment of internalizing psychopathology in youth is an important area of research in risk and resilience.

In a parallel line of research, laboratory paradigms have been developed in order to assess these strategies in real time, in which participants are presented with emotionally evocative stimuli in order to assess how participants regulate the experience of negative emotions in real time (Ochsner et al., 2002). These paradigms have largely been designed to assess specific strategies such as cognitive reappraisal, suppression, or distraction. Paradigms typically display negative stimuli, including images from the International Affective Pictures System (IAPS; Lang, Bradley, & Cuthbert, 2008) or film clips that are intended to evoke negative emotion, and participants are asked to either attend to the stimulus or use a regulation strategy in response to stimuli (e.g., reappraise the image; Goldin et al., 2008; McRae et al., 2008, 2009; Ochsner et al., 2002, 2004). Participants rate their negative emotion following each stimulus presentation to assess whether participants are able to modulate their negative affect by utilizing the specific strategy (Ochsner et al., 2002).

In a salient example of this research, McRae et al. (2008) examined these processes using 90 neutral or negative images from the IAPS and found that adults reported lower levels of negative affect during a reappraise compared to react condition when viewing negative images. McRae et al. (2009) found adult females demonstrated lower negative affect when using reappraisal compared to both distraction and react conditions while viewing emotional images from the IAPS. Notably, the distraction condition used in this study was a working memory task (i.e., keep a string of 6 letters in your mind), rather than distraction by thinking

about something more positive (McRae et al., 2009). In a modified paradigm using film clips designed to elicit disgust rather than static images, Goldin et al. (2008) found adults reported lower levels of negative affect during a reappraisal condition compared to both react and suppression (i.e., suppress the expression of negative emotion while viewing the images) conditions. Taken together, studies with healthy adult samples consistently indicate that laboratory paradigms can elicit negative emotions in adults in real time, and when instructed to use reappraisal or distraction strategies, adults report lower levels of negative emotion while viewing stimuli. In addition, these studies have consistently found that participants exhibit greater prefrontal activation (e.g., dorsolateral prefrontal cortex) and lower activation in emotion regions of the brain (e.g., amygdala) during coping and emotion regulation trials (Goldin et al., 2008; McRae et al., 2008, 2009; Ochsner et al., 2002, 2004).

A smaller number of studies have examined similar laboratory emotion regulation paradigms in samples of children and adolescents. In a study comparing adolescents and young adults, participants viewed negative images from the IAPS and were instructed to either decrease negative affect (i.e., reappraise) or attend (i.e., react) in response to the image (McRae et al., 2012). Results showed a significant association between reappraisal success (i.e., reduction in negative affect) and age, such that older participants reported significantly less negative affect during reappraisal trials compared to adolescents (McRae et al., 2012). In a study using a younger sample, children ages 4 to 10 years old viewed negative and neutral images from the IAPS and were instructed to attend, increase their emotion, or decrease their emotion while looking at the pictures (Dougherty et al., 2015). Children reported significantly lower negative affect in the decrease condition (i.e., positive appraisal) compared to both the increase condition (i.e., negative appraisal) and attend trials when viewing negative stimuli. Importantly, however, with one exception, none of these studies in youth or adults have examined whether coping and emotion regulation in the laboratory paradigm is associated with participants' self-reported use of these skills in daily life. Belden et al. (2014) tested a similar emotion regulation paradigm in youth ages 8 to 12 years old who were instructed to react to or reappraise sad and neutral images from the IAPS. Youth reported lower levels of negative affect in response to reappraisal instructions compared to react instructions. Further, this study examined whether affective rating scores during the laboratory task were associated with self-reported positive refocusing as measured by the Cognitive Emotion Regulation Questionnaire for Kids (CERQ-K; Garnefski et al., 2007). Notably, affective ratings during reappraisal trials were not significantly correlated with self-reported positive refocusing on the CERQ-K (Belden et al., 2014). The lack of an association between self-reports of emotion regulation strategies and emotional responses in the laboratory paradigm may be due in part to differences in the stimuli that were the focus of these two methods.

Taken together, evidence suggests that negative emotion can be reduced when youth are instructed to use secondary control coping strategies, specifically distraction and reappraisal, in response to negative valence images. However, studies in both adults and youth have used largely non-specific emotional stimuli to elicit negative emotions (e.g., general negative images from the IAPS), rather than stimuli that may be directly relevant to stress experienced in their daily lives. Further, as noted by Compas et al. (2017), studies have not provided evidence for the convergence of laboratory and questionnaire methods to assess

these constructs. The current study aims to extend findings from previous studies by examining the associations between a laboratory-based coping and emotion regulation paradigm and a widely used self-report measure of coping and emotion regulation in youth. The current study builds upon previous research in a number of ways: (1) by modifying previous paradigms to use images that depict family stress, particularly parental distress displayed as parental anger or sadness and (2) examining links between how youth report coping with real-life situations and youth's ability to enact coping and emotion regulation responses in the laboratory setting. The use of stimuli in the laboratory that may mirror images of parental distress experienced in their daily lives, rather than general images from the IAPS, allows for a better understanding of how youth cope with real life stressors and may inform interventions to target at-risk youth and families.

Further, although there is strong evidence for associations among self-reported coping and emotion regulation and internalizing psychopathology in youth (Compas et al., 2017), studies utilizing laboratory methods have largely not explored associations with symptoms in youth. A small number of studies have examined differences in task performance between clinical and non-clinical groups. These studies suggest that there are no differences in emotion ratings during the task as a function of group, but there may be differences in neural activation in clinical populations as compared to non-clinical populations (Belden et al., 2015; Goldin et al., 2009; Smoski et al., 2013). However, these differences are still not well understood, and further research in is needed in order to better understand whether differences do exist and whether these differences are meaningful indicators of risk for or the presence of emotional or behavioral difficulties. Importantly, research utilizing these paradigms have not examined whether indices of task performance during laboratory coping and emotion regulation paradigms are associated with symptoms of anxiety and/or depression in youth samples.

The current study examined the convergence of self-report and laboratory methods to assess secondary control coping in youth and associations with internalizing symptoms. To replicate and extend findings from previous studies in youth using similar paradigms, the following hypotheses were tested: (1) Youth will report significantly *greater* negative emotion during each of three conditions in the laboratory task with emotional images (i.e., reappraise, distract, and react-negative conditions) compared to a condition with neutral images. (2) Youth will report significantly *lower* negative emotion in the reappraisal and distraction conditions compared to the react-negative condition. In addition, in order to build upon previous research and assess whether self-report and laboratory methods converge, we hypothesized: (3) Youth self-reported secondary control coping will be significantly *negatively* associated with emotion ratings in the reappraise and distract conditions of the laboratory task.

Lastly, we examined associations between secondary control coping and youth symptoms of anxiety and depression. Based on prior studies supporting significant associations between self-reported secondary control coping and internalizing psychopathology (Compas et al., 2017), the following hypotheses were tested: (4) Youth self-reported secondary control coping will be significantly *negatively* associated with youth symptoms of anxiety and depression. (5) Youth emotion ratings during reappraise and distract conditions of the

laboratory task will be significantly *positively* associated with youth symptoms of anxiety and depression. (6) Youth self-reported secondary control coping and mean negative emotion ratings during reappraisal and distract conditions of the task will significantly independently predict youth symptoms of anxiety and depression.

Method

Participants

The sample included 70 youth ages 9 to 15 years old (M = 12.24, SD = 1.83; 52.9% female) recruited from a metropolitan area in the southeastern United States. The sample of youth was 69.1% Euro-American, 20.0% African American, 4.4% Asian, and 5.9% identified as more than one race. The sample of youth was predominantly non-Hispanic (88.6%). Participant grade level ranged from 4th to 10th grade; mean grade level was 6th grade.

The final study sample was drawn from a sample of 170 families that initially expressed interest in participating in the study. Potential participants filled out a brief survey on-line to indicate study interest and were contacted by study staff within one week of survey completion. Of the 170 families that completed the on-line study interest survey, 88 families completed a phone screen and were eligible for study participation, 3 families completed a phone screen and were not eligible for study participation, 16 families scheduled phone screens but did not answer despite repeated attempts to contact, and 63 were non-responsive to attempts to contact to schedule the phone screen or filled out the interest survey twice and were already screened for the study previously. Of the 88 eligible families, 70 completed the study, 10 declined to participate, and 8 were non-responsive to contact attempts to schedule.

Procedure

Participants were invited to take part in a study designed to better understand how youth cope with stress in the family. Participants were recruited between June 2016 and July 2017 through a variety of sources, including emails to a university employee list serve and other university web-based methods of advertising research studies. Interested participants were screened via phone prior to study enrollment for exclusion based on prior diagnoses of substance abuse, schizophrenia, bipolar disorder, and intellectual disability. Prior to the lab visit, children completed a battery of measures through RedCap about stress, coping, and psychopathology (see Measures below).

During the lab visit, youth completed the laboratory coping and emotion regulation task. While completing the task, participants also underwent a brain scan using functional Near Infrared Spectroscopy and a measure of cognitive functioning during the lab visit (these data are not reported here). The University Institutional Review Board approved all procedures. Parents provided consent for participation in the study, and youth provided assent for participation in the study. Parents accompanied youth to the laboratory visit and families were compensated $40 in total for the assessment ($10 for the parent, $30 for the child).

Measures

Coping and emotion regulation.—Children completed the family stress version of the Responses to Stress Questionnaire (RSQ; Connor-Smith et al., 2000; Wadsworth & Compas, 2002), a questionnaire measure of youth family stress and how youth cope with and regulate their emotions in response to this stress. The RSQ includes 12 items assessing stress associated with family stress and 57 items assessing how often the youth engaged in or enacted specific coping responses in response to family stress in the past 6 months. The RSQ provides scores for three coping and emotion regulation scales (i.e., primary control, secondary control, and disengagement coping), and two stress reactivity scales (i.e., involuntary engagement and involuntary disengagement). A five-factor model of the ways in which youth cope with and regulation emotions in response to stress has been established and supported by confirmatory factor analyses across diverse samples of adolescents reporting on a wide range of stressors (Benson et al., 2011; Compas et al., 2006; Connor-Smith et al., 2000; Wadsworth et al., 2004; Yao et al., 2010). The RSQ has demonstrated excellent reliability and validity (Connor-Smith et al. 2000). Notably, the RSQ has also demonstrated associations with laboratory and biological measures, including glycemic control (Jaser et al., 2012) and heart rate responses during a stress task (Connor-Smith et al., 2000; Dufton, Dunn, Slosky, & Compas, 2011).

Analyses in the present study focused on youth self-reports of secondary control coping in response to family stress. As noted above, the secondary control coping scale includes items that assess the use of acceptance, positive thinking, cognitive reappraisal, and distraction as coping and emotion regulation strategies.

Laboratory paradigm.—Youth completed a laboratory assessment of coping and emotion regulation that was designed to depict stress in the family stress associated with parental stress and depression, including parental displays of sadness and irritability. These images differed from previous similar paradigms in that the goal was to select images depicting emotions and scenarios that youth are likely to encounter in the home. Previous studies have relied on images known to evoke strong negative emotion, but not images specific to stress experienced in participants' lives, while the images selected for the current task were selected to mirror stress youth experience when their parents or caregivers are distressed. In order to identify images for the paradigm, an extensive Internet search process was conducted to identify images that depict stressors associated with parental sadness, irritability, and marital discord using the Google Image search engine. In addition, a search was conducted for a diverse sample of images with regard to parental race and ethnicity to match the expected enrollment based on census data from the region from which the sample was drawn. In total, over 200 images were initially identified displaying parental sadness, irritability/anger, or marital discord.

To determine if the stimuli depicted negative emotions and evoked negative emotions upon viewing, pilot data were collected from 40 university undergraduate students through a protocol rating images of parental sadness, anger, and marital discord, as well as images of adults displaying happy or neutral facial expressions. Undergraduates rated images on two levels: (1) the degree to which participants felt negative emotions upon viewing the image

and (2) the degree to which participants thought the image displayed negative emotion. Ratings were on a Likert scale from 1 (none) to 5 (a lot). Pilot ratings made by undergraduates regarding the degree to which the image displayed negative emotion were used to select the images included in the final task. Images with average ratings of 3 or higher on the degree to which the image evoked overall negative affect in the participant were considered for inclusion in the task. Seventy-five images met this criterion, and from the original images, 45 images (15 sad, 15 mad, and 15 marital discord) were selected. As a manipulation check, no images depicting happy faces were scored on average a 3 or higher during the image selection phase. However, images depicting neutral faces were variable in the degree to which they evoked negative emotions in the participants. Therefore, a separate set of neutral images of common household objects was selected from the IAPS (e.g., a spoon, desk, lamp) for use in the task. In order to minimize the length of the task and optimize the amount of time participants will view the images during the task, the final task includes 30 images depicting parental negative emotions (15 sad and 15 mad) found through the methods described above and 10 neutral images selected from the IAPS. Images related to marital discord were not included in the final version of the task.

The final version of the task instructed youth to view images of adults that look sad or mad and rate their own negative emotion after each image was presented. Presentation of stimuli and collection of responses was controlled by EPrime 2.0 (Schneider et al., 2012). Youth were asked to imagine that the adult in the image was their parent, and that their parent was feeling sad or mad. Modeled after prior studies using similar tasks (Belden et al., 2014; McRae et al., 2012) the task included four conditions: three conditions (reappraisal, distraction, and react-negative; see Figure 1) included images of adults displaying emotions and one condition (react-neutral) included neutral pictures. In the reappraisal condition, youth were instructed to reappraise the image to make it *less* negative or *more* positive (e.g., think, "My mom is just having bad day, she won't be sad forever," when viewing the image). Participants saw the words "Make Positive" on the screen for 1 second prior to the stimulus presentation to remind youth to use reappraisal while viewing the image. In the distraction condition, youth were instructed to think about something *else* that makes them feel good instead of the image to make it *less* negative (e.g., think about the last time they went on a vacation with their family when viewing the image). Participants saw the words, "Distract Yourself" on the screen prior to stimulus presentation to remind youth to use distraction while viewing the image. In the react conditions (react-negative and react-neutral), youth were instructed to look at the image as they normally would and the words, "Just Look" were presented prior to the stimulus presentation.

The task included three levels of randomization: (1) order of condition (reappraisal, distraction, react-negative, react-neutral), (2) order of presentation of blocks of sad vs. mad images in the three negative image conditions, and (3) specific images presented within each condition. All youth completed the four task conditions (reappraisal, distraction, react-negative, react-neutral) and were presented with a total of 40 images (i.e., 10 images presented in each of four conditions) drawing from 15 images of adults appearing sad, 15 images of adults appearing mad, and 10 images of neutral objects.

In each condition, instructions were presented on the computer screen and read aloud to participants by the examiner. After instructions for a specific condition were presented, a practice image was presented for 10 seconds. After the practice image was presented, the examiner asked the youth what they were thinking while viewing the image and recorded youth responses on paper. In the reappraisal and distraction conditions, youth were given feedback about their reappraisal or distraction thought; the goal of this feedback was to praise participants for correctly using the specified strategy or to help them understand how to use distraction or reappraisal. Feedback was limited to prompting the child to make a reappraisal or identify a distraction thought up to 2 times following the practice image. Within each condition, after the practice was completed, youth saw a series of 10 images (5 sad and 5 mad); the task instruction (i.e., Make Positive, Distract Yourself, Just Look) was presented for 1 second followed by the image presentation for 10 seconds. After each image, youth rated their negative emotion on a scale from 1 (not at all negative) to 5 (very negative). This was repeated for each of the 10 images within each condition. In total, the task was approximately 25–30 minutes in length. Mean negative emotion ratings during each of the four conditions of the task (reappraisal, distraction, react-negative, react-neutral) were used in analyses. In addition, mean negative emotion ratings during the trials with sad images and mad images were calculated separately within each condition and used in analyses.

Symptoms of anxiety and depression.—Youth completed the Screen for Child Anxiety Related Disorders (SCARED; Birmaher et al., 1999) to assess symptoms of anxiety. The SCARED is a 41-item self-report measure that captures symptoms associated with panic disorder or somatic complaints, generalized anxiety, separation anxiety, social anxiety, and school avoidance in youth in the past 3 months. Youth completed the Center for Epidemiologic Studies – Depression Scale (CES-D; Radloff, 1977) to assess symptoms of depression. The measure consists of 20 items that assess symptoms of depression in the past week. Both the SCARED and CES-D demonstrate good reliability and validity in child and adolescent samples (Hale et al., 2011; Phillips et al., 2006).

Data Analytic Approach

Proportion scores for secondary control coping were used in analyses; that is, secondary control coping was scored as a proportion of the total amount of coping endorsed. Proportion scores for secondary control coping were calculated by dividing the total score for a factor by the total score on the measure. This scoring method is used to control for response bias and individual differences in base rates of item endorsement (see Osowiecki & Compas, 1999; Vitaliano, Maiuro, Russo, & Becker, 1987) and is the most commonly used method to score the RSQ (Connor-Smith et al., 2002). In addition, total symptom scores on the CES-D and SCARED were used in analyses.

Means and standard deviations for negative emotion ratings during the four laboratory conditions were examined (Table 1). The average negative emotion rating across the 10 images presented within a single condition was examined. Paired-samples *t*-tests were examined to determine whether emotion ratings differed as a function of task condition. Comparisons between overall emotion ratings by instruction condition (i.e., distraction vs.

reappraisal) were conducted. In addition, means and standard deviations for youth self-report measures of coping and emotion regulation and symptoms were examined.

Bivariate correlations among negative emotion ratings during the laboratory task, secondary control coping in response to family stress, and anxiety and depressive symptoms are presented in Table 2. Linear regression analyses were conducted to examine whether self-reported secondary control coping, and mean emotion ratings when using secondary control coping skills during the task (i.e., mean emotion rating across distraction and reappraisal trials) were significant predictors of symptoms of anxiety and depression in youth (see Table 3). In addition, there were no significant differences in levels of symptoms, negative emotion ratings, or self-reported secondary control coping by age or gender in the current sample. Therefore, age and gender were not included as covariates in the present study analyses.

Results

Descriptive Statistics

Mean levels of youth symptoms are presented in Table 1. Youth symptoms of anxiety ($M =$ 20.04, SD = 11.48) and depression ($M =$ 11.17, $SD =$ 7.87) were in the normative range; seventeen youth (35%) scored above the clinical cutoff (SCARED total score   25) for anxiety and 12 youth (25%) scored above the clinical cutoff (CES-D total score   16) for depression.

Emotion ratings.—Mean negative emotion ratings during the laboratory paradigm and paired-samples t-tests comparing mean negative emotion ratings are presented in Table 1. Paired-samples t-tests indicate that on average youth reported higher levels of negative emotion during the react-negative condition ($M =$ 2.84) as compared to the react-neutral condition ($M =$ 1.24), $t(69) =$ 14.13, $p <$ .001) (Hypothesis 1). This indicates youth experienced higher levels of negative emotion when viewing images of parental distress compared to neutral images.

Comparisons between conditions with emotional stimuli indicate that youth reported lower negative emotion on average when instructed to use secondary control coping strategies compared to react to the stimuli. Specifically, youth average emotion ratings during the reappraisal condition ($M =$ 2.26; $SD =$ .82) were significantly lower than emotion ratings during the react-negative condition ($M =$ 2.84; SD = .80), $t(69) =$ −5.31, $p <$ .001). Similarly, average emotion ratings during the distraction condition ($M =$ 2.13; SD = .98) were significantly lower than during the react-negative condition ($M =$ 2.84; SD = .80), $t(69) =$ −6.26, $p <$ .001) (Hypothesis 2). Average emotion ratings were not significantly different for reappraisal and distraction conditions, $t(69) =$ 1.33, $p =$ .19.

Correlational Analyses

Bivariate correlations were conducted to examine associations between emotion ratings among task conditions (see Table 3). Average emotion ratings during distraction and reappraisal trials were significantly positively correlated ($r =$ .59, $p <$ .001). Further, average emotion ratings during distraction and reappraisal trials were also both positively correlated with emotion ratings during the react-negative trials ($r =$ .47 and .51, respectively, $p <$ .001).

Lastly, average emotion ratings during the reappraisal and distraction trials were not significantly correlated with emotion ratings during the react-neutral trials.

Secondary control coping: Self-report and task ratings.—As hypothesized, youth secondary control coping reported on the RSQ was significantly negatively correlated with the average negative emotion rating during distraction trials ($r = -.28$, $p = .02$). That is, higher reports of the use of secondary control coping strategies in response to family stress were associated with lower levels of negative emotion during trials in which youth were instructed to use distraction in the laboratory task (Hypothesis 3). However, contrary to hypotheses, secondary control coping was not significantly correlated with the average emotion rating during reappraisal trials. Secondary control coping was also not significantly correlated with emotion ratings during react-negative or react-neutral trials (Hypothesis 3).

Symptoms of anxiety and depression and secondary control coping: Self-report and task ratings.—Youth symptoms of anxiety on the SCARED were significantly negatively correlated with self-reported secondary control coping on the RSQ ($r = -.50$, $p < .001$), such that higher levels of anxiety symptoms were associated with less self-reported use of secondary control coping strategies in response to family stress (Hypothesis 4). Youth anxiety symptoms were significantly positively correlated with negative emotion ratings during distraction trials ($r = .44$, $p - .002$), but not reappraisal trials ($r = .25$, $p = .08$). That is, higher levels of youth anxiety symptoms were associated with higher negative emotions when using distraction during the laboratory task (Hypothesis 5).

In support of hypotheses, youth symptoms of depression on the CES-D were also significantly negatively correlated with self-reported secondary control coping on the RSQ ($r = -.40$, $p = .005$); higher levels of depressive symptoms were associated with less use of secondary control coping per youth report (Hypothesis 4). In addition, youth depressive symptoms were significantly positively correlated with youth negative emotion ratings during reappraise trials ($r = .35$, $p = .02$), but not distraction trials ($r = .27$, $p = .06$). Findings indicate higher levels of youth depressive symptoms were associated with higher negative emotions when using reappraisal during the laboratory task (Hypothesis 5).

Multivariate analyses.—Linear regression analyses were conducted to assess whether secondary control coping and mean emotion ratings during distraction and reappraise trials of the laboratory task significantly predicted youth symptoms of anxiety or depression. Both youth self-reported secondary control coping on the RSQ ($\beta = -.42$, $p = .002$) and negative emotion during distraction and reappraisal trials ($\beta = .28$, $p = .037$) were significant independent predictors of youth symptoms of anxiety. That is, higher levels of self-reported secondary control coping and lower mean levels of negative emotion during distraction and reappraisal trials during the laboratory task predicted lower levels of youth anxiety symptoms (Hypothesis 6).

When youth depressive symptoms were used as the dependent variable in analyses, only secondary control coping reported on the RSQ was a significant independent predictor of youth depressive symptoms ($\beta = -.33$, $p = .02$). Youth mean negative emotion ratings during distraction and reappraisal trials did not independently predict youth depressive symptoms

($\beta = .26$, $p = .07$), although findings approached significance in the expected direction (Hypothesis 6).

Discussion

A large body of research has demonstrated significant associations between questionnaire reports of child and adolescent coping and emotion regulation and symptoms of internalizing and externalizing psychopathology (Compas et al., 2017). Laboratory paradigms assessing the use of specific coping and emotion regulation strategies are important both for examining individuals' ability to use strategies in the moment to reduce negative emotion and how these abilities are linked to their reports of the use of these strategies in their daily lives. The current study employed a new laboratory coping and emotion regulation task designed to capture children and adolescents' responses to emotional distress in adults. In addition, the current study aimed to link the laboratory task to a self-report measure of coping and emotion regulation that was a direct parallel to the images presented during the task in order to understand how laboratory methods may relate to coping and emotion regulation in daily life. The current study provides additional data on the convergent validity of self-report measures of coping and emotion regulation in youth and may strengthen our clinical understanding of the ways in which youth cope and regulate emotions in response to stress.

First, the current findings demonstrate that a laboratory paradigm designed to depict parental distress was able to elicit general negative emotion in youth. As hypothesized, youth reported higher levels of negative affect in response to images depicting parental distress compared to neutral images. Further, the paradigm demonstrated that youth are capable of regulating negative emotion when instructed to use specific regulation strategies. Youth reported lower levels of negative emotion when instructed to use reappraisal or distraction while viewing emotional images as compared to instructions to attend or react to the images presented. Further, as hypothesized and consistent with prior studies comparing distraction and reappraisal (McRae et al., 2009), there were no differences in self-reported negative emotion when using distraction compared to reappraisal in response to emotional stimuli. These findings are consistent with prior research in adult samples (Ochsner et al. 2002, Drabant et al., 2009) and child and adolescent samples (Dougherty et al., 2015; McRae et al., 2012), suggesting that across development, individuals are able to modulate their negative emotion in real time using cognitive reappraisal or distraction in the face of relevant emotional stimuli.

It is noteworthy that many studies of adults and children and adolescents have included practice or teaching sessions in which participants learn how to use reappraisal or distraction or participants are instructed on specifically how to think about the images differently (i.e., "think the picture is not real" or "keep a string of letters in your mind") (Dougherty et al., 2015; McRae et al., 2012; Ochsner et al., 2004). However, in the present study relatively minimal instruction was provided to participants with regard to the use of either distraction or reappraisal. Youth were not provided with an explicit reappraisal or distraction technique to use during the paradigm, but rather were expected to generate their own reappraisal and distraction thoughts for each image presented. Therefore, youth may have tried to generate a

new reappraisal or distraction thought for each of the 10 images presented during the two conditions, or youth may have employed the same reappraisal or distraction thought for each image. The quality of youth's reappraisal or distraction thoughts was not captured, and as such, youth's use of these skills may have varied greatly between participants. Further, there may be demand characteristics associated with the paradigm design, particularly during reappraisal, in that youth are instructed to "make positive" and as a result, may be influenced to rate reduced negative emotion during this condition.

The current study is the one of the first to examine whether a laboratory paradigm that was designed to parallel a questionnaire measure of coping and emotion regulation would demonstrate associations to the questionnaire method. In partial support of hypotheses, mean emotion ratings during the distraction trials, but not reappraisal trials, of the task were significantly correlated with self-reported secondary control coping on a self-report measure. Notably, the secondary control coping factor on the RSQ encompasses distraction *and* reappraisal, as well as acceptance, which was not included in the laboratory paradigm (Connor-Smith et al., 2001). Given that both reappraisal and distraction were associated with lower levels of negative emotion during the laboratory paradigm, both strategies are arguably effective regulation strategies for youth in the presence of stressful stimuli. However, it is possible that youth in the current sample used distraction more frequently in their daily lives when managing stress in the family, and therefore the regulation of emotions in real time using distraction may be more closely related to their daily experience. It is also possible that cognitive reappraisal is a more complex strategy than distraction and therefore harder to generate in the moment in the laboratory. Further, youths' coping in their naturalistic environment may differ from prompted coping in a laboratory setting in important ways; in naturalistic situations, youths may be more likely to use coping strategies flexibly within a given stressor, whereas youths are encouraged to utilize one specific strategy during each condition of the paradigm. Assessment of the specific ways youth are engaging in distraction and reappraisal during the laboratory paradigm may be beneficial in future research to better understand associations with questionnaire methods.

Emotion ratings during the reappraisal or distraction conditions of the laboratory paradigm were also significantly correlated with self-reported anxiety and depression symptoms in youth. Higher levels of anxiety and depression were correlated with higher emotion ratings when using secondary control coping strategies in response to images of parental distress. However, emotion ratings during the task were a significant predictor of anxiety, but not depressive symptoms, in regression analyses. Coping flexibility, or the ability to use strategies to manage stress variably, has been linked to positive psychological adjustment (Cheng, Lau, Chan, & Man-Pui, 2014). Notably, the laboratory paradigm constrains coping flexibility but instructing youth to engage in one specific strategy at a time. Bivariate analyses, however, suggest the presence of high levels of symptoms may impact the ability to effectively use strategies to manage emotional distress in the moment. Given that this is the first study in youth to examine associations between the task and symptoms, replication of these results are needed to determine whether associations are specific to anxiety verses depression. It is notable that in a preventive intervention for children of depressed parents, changes in secondary control coping accounted for intervention effects on youth internalizing symptoms (Compas et al., 2010). As such, targeting coping and emotion

regulation skills may be particularly relevant for youth prior to the onset of clinically significant internalizing symptoms.

The current study has a number of strengths. First, the current study employed multiple methods to examine the use of secondary control coping in youth in response to family stress. Second, the current study expanded on previous coping and emotion regulation laboratory paradigms in important ways. The images used in the paradigm depict specifically the experience of seeing a parent distressed, which is representative of some forms of family stress. Previous studies have utilized images that are effective in evoking negative emotion, but have rarely selected images that are directly relevant to daily stressful experiences of participants (see Goldin et al., 2014, for an exception). While general negative stimuli such as those included in the IAPS may offer the opportunity to examine the relative use of regulation strategies in the laboratory, it is difficult to draw parallels to how these strategies are important in the face of stressors that lead to negative emotion in daily life. In order to continue to understand how momentary regulation of emotion are associated with individuals' real life experiences with stress and emotions, the selection of relevant stimuli is important. Third, the current study used a questionnaire measure of youth coping and emotion regulation that paralleled the laboratory task and specifically assessed how youth respond to stress in the family (RSQ-Family Stress Version; Wadsworth & Compas, 2002).

One important limitation is that the study only examined cross-sectional associations between laboratory and questionnaire reports of coping and emotion regulation; future research examining longitudinal associations among these methods and key study constructs will be important. Second, findings suggest that in addition to longitudinal analyses of how processes of coping and emotion regulation change over time, examining these processes in the context of intervention studies may be particularly important. For example, Goldin et al. (2014) found changes in responses to a laboratory paradigm assessing social evaluative threat in a sample of socially anxious adults undergoing CBT treatment. In addition, the task in the current study was designed for an at-risk sample, specifically for youth experiencing high levels of family stress and parental distress; the current sample, though experiencing moderate levels of family stress, was not an at-risk sample of youth. Further, full diagnostic assessments were not conducted to fully capture the extent of psychopathology in the current sample. Therefore, associations between self-reported coping and emotion regulation, laboratory responses to the coping and emotion regulation paradigm, and symptoms of anxiety and depression may be different in a higher risk population and will be an important area of future research. In addition, data were not obtained with regard to socioeconomic status in the current sample, and this may be an important variable to consider in future analyses in order to better understand covariates or moderators of coping and emotion regulation in youth.

Taken together, findings suggest that youth are capable of utilizing distraction and reappraisal strategies to regulate negative affect in response to images of parental distress in a controllable laboratory setting. In addition, behavioral measures of a laboratory coping and emotion regulation paradigm show preliminary associations with self-report methods, indicating that there may be some benefit to assessing these processes using multiple

methodologies. The study results strengthen the validity of studies using self-reports of coping and emotion regulation, and therefore strengthen the clinical implications of the use of these measures. The current findings also underscore the potential importance of cognitive reappraisal and distraction as strategies that are associated with lower symptoms of anxiety and depression in youth, and highlight the importance of examining these strategies as in the context of interventions designed to target internalizing problems. Further research is needed to better understand the development and use of coping and emotion regulation skills across childhood and adolescence, as well as how these skills may act as a mechanism of risk or resilience during development. More specifically, future research will benefit from examining other potential correlates of coping and emotion regulation in the context of laboratory paradigms, including neurobiological and physiological measurements. The convergence of laboratory and questionnaire methods to assess specific regulation skills is promising and indicates the possible clinical utility of experimental coping and emotion regulation paradigms in research.

Acknowledgments

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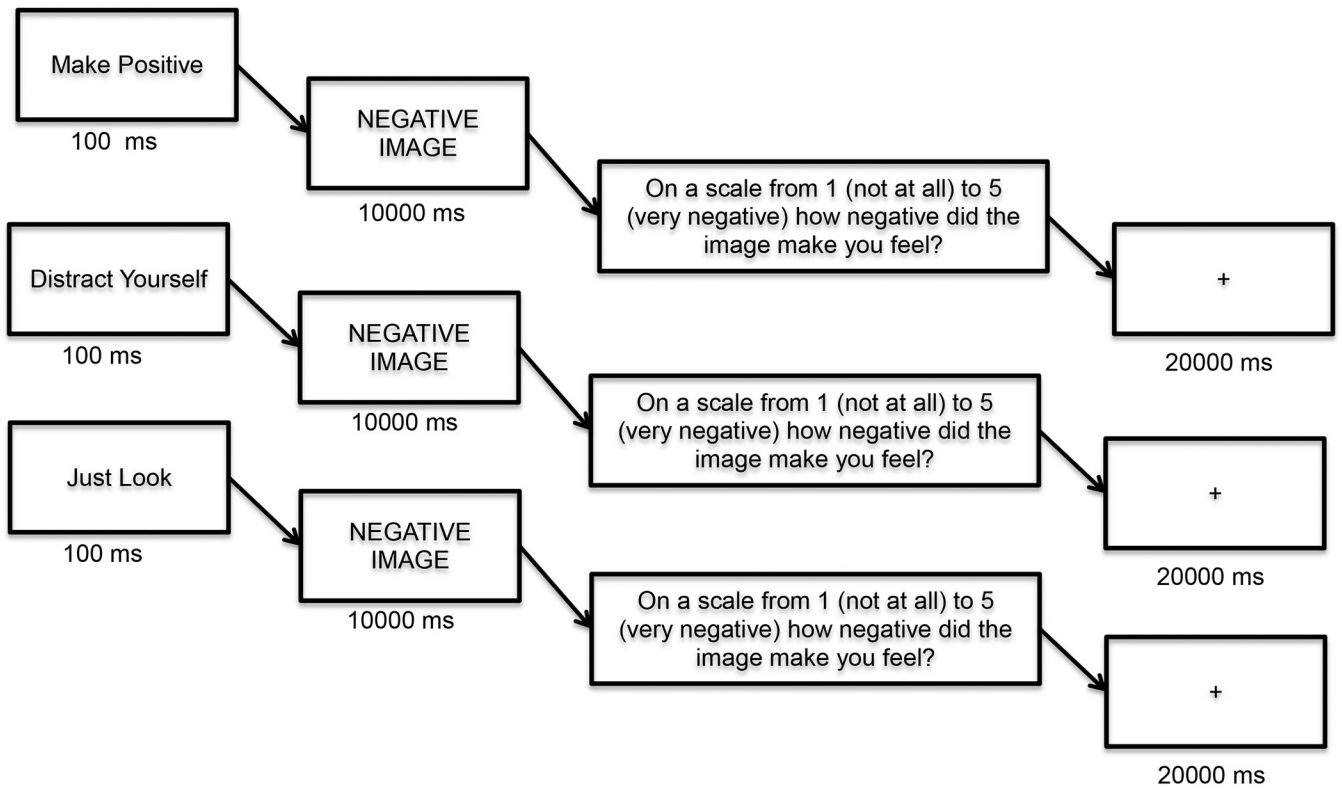
Figure 1.
The basic structure of the stimuli presented in the task for the reappraise, distraction, and react conditions.

Table 1.

Means, standard deviations, and paired samples t tests comparing mean emotion ratings between task conditions.

	Mean	Standard Deviation
Responses to Stress Questionnaire (Youth Report)		
Secondary Control Coping	.25	.05
Laboratory Task Average Emotion Ratings		
Distraction	2.13	.98
Reappraisal	2.26	.82
React – Negative	2.84	.80
React – Neutral	1.24	.40
Symptoms of Anxiety and Depression		
SCARED	20.04	11.49
CES-D	11.17	7.87
Paired samples t tests	**$t(69)$**	***p***
Reappraise vs. React	−5.31	< .001
Distract vs. React	−6.26	< .001
Reappraise vs. Distract	1.33	.19
React-Negative vs. React-Neutral	14.13	< .001

Table 2.

Bivariate correlations between measures of coping and emotion regulation, stress, and anxiety and depressive symptoms.

	1	2	3	4	5	6	7
1 RSQ SCC	--						
2. Reappraise	−.17	--					
3. Distract	−.28*	.59**	--				
4. React-Negative	−.13	.47**	.51***	--			
5. React-Neutral	−.16	.23+	−.01	.21+	--		
6. SCARED	−.50***	.25+	.44**	.26+	.33*	--	
7. CES-D	−.40**	.35*	.27+	.13	.37**	.56***	--

Note: RSQ SCC = Secondary control coping score on the Responses to Stress Questionnaire. Distract = condition during which youth were instructed to "Distract Yourself" when viewing emotional images; Reappraise = condition during which youth were instructed to "Make Positive" when viewing emotional images; React-Negative = lab task condition during which youth were instructed to "Just Look" when viewing emotional images; React-Neutral = condition during which youth were instructed to "Just Look" when viewing neutral images.

+ indicates $p < .10$,

* = $p < .05$,

** = $p < .01$,

*** = $p < .001$

Table 3.

Linear regression analyses predicting youth symptoms of anxiety and depression.

	DV: SCARED		
	β	*t*-value	*Total R²*
Regression 1			.32
Self-Reported SCC	−.42**	−3.22	
Mean Emotion Rating – SCC	.28*	2.15	
	DV: CES-D		
Regression 2			.22
Self-Reported SCC	−.33*	−2.38	
Mean Emotion Rating – SCC	.26+	1.84	

Note: Self-reported SCC = Secondary control coping proportion score on the Responses to Stress Questionnaire; Mean Emotion Rating SCC = mean emotion rating for distract and reappraise trials during the laboratory task.

+ indicates $p < .001$,

*= $p < .05$,

***= $p < .001$