Research Article

ROLE OF DEPRESSIVE SYMPTOMS IN EARLY ADOLESCENTS' ONLINE EMOTIONAL RESPONDING TO A PEER EVALUATION CHALLENGE

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Background: *Problems regulating emotions effectively (emotion dysregulation) are implicated in many psychological problems. Depression in particular has been increasingly conceptualized as a disorder of emotion regulation.* **Methods**: *This study examines the linkage between children's depressive symptoms and the activation and regulation of positive and negative affect in response to an manipulated peer evaluation outcome. Participants (N = 142) aged 10–13 played a computer contest ("Survivor") and were randomized to either a negative (i.e., receiving the lowest "likeability" score from a group of peer judges), a positive (i.e., highest score), or a neutral peer evaluation outcome. Positive and negative affect were assessed at baseline, immediately post-feedback, and after a 5 min post-feedback waiting period.* **Results**: *No linkage was observed between depressive symptoms and emotional activation in response to either success or failure feedback. Consistent with expectations, we observed a negative linkage between depressive symptoms and children's up-regulation of positive affect subsequent to receiving negative peer feedback. No such linkage was observed for the maintenance of mood improvement over time.* **Conclusions**: *Results suggest that depressive symptoms in children are not linked with deficits or excesses in the overall magnitude of emotional reactivity. However, it appears that elevated depressive symptoms interfere with the ability to swiftly transition out of negative affective states. Depression and Anxiety 26:135–146, 2009.*

Key words: *depressive symptoms; emotional activation; emotion regulation; peer evaluation manipulation; pre-adolescent children*

INTRODUCTION

Contemporary theorists have highlighted that emotions typically involve coordinated changes in distinct response systems (i.e., physiology, motor behavior, feelings, expression, and cognitive processes) that are called forth when people evaluate a situation as offering important challenges or opportunities.[1–3] Emotions are quick-moving response tendencies that prepare an individual for situationally appropriate actions that have generally proven valuable over evolutionary time.[4, 5] People often express these emotional response tendencies, but they have the capacity to modulate them, and this important ability to regulate both positive and negative emotions figures prominently in human functioning.[1, 6, 7]

Despite ambiguities in the use of the term emotion regulation (ER), many contemporary researchers

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subscribe to the view that ER refers to systematic changes (e.g., changes in intensity and/or duration) associated with *activated* emotions.[3, 8] It has been noted for long e.g.,[9] that proficiency in ER is a fundamental prerequisite for adaptive daily functioning, including feelings of general well-being, the capacity to work, and to relate to others. However, people can experience difficulties in modulating their emotions in response to contextual demands. Problems regulating emotions effectively (emotion dysregulation) is implicated in over half of the DSM-IV axis-I disorders (e.g., depression, anxiety disorders, substance abuse, and eating disorders) and in most axis-II disorders APA.[10–12]

Depression in particular has been increasingly conceptualized as a disorder of ER.[13–14] Indeed, the core emotional symptoms of depression-persistent sad mood and the diminished capacity to experience pleasure and enjoyment (i.e., anhedonia) — strongly allude to difficulties with ER. Although many theorists do not specifically address which aspects of ER are dysregulated in depression and in what ways, it is generally accepted that depression may involve dysregulation of positive affect, dysregulation of negative affect, or both.[1, 15] Moreover, depression may be linked to deficits or excesses in the overall magnitude of emotional reactivity (emotion activation), but may also involve abnormalities in the temporal course of an emotional response as it unfolds over time (ER), such as difficulty sustaining or enhancing positive affect, difficulty terminating sadness, or both.[2, 15]

During the past two decades, considerable evidence has emerged suggesting that relative to their peers school-age children higher in depression (depressive symptoms) display higher levels of distress in response to negative emotion-eliciting events, as well as greater difficulties in transitioning out of negative affective states.[16–20] For instance, when presented with hypothetical peer rejection vignettes,[17] observed that children between 10 and 13 scoring higher on depressive symptoms were more likely than their peers to rate these stressors as more emotionally distressing. Moreover, as children's level of depressive symptoms increased, they were less likely to endorse behavioral and cognitive emotion-regulation strategies typically associated with mood improvement (e.g., problem solving activity, behavioral distraction, cognitive restructuring).

In a study conducted by,[20] adolescents between 12 and 15 years retrospectively reported on their use of cognitive and behavioral emotion-regulation strategies in response to a self-identified negative emotion-eliciting experience during the hour preceding a pre-programmed beep transmitted from a wristwatch. Results revealed that adolescents displaying higher levels of depressive symptoms reported more intense negative emotions. Moreover, greater endorsement of disengagement strategies (e.g., denial) or involuntary engagement strategies (e.g., rumination) was linked to less effective regulation of negative affect (i.e., lower levels of mood improvement), and higher levels of depressive symptoms were linked to greater use of these strategies. Several authors have noted the potential pitfalls in assuming that individuals' prospectively and retrospectively reported reactions to emotion-eliciting events correspond to how they actually respond when faced with these events in vivo.[21, 22] Cognitive and behavioral reactions to online experienced feeling states are largely governed by the appraisal of current situational conditions, which are episodic, contextual, and experiential in nature.[21] Conversely, reports on appraisal of and reactions to noncurrent emotion-eliciting events are based on "semantic emotion knowledge"; i.e., situation-specific and/or general beliefs about emotions and the reactions these emotions are likely to elicit.

Numerous studies have revealed marked discrepancies between online versus noncurrent reports of emotional responding to identical or fairly similar stimuli see[21] for a review. Moreover, research has demonstrated that noncurrent reports may not capture individual differences as indexed by momentary assessments e.g.,[23, 24] For example,[24] observed marked gender differences in adults' predictions of negative emotional reactions to hypothetical vignettes, with women estimating that their emotions would be more intense than men's. In contrast, similar ratings obtained online did not vary by gender of the participant.

The existing work on the linkage between depression (depressive symptoms) and ER in school-age children is limited in several respects. First, although several researchers have asserted that negative state-relief and positive affect maintenance may represent fundamentally distinct processes e.g.,[25–26] to our knowledge no study has examined the linkage between level of depressive symptoms and potential difficulties in generating and/or maintaining increases in positive affect in real time. Second, by examining emotion regulation in response to naturally occurring as opposed to standardized emotion-eliciting event-se.g.,[20] inferences regarding the effects of depression are hindered by the confounding of person variables and the type or intensity of emotion-eliciting stressors. In this context, it should be noted that studies have shown that depressed children are more likely to generate certain stressors, interpersonal in particular, relative to nondepressed controls.[27, 28] Third, few studies have assessed the activation and the regulation of emotions independently; i.e., disentangled the effects of the impact of the emotion-eliciting event from the subsequent regulation of the evoked emotion.[8] In this study, an experimentally manipulated peer evaluation outcome served as the emotion-eliciting event. In brief, participants were led to believe that they were participating in an Internet version of the American television show "Survivor" with four same-sex contestants of comparable age from different schools in the same area (in actuality, contestants were

fictitious). They were informed that all contestants would be evaluated by a team of same-age peer judges. Participants were randomized to one of three peer feedback conditions: success, failure, or control. State mood was assessed at three separate time points—baseline, immediately postfeedback, and 5 min after receiving feedback. Changes in the intensity of subjectively experienced positive and negative affects during the 5 min postfeedback served as the index of ER.

This research was performed using a sample of early adolescents. The focus on this age range was based on several considerations. First, relative to young children and adults, few studies have investigated ER in older children or early adolescents e.g.,[29] Second, the most salient content of self-representations among children in this age range is one's social appeal and social skills/attributes that influence interactions with others.[30] Finally, in this age group approximately 50% of children's social activities involve peers,[31, 32] and peers as a reference group are of central importance in these children's lives e.g.,[33, 34]

We chose peer evaluation as the emotion provocation stimulus because evaluative feedback from peers is one of the most common emotion-eliciting events in this age range.[35] Moreover, ample evidence suggests that rejection ranks among the most aversive of human experiences and is associated with marked negative affect.[36, 37] Third, peer rejection figures prominently in the development and/or maintenance of several forms of psychopathology, including depression e.g.,[38]

In a previous study examining the short-term mood effects of several distinct ER strategies (e.g., behavioral distraction), Survivor-administered feedback was also used to experimentally manipulate changes in affective state e.g.,[18] Results showed that Survivor was successful in eliciting marked differential affective reactions as a function of feedback valence. Moreover, as recommended by,[8] the paradigm allows for distinguishing between the initial activation of emotion, subsequent changes in the activated emotion, and factors systematically associated with these changes (e.g., the naturally occurring use of different ER strategies). This study employed an adapted version of Survivor, which, in addition to the negative and neutral feedback conditions, now also included a positive feedback condition. Other studies using this paradigm have shown that children's responses to the feedback are meaningfully related to scores on widely used questionnaire measures tapping social anxiety[39] and attributional style.[40]

The overarching aim of this study was to assess the linkage between depressive symptoms in early adolescents and their emotional responding to a positive and a negative event in real time. In so doing, we also examined the role of children's peer-nominated social acceptance in the peer group. Several studies have shown that being more disliked by peers is positively associated with depression in children e.g.,[41, 42] Hence, by also examining peer acceptance we controlled for the effect of one potential confounding third variable.

The following specific research questions were addressed:

(1) Does depression influence the activation of positive and negative affects in response to peer feedback? On the basis of previous work e.g.,[17, 18, 20] we hypothesized that children reporting higher levels of depressive symptoms would display greater activation of negative affect in response to peer rejection feedback. Conversely, based on work suggesting that depressed individuals display deficits in response to positive, approach-related cues e.g.,[2] we predicted that children higher in depressive symptoms would display an attenuated rise in positive affect in response to peer success feedback.
(2) Does depression influence the short-term regulation of children's affective response after an emotion-eliciting event? On the basis of previous work suggesting that children with higher levels of depressive symptoms experience more difficulties with negative affect regulation e.g.,[16, 20] we hypothesized that children displaying higher depressive symptoms would show greater difficulty up-regulating their negative emotional reaction to negative peer feedback and would be less able to maintain their positive emotional reaction to positive peer feedback.

METHODS

SAMPLE AND PROCEDURE

Participants were 142 children (73 boys, 69 girls) enrolled in 5th and 6th grade classes from two public elementary schools in the Netherlands, who were predominantly from a middle-class SES background. The participants were predominantly Caucasian (92.9%) and ranged in age from 10 to 13 years ($M = 11.2$, $SD = 0.66$). For the initial sample of 214 children, classroom teachers sent parent permission letters home with children. Of the 165 letters returned (77.1%), 142 parents (86.1%) gave their consent for their children to participate in the study, and 23 (13.9%) declined. We also obtained verbal permission to perform the study from the principal of the school and each child's teacher. Those children who had received parental permission were explained that they were not obliged to participate, and that they were free to discontinue their participation at any time.

PROCEDURE

In the first of two sessions, approximately 1 week apart, participants were administered the Children Depression Inventory CDI,[43] in their regular classrooms during school hours. Moreover, participants' social standing in their peer group was assessed via a commonly used procedure, which asks children to indicate whom among their classmates they like most and whom they like least e.g.,[44] During administration of the measure, the classroom teacher

remained in the room. A research assistant read the directions aloud and children were encouraged to ask for help if they had questions or encountered problems completing the questionnaire. At the end of the first session, which lasted approximately 30 min, children were informed that later that week they would participate in a computer contest. The second session was carried out in a quiet room on the school grounds. Participants were told that their class was selected to take part in an Internet computer contest called "SURVIVOR". In reality, the contest was a computer program written in Visual Basic designed to present the illusion of participating online with four other children.

SURVIVOR CONTEST

On arrival, the participant was seated in front of a laptop computer equipped with a web-cam to have their photo taken. Participants were told that their picture would allow all the children participating to see what each of the other contestants looked like. Before beginning (Time 1), participants completed a baseline mood measure; i.e., the Dutch translation of the PANAS [positive and negative affect schedule].[45] To provide a credible rationale for the repeated administration of the PANAS, participants were also told that they would complete questionnaires at several time points because the designers of Survivor were curious to know how children felt while participating.

In an attempt to add both to the credibility and the attractiveness of the contest, the opening bars of the hit "Survivor" (produced by the band "Destiny's Child") were played at the start of the game. In addition, an eye-catching logo of the American TV show appeared on the computer display. The objective and rules of the contest were presented on screen. Participants were encouraged to read the information, which was pretested on comprehensibility for children in this age range, carefully at their own pace and click "continue" to progress to the next screen. Participants were informed that they would be playing against four same-sex contestants of comparable age (all of them were computerized fictitious co-players) from four different schools in the same area, and that all participants would be evaluated by a panel of judges consisting of 16 members, eight boys and eight girls. Specifically, participants were explained that each judge would give them a score between 0 and 100, with higher scores reflecting higher levels of perceived likeability.

After receiving this information, the computer displayed a screen announcing that in a moment pictures and names of all 16 judges would be presented one at a time. The children whose pictures appeared were child actors from two different modeling agencies in the Netherlands. After viewing these children, participants were directed through a series of screens in which they were asked to answer a series of questions that would give the members of the jury and the other contestants information about them. Participants responded to questions about their favorite musical group, hobbies, future occupation, things they liked and disliked about themselves, a number of character traits (e.g., sense of humor, agreeableness, intelligence, trustworthiness), how they got along with other children, and their academic performance. Most of the questions were in a multiple-choice format but some (e.g., "what is your favorite musical group?") required an open-ended response. In view of the potential risk that children would respond to personal questions in a socially desirable fashion, instructions emphasized the importance of responding to questions honestly. To further minimize response bias, most questions were worded such that the "best" or "optimal" answer was unclear (e.g., "what is your favorite leisure activity"?). Participants were informed on screen that their picture (previously taken by a web camera) along with the biographical information from their answers to the personal questions would be transmitted over the Internet and viewed by the judges who would then give them a "likeability" score ranging from 0 to 100.

Subsequent to answering all the biographical questions, participants were informed that pictures and descriptions of each of the other contestants would be presented one at a time for review. On clicking "continue", the picture of the first fictitious co-player was displayed together with his or her self-description. The latter consisted of the alleged answers to the same questions that the participant had answered earlier. To enhance credibility of the fictitious co-players, actual self-descriptions were taken from those of same-age children participating in another study. These participants gave their explicit consent to have this information viewed by other children, provided that the alleged self-description profiles would contain randomly combined personal information from at least three different children.

Participants progressed through the game examining each of the profiles at their own pace. After the participant scrutinizing the last profile, a message appeared on the screen indicating that the computer would now for each player add the judges' scores to determine which player had received the highest total score and which player had received the lowest total score. After a 5-s. waiting period, the names of the players with the highest and the lowest scores appeared in capital letters on the screen. In the *success* condition, the name of the participant was displayed as having obtained the highest total score; one randomly chosen alleged co-player's name appeared as having obtained the lowest total score. Conversely, in the *failure* condition the name of the participant was displayed as having obtained the lowest total score, while one alleged co-player's name appeared as having obtained the highest total score. In the *control* condition, the participant received neither the highest nor the lowest score.

Immediately after receiving feedback (Time 2), participants were re-administered the PANAS on the computer. Instructions emphasized the importance of rating how they felt "right now". Subsequent to completing this measure, participants responded to several probes that were designed to assess cognitive appraisals of the feedback outcome (see Measures). Next, to avoid the complexities that might result from participants taking on different activities during the subsequent waiting (ER) period (see also Discussion), participants engaged in the same behavioral activity, designed to represent the strategy of behavioral "engagement" or approach (see below). Previous work has shown that behavioral approach exerts no significant effects on short-term changes in state mood subsequent to Survivor-administered peer rejection feedback.[17, 18]

Specifically, a computer screen appeared announcing that during a 5-min viewing period participants would be offered the opportunity to obtain additional information about the judges by viewing the individual profiles of each of the judges online. Each fictitious judge profile contained personal information consisting of answers to a series of personal questions (e.g., "do you have pets?", "what do you fear most in life?", "how well do you get along with your parents?", "do you have any siblings?", "what is your favorite food?", "what are your two best character traits?", "on average, how much time per day do you spend watching TV").

On clicking "continue", an overview screen appeared containing pictures of all 16 judges, together with the scores they had allegedly given the participant. By clicking on the picture of a targeted judge, a separate screen appeared displaying the name and picture of the judge, as well as his or her profile. Participants had allegedly received high scores ($M = 80$, range 76–83) from eight judges (four boys and four girls) and low scores ($M = 40$, range 36–43) from the other eight judges (also four boys and four girls). During this viewing activity, the screen displayed a clock indicating how much time (in seconds) was

left. The time spent viewing the profiles of each of the 16 judges was recorded by a computer (in seconds). After the 5-min postfeedback waiting period (Time 3), participants were re-administered the PANAS a third time. Subsequently, a screen appeared announcing that participants would now continue with a different task in an adjacent room. On arrival, a research assistant informed participants that in actuality there was no other activity and then debriefed participants thoroughly.

DEBRIEFING

Each child was thoroughly debriefed with the aim of removing any lingering effects of the false feedback while participating in the Survivor contest. During the debriefing, the child was informed that the judges, the co-players, and the received feedback were entirely fictitious and that this deception was a necessary part of the procedure. At this point it should be noted that in previous work, more than 100 participants were assigned to receive Survivor-administered peer rejection feedback,[18] including children with elevated depressive symptoms. Interviews with all participants, both immediately postfeedback as well as at 1-week follow-up, indicated that the peer failure experience was not too emotionally upsetting. For instance, when asked, none of the participants made mention of any feelings of regret with regard to participation and none reported any objections to the procedure. Still, during the experiments a registered clinical psychologist was available if needed. Moreover, in our effort to maximize the remedy for children showing a strong emotional response to the peer rejection feedback, before being dismissed children were interviewed at length about a recent positive social experience in which they felt positive and/or were successful.

Toward the end of the debriefing, participants were encouraged to ask questions or voice their concerns. All children reported that they understood the purposes of the research, as well as the necessity of having been deceived. The credibility of the deception manipulation was also assessed during the debriefing by asking each participant whether they had believed that they were playing against other children. Without exception, participants indicated that they believed that the contest was genuine. Finally, all participants reported that before participating they had not talked with classmates about Survivor.

At the conclusion of the debriefing, participants were urged to observe complete secrecy by not talking with their classmates about Survivor until all the other children had participated. To increase adherence to this instruction, children were asked to sign a nondisclosure agreement and were then provided a choice of one of several possible small gifts for participating (e.g., a small tape recorder, a gift certificate worth about 3 dollars).

MEASURES

Positive And Negative Affect Schedule[45]. The 20-item Dutch version of the PANAS was administered to assess participants' changes in positive and negative affects. Respondents were presented a series of mood-related adjectives (e.g., distressed, ashamed) and asked to rate their current feeling state on a 5-point scale ranging from "very slightly or not at all" to "extremely". The wording was slightly modified for children. Positive affect reflects the extent to which a person feels enthusiastic, active, and alert. In contrast, negative affect is a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states, including anger, contempt, disgust, fear, and nervousness. The two mood factors have emerged as highly distinctive orthogonal dimensions in factor analytic studies of affect.[45] For both subscales, possible scores range from 10 to 50. The English version of the PANAS has adequate internal consistency, test–retest reliability, convergent validity, and predictive validity.[46] In the present sample, the reliability coefficient (coefficient α) was 0.88 for the negative affect subscale and 0.86 for the positive affect subscale. The two subscales were unrelated ($r = -0.02$, $P > .30$). Scores at baseline (Time 1) did not differ as a function of age, gender, or their interaction.

Children Depression Inventory[43]. The CDI is a 27-item self-report measure designed to assess the social, behavioral, and affective symptoms of depression in children. Each item consists of three sentences that describe a symptom of depression in increasing degrees of severity. The respondent chooses the sentence that best describes him or her during the past week. Each item set is scored from 0 (symptom absent) to 2 (symptom is present always or most of the time). The CDI has adequate discriminant and convergent validity, test–retest reliability, and internal consistency.[47] Coefficient α in the present sample, using the Dutch translation of the instrument,[48] was 0.80. Total scores ranged from 0 to 23 ($M = 8.03$, $SD = 6.59$). Scores for this sample were similar to those previously reported[17, 18, 49] and did not differ as a function of age, gender, or their interaction. About one fifth of the sample (19.7%) exceeded the cut-off score of 12 employed by Garber and colleagues[16] to distinguish "depressed" from "non-depressed" children.[16]

Social acceptance in the peer group. Participants completed a widely used nomination-based sociometric questionnaire, in which they identified the three classroom peers they liked most and the three classroom peers they disliked most.[44] Children who declined participation in this study were included in the classroom lists, but the data obtained for these children were not used. From the nomination data, two continuous scores for each participating child were computed. These scores included: (a) a measure of preference, by dividing the number of times each participant was nominated for the "like most" question by the total number of participating children in the class, and (b) a measure of rejection, by dividing the number of times each participant was nominated for the "like least" question by the total number of participating children in the class. Social acceptance (i.e., social standing in the peer group) was calculated by subtracting the measure of rejection from the measure of preference. This figure was then multiplied by 100, yielding scores ranging from 84.6 to 61.5 ($M = 3.56$; $SD = 27.10$). These scores did not differ as a function of gender, age, or their interaction. For the majority of participants (58%), a positive social acceptance score was observed.

SURVIVOR CONTEST COGNITIVE REACTIONS MEASURE

A seven-item measure was developed to assess participants' cognitive attributions of the feedback outcome. The first four items were designed to assess the dimension of *stability* by assessing participants' contest-related outcome expectancies for a subsequent round of Survivor. The specific items included: (a) "If I would play again against four other players, my total score would be…"; (b) "If I would play again with other jurors, my total score would be …"; (c) "If I would play again three weeks from now, my total score would be …"; and (d) "If I played again from home at my own computer, my total score would be …". Participants rated their responses on the same 5-point Likert scale (1 ,substantially higher; 2, somewhat higher; 3, about the same; 4, somewhat lower; 5, substantially lower).

The next three items were designed to assess the attributional dimension of *globality*, by having children make judgments about the extent to which the peer evaluation outcome received during the Survivor contest converges with their peer evaluations in other contexts. The specific items included: (a) "The outcome of Survivor

is in line with my popularity in class"; (b) "The outcome of Survivor is in line with my popularity among peers that visit other schools"; and (c) "The outcome of Survivor is in line with my popularity among peers in general". Participants rated their responses on the same 5-point Likert scale (1, completely agree; 2, mostly agree; 3, somewhat agree; 4, mostly disagree; and 5, completely disagree).

In the hopelessness theory of depression,[50] the *internal* attributional dimension was demoted to a contributory cause of one particular symptom of depression (i.e., low self-esteem); whereas the global-specific and the stable–unstable dimensions by themselves were posited to be related to the risk for development of hopelessness and depressive symptoms. In line with this formulation,[51] showed that the attributional dimensions of stability and globality reflect the same underlying factor, but internality does not. Hence, in this study we only assessed stability and globality attributions.

The mean scores for the stability and globality dimensions were calculated and then summed to yield one cognitive appraisal composite score, with higher scores reflecting more negative appraisals. Coefficient α for this composite was 0.68. Scores did not differ as a function of the single or joint effects of condition, gender, and age ($P>.10$).

DATA ANALYTIC STRATEGY

After conducting preliminary analyses, experimental conditions' equivalence was examined. Univariate analyses of variance (ANOVAs) were used to compare the three conditions at baseline measures. To examine the magnitude and direction of emotional reactivity—both positive and negative—elicited by success feedback and failure feedback, each relative to the control (neutral) feedback condition, two a priori multivariate repeated measures MANOVAs were performed. In the first planned contrast, scores on the positive and negative subscales of the PANAS served as the dependent variables. Condition (success versus neutral feedback) served as the between subjects factor, and assessment phase (prefeedback versus postfeedback) served as the within subject factor. Significant multivariate effects were followed up with univariate tests. Interaction effects were followed up with simple main effects analyses, comparing Time 1 versus Time 2 PANAS scores for each feedback condition separately. In the second analysis, the planned contrast comparing failure versus neutral feedback was tested using the same analytic approach as that outlined above for the success versus neutral feedback contrast.

The above comparison of mean changes between groups in state mood across the two points in time provides minimal information on the variability of mood change within children randomized to the success or failure condition (i.e., at the level of the individual participant). According to,[8] genuine emotional activation (which is also a prerequisite for subsequent ER) requires that individuals show a statistically reliable activation of emotion in response to a conceptually meaningful event. We therefore identified those children who showed a significant change in affect in response to the feedback manipulation. This was accomplished by computing a two-level emotional response classification for each participant, following the approach outlined by.[52] Reliable emotional activation (yes versus no) was calculated for each of the two PANAS subscales separately, using the reliable change (RC) formula advanced by.[53]][1] Manifest mood change on each of the PANAS subscales was defined as showing RC from pre to postfeedback (i.e., from Time 1 to Time 2). If the value of RC is greater than 1.96, it is most likely ($P<.05$) that the posttest score is reflecting real change, as opposed to the fluctuation of an imprecise measuring instrument. Hence, participants were classified as displaying emotional activation if the value of RC exceeded 1.96.

Next, for those children who showed RC from Time 1 to Time 2 in response to success or failure feedback, we examined their subsequent change in affect from Time 2 to Time 3. Paired *t*-tests were performed for each of the two PANAS subscales separately. Finally, after the regression approach outlined by,[54] we examined whether these changes in mood during the Time 2 to Time 3 waiting period were predicted by children's level of depressive symptoms or peer-nominated social acceptance score. Because of the significant inter-correlation between CDI_t and social acceptance ratings, and diagnostics indicating significant multicollinearity in the model when entered simultaneously (variance inflation factors >10), separate regression analyses were performed for these two within-child variables. In these analyses, we also examined the potential effects of level of initial mood change, gender, and cognitive appraisal score.

In the first regression analysis, residualized positive affect change scores from Time 2 to Time 3 served as the dependent variable. In Step 1, we examined the potential effects of level of initial mood change by entering residualized positive affect change scores from Time 1 to Time 2. In Step 2, gender and cognitive appraisal scores (centered) were entered. In Step 3, CDI_t score (centered) was entered. Finally, all two and three-way interaction terms (e.g., gender by CDI_t score) were entered in Step 4. An identical analytic strategy as reported above was used for the PANAS-N. For both subscales, this analysis was repeated to assess the potential effect of peer-nominated social acceptance.

RESULTS

PRELIMINARY ANALYSES

Exploratory analyses revealed a significant skewness in the distribution of scores for the CDI, as evidenced by a skewness value of 5.84. The distribution of the peer-nominated social acceptance score was not severely skewed (skewness value <1.5). We performed a square root transformation of the CDI scores, which was successful in producing a distribution that was no longer skewed (skewness value = 0.73). This transformed variable (CDI_t) was used in all analyses reported below.

Participants' CDI_t scores were associated with lower levels of positive affect ($r=-0.22$, $P<.01$) and higher levels of negative affect ($r=0.29$, $P<.001$) at baseline. Conversely, social acceptance scores were not related to either positive or negative affect scores at baseline. CDI_t scores were inversely related to social acceptance scores ($r=-0.35$, $P<.01$). In response to the *negative* peer evaluation feedback, children displaying higher levels of depressive symptoms were significantly more likely to construe the rejection experience in a more negative fashion, $r=0.37$, $P<.02$. In contrast, in the success and neutral condition no relationship between level of depressive symptoms and cognitive appraisals emerged. In all feedback conditions, children's appraisals were unrelated to peer-nominated social acceptance scores.

[1] $RC = x_2 - x_1 / S_{diff}$, $S_{diff} = \sqrt{2}(S_e)2$; $S_e = S_1(1-r_{xx})$; where x_1 represents a child's pretest score, x_2 represents that same child's posttest score, S_{diff} is the standard error of the difference between the two test scores, r_{xx} = test–retest reliability, and S_e is the standard error of measurement.

Results also revealed that viewing time during the waiting period was significantly influenced by the fictitious likeability scores provided by the peer evaluators, indicating that participants spent significantly more time viewing the profiles of peers who rated them favorably ($M_{favorable} = 181.9$) relative to peers who rated them unfavorably ($M_{unfavorable} = 118.1$), $F(1, 132) = 63.56$, $P<.001$, $\eta^2 = 0.33$. This effect was not qualified by the single or joint effects of condition, gender, level of depressive symptoms, or social acceptance score.

EQUIVALENCE OF EXPERIMENTAL GROUPS

Results revealed no significant between-group differences ($P>.10$; see Table 1) suggesting that the randomization was successful in creating equivalent groups at baseline.

EMOTIONAL REACTIVITY: EFFECTS OF THE FEEDBACK MANIPULATION

Scores on positive and negative affects at Time 1 (baseline), Time 2 (immediately postfeedback), and Time 3 (5 min postfeedback) are presented in Figure 1.

Success versus neutral feedback. The analysis comparing Time 1 versus Time 2 PANAS scores yielded a marginally significant multivariate effect for time, Wilks' λ $F(2, 91) = 2.80$, $P<.07$, which was qualified by a significant time by condition interaction, Wilks' λ $F(2, 91) = 4.73$, $P<.02$, $\eta^2 = 0.09$. Follow-up univariate analyses showed that the time by condition interaction was only significant for the PANAS-P ($F(1, 92) = 7.22$, $P<.01$, $\eta^2 = 0.07$). Subsequent simple effect analyses for both conditions separately revealed a significant increase in positive affect as assessed by the PANAS-P in the success condition, $F(1, 46) = 8.98$, $P<.005$, $\eta^2 = 0.16$, but no significant change in positive affect in the neutral condition, $P>.40$ (see Fig. 1). Cohen's d effect sizes (success versus neutral) were 0.66 and 0.11 for the PANAS-P and PANAS-N, respectively. Taken together, these findings indicate that the success feedback condition was successful in activating a marked change in positive affect, but not a statistically RC in negative affect. Noteworthy, in a recent meta-analysis examining affective reactions to success–failure manipulations, including 32 studies with a total of 2,468 participants, the average effect size for change in positive affect subsequent to success feedback amounted to 0.33.[55]

Failure versus neutral feedback. The analysis comparing Time 1 versus Time 2 PANAS scores yielded a main multivariate effect for time, Wilks' λ $F(2, 89) = 16.08$, $P<.001$, which was qualified by a time by condition interaction, Wilks' λ $F(2, 89) = 12.31$, $P<.001$, $\eta^2 = 0.22$. Follow-up univariate analyses showed that the time by condition interaction was significant for both the PANAS-P, $F(1, 90) = 19.58$, $P<.001$, $\eta^2 = 0.18$, and the PANAS-N, $F(1, 90) = 6.64$, $P<.02$, $\eta^2 = 0.07$. Subsequent simple effect analyses for both conditions separately revealed a significant decrease in positive affect as assessed by the PANAS-P in the failure condition, $F(1, 44) = 34.05$, $P<.001$, $\eta^2 = 0.44$, but no significant change in positive affect in the neutral condition, $P>.40$ (see above). A significant increase in PANAS-N scores was observed in the failure condition, $F(1, 44) = 8.79$, $P<.006$, $\eta^2 = 0.17$, but not in the neutral condition ($P>.40$). Cohen's d effect sizes (failure versus neutral) were 0.92 and 0.53 for the PANAS-P and PANAS-N, respectively. Taken together, these findings indicate that the failure feedback condition was successful in activating a marked change in both positive and negative affects. In the recent meta-analysis conducted by,[55] the average effect size observed for changes in negative affect subsequent to receiving failure feedback was 0.34.

TABLE 1. Means and standard deviations of measures by condition

	Feedback condition					
	Success ($n = 47$)		Neutral ($n = 47$)		Failure ($n = 45$)	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*
CDI	7.83	7.18	8.34	6.00	8.11	6.00
Social acceptance	3.72	27.47	3.90	26.74	3.02	26.74
Age (months)	134.60	8.22	134.10	7.51	132.40	7.51

CDI, Children depression inventory. All F-values are <1; $P>.20$.

EMOTIONAL REACTIVITY AS INDEXED BY RC IN STATE MOOD

Our analyses revealed that 17 of the 47 children (seven boys, 10 girls) in the success feedback condition (36.2%) met the criteria for emotional activation as evidenced by significant RC on the PANAS-P ($n = 12$), the PANAS-N ($n = 8$), or both ($n = 3$). The other children in the success feedback condition did not meet the criteria for RC in emotional activation on either PANAS subscale. Children displaying reliable emotional activation in response to success feedback (reactors) did not differ from nonreactors with respect to gender, CDI score, social acceptance score, or cognitive appraisal scores (all $P>.10$).

In the failure feedback condition, 24 of the 45 children (53.3%; 11 boys and 13 girls) experienced significant emotional activation on the PANAS-P ($n = 19$), the PANAS-N ($n = 10$), or both subscales ($n = 5$). The remaining 21 children in the failure group did not show reliable emotional activation on either PANAS subscale. Children displaying reliable emotional activation in response to failure feedback

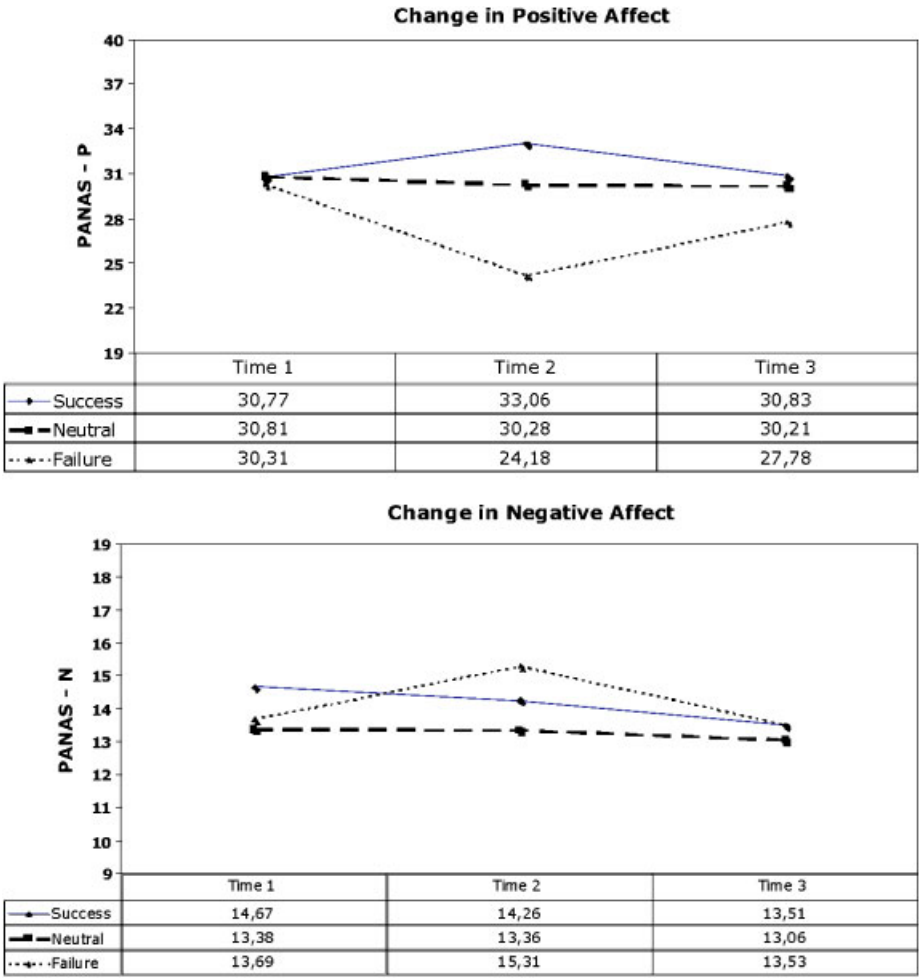

Figure 1. Scores for positive and negative affect at baseline (Time 1), immediately postfeedback (Time 2), and 5 min postfeedback (Time 3) by condition. 210 × 297 mm (200 × 200 DPI).

(reactors) did not differ from nonreactors with respect to gender, CDI score, social acceptance index, or cognitive appraisal scores (all $P>.10$).

In the neutral condition, six of the 47 children (13.1%; three boys, three girls) met the criteria for emotional activation as evidenced by significant RC on the PANAS-P ($n=4$) or the PANAS-N ($n=2$). The other children in the neutral feedback condition did not meet the criteria for RC in emotional activation on either PANAS subscale.

CHANGES IN AFFECT DURING THE 5-MIN POSTFEEDBACK WAITING PERIOD

Changes in affect after success feedback. For the 17 children showing emotional activation as evidenced by a significant RC index from Time 1 to Time 2,[2] a significant decrease in positive affect was revealed during the Time 2 to Time 3 waiting/ER period: $t(16)=4.01$, $P<.01$. However, participants' level of positive affect at the end of the ER period remained significantly higher than their baseline level; $t(16)=-2.39$, $P<.05$. In contrast, for negative affect no significant change was observed from Time 2 to Time 3; and participants' negative affect at Time 3 remained significantly lower than it was at baseline; $t(16)=3.04$, $P<.01$.

Changes in affect after failure feedback. For the 24 children showing significant emotional activation from Time 1 to Time 2 (refer Footnote 2), we observed a significant increase in positive affect during the Time 2 to Time 3 period; $t(23)=-5.59$, $P<.001$. However, participants' positive affect at Time 3 remained significantly lower than their baseline levels; $t(23)=2.88$, $P<.01$. For negative affect, our analyses revealed a significant decrease from Time 2 to Time 3; $t(23)=3.57$, $P<.01$. Participants' level of negative affect at Time 3 was no longer significantly different from their level of negative affect at Time 1 ($P>.05$).

[2]We also conducted separate analyses for the subset of children who displayed RC on each of the two PANAS subscales. For both success and failure, these analyses yielded similar results.

VARIABLES PREDICTING CHILDREN'S CHANGE IN AFFECT DURING THE 5 MIN ER PERIOD

For children displaying an RC in affect to either success or failure feedback, greater change in positive affect from Time 1 to Time 2 predicted a greater return to baseline in positive affect during the subsequent Time 2 to Time 3 waiting period (for success $\beta = -0.88$, $R^2_{\text{change}} = 0.25$, $F_{\text{change}} = 18.75$, $P < .001$; for failure $\beta = 1.51$, $R^2_{\text{change}} = 0.08$, $F_{\text{change}} = 5.53$, $P < .03$). For those randomized to the success condition, none of the other variables examined (i.e., gender, depression, cognitive appraisals, and social acceptance) predicted children's regulation of positive or negative affect during the Time 2 to Time 3 waiting period.

Consistent with expectation, among children randomized to the failure feedback condition, higher CDI_t scores predicted a weaker return to baseline in positive affect during the Time 2 to Time 3 waiting period: $\beta = -0.38$, $R^2_{\text{change}} = 0.09$, $F_{\text{change}} = 7.84$, $P < .01$. In the failure condition, none of the other variables examined predicted children's regulation of positive or negative affect during the Time 2 to Time 3 waiting period.

DISCUSSION

This study sought to advance knowledge on the role of depressive symptoms in the activation and regulation of positive and negative affects in early adolescents. The strength of the affective reactions in both the success and the failure feedback conditions, as indexed by effect size, exceeded the average level observed in a recent meta-analysis of 32 studies using success–failure manipulations to induce changes in affective state. Moreover, our debriefing interviews revealed that none of the participants reported being aware that the feedback they received was false. Taken together, these data suggest that the Survivor paradigm was successful in achieving its major objective of providing a credible and ecologically relevant emotion-eliciting event.

Contrary to expectation, we observed no relationship between children's level of depressive symptoms and their emotional activation in response to either success or failure feedback. This observation is at odds with previous work showing that children displaying higher CDI scores anticipate a significantly more pronounced mood effect in response to hypothetical written scenarios depicting negative emotion-eliciting events, including peer rejection.[17, 56] What might account for these divergent findings across studies? We entertained the possibility that the present sample may have evidenced relatively modest levels of depressive symptoms. Clearly, among more severely depressed children the activation of negative mood might have been stronger. Another possibility is that our stringent criterion for emotional activation (i.e., RC) may have yielded different findings. Hence, we ran a regression analysis examining whether CDI_t score predicted Time 2 affect after controlling for Time 1 affect. No significant effect was observed.

Alternatively, the difference in findings may be attributable to differences in methodologies, with other studies employing hypothetical vignettes as opposed to the online approach employed in this study. According to numerous authors e.g.,[57, 58] depression is characterized by a negative bias in the strategic elaboration of information. Thus, if one is feeling depressed and thinks about an upcoming negative event, information is processed in a more negative fashion, thereby yielding inflated negative anticipated judgments relative to momentary obtained ratings. Consistent with this explanation,[23] showed that, relative to their online obtained ratings, participants high in dental anxiety both prospectively and retrospectively reported higher levels of anticipated experienced dental pain during treatment. In a similar vein,[59] showed that among adults high in neuroticism, the reported frequency of experienced negative emotions tended to be higher for retrospective reports, compared to these same reports obtained online; whereas this effect was not observed for those low in neuroticism.

While we observed no significant linkage between level of depressive symptoms and emotional activation, several interesting findings emerged with respect to the linkage between depressive symptoms and regulation of the elicited emotion during the 5-min postfeedback period. For instance, the present results provide some preliminary evidence to suggest that children with elevated depressive symptoms do not experience more difficulties than their peers maintaining (regulating) increased positive affect over time. In contrast, above and beyond the effects of level of initial mood change, we observed that in response to negative feedback, higher levels of depressive symptoms were associated with a weaker return to baseline as indexed by positive affect. The finding that social acceptance in the peer group was not associated with level of mood change provides some preliminary evidence for the specificity of this finding for depressive symptoms.

What may account for this observed effect for depressive symptoms? An effort was made to control for individual differences in the spontaneous use of behavioral ER strategies observed in previous work[17, 18] by having children engage in the same behavioral activity during the 5-min postfeedback waiting period (i.e., perusing online the profiles of the alleged judges). Because viewing time patterns did not differ as a function of level of depressive symptoms, it seems unlikely that the viewing time activity as such was responsible for (mediated) the negative linkage between depressive symptoms and children's up-regulation of positive affect. It may be that the weaker return to baseline observed among those displaying elevated depression is a function of one or more cognitive factors associated with depression, such as selective attention to negative elements, discounting the

positive,[57, 60] and/or depressogenic ruminative processes.[61] In this study we only assessed children's attributions for the outcome, which did not predict changes in mood. One possibility is that other cognitive variables not assessed in this study may have mediated the changes in mood.

Several features of this study deserve further comment. A limitation of many research designs employed in studying ER is their "lack of scientific rigor and clarity"[8] The terms emotion and ER are notoriously slippery, and have often been used in confusing and contradictory ways.[62] In their seminal paper,[8] have argued that because the assessment of emotion and ER is necessarily inferential in nature, researchers "should build the strongest possible case for inferring these processes by careful conceptualization and rigorous measurement". Certainly, our approach does not solve all the thorny issues involved in distinguishing emotion from ER. Following the lead of others e.g.,[3, 8] we conceptualized ER as systematic changes associated with *activated* emotions. In so doing, we borrowed from the clinical science literature by using the RC index as an unequivocal criterion for genuine emotion activation. Although this rigorous approach ensures that emotions are truly activated, it should be noted that the power to detect significant differences in subsequent ER is reduced as a result of a sizeable reduction in sample size. In fact, post hoc analyses revealed less than adequate power to detect a moderate effect size in both the failure condition and success condition. However, the use of a nonclinical sample (as opposed to children with a diagnosed mood disorder) may also have accounted for the observation that depressive symptoms were not associated with the regulation of negative affect.

With regard to the ecological validity of our peer manipulation procedure, we acknowledge that our laboratory manipulation diverges from the peer rejection and peer praise experiences that individuals in this age range may encounter in their daily lives. However, especially during the past decade, being evaluated while interacting with unfamiliar peers on the Internet (e.g., text messaging, participating in online teen chat rooms) has become an integral part of (early) adolescent's contemporary culture. Nevertheless, we acknowledge that in response to a more ecologically meaningful stimulus event (e.g., being rejected/evaluated by significant others such as classmates), elevated depressive symptoms might have also shown a significant relationship with the activation and/or regulation of negative mood.

Several limitations of this study should be addressed in future work. First, in this study we controlled for what children could do during the waiting period (i.e., perusing profiles of judges). Our decision to have children engage in the same behavioral activity during the waiting period was based on the following reasoning. ER deficits associated with depression may manifest themselves in the differential use of (mal) adaptive strategies after being faced with an emotion-eliciting event. However, when children are allowed to self-select a variety of behavioral ER strategies subsequent to the feedback outcome (as opposed to have them engage in a specific ER strategy), inferences regarding the effects of CDI score and ER strategy on affective change are hindered by the confounding of the within-child variable and the use of multiple ER strategies (e.g., approach behavior and behavioral distraction). In contrast, the present design enabled investigating potential linkages between CDI score, viewing choices (i.e., time spent viewing profiles of favorable versus unfavorable judges), and change in affective state. Whereas we anticipated that relative to their peers children reporting higher CDI scores would spend more time viewing profiles of unfavorable judges (which might be indicative of maladaptive ER), results showed that CDI scores were not related to viewing time patterns. Future research is needed in which children are free to engage in different behavioral activities (ER strategies) after being faced with a mood inducing event.

Second, our findings are based on a community sample of children, rather than a clinical sample with a diagnosed mood disorder. However, it should be noted that several studies have shown that moderate levels of depression are associated with significant impairment in school and peer functioning e.g.,[63, 64] and may persist for years in some children.[63] Similar to research with adults showing that elevated depressive symptoms put one at significantly greater risk of developing subsequent major depression e.g.,[65] children displaying moderate levels of depressive symptoms are at high risk to suffer from severe recurrent depression later in life e.g.,[66, 67] Hence, although moderate levels of depressive symptoms may not meet criteria for MDD, they are a significant concern. Nevertheless, future research should examine to what extent the present findings can be generalized to children with a diagnosed mood disorder.

Third, with regard to cognitive activity only attributions for the outcome were assessed. Results showed that these attributions did not predict changes in mood, whereas other cognitive factors such as depressogenic ruminative processes or selective attention to negative elements might have been associated with changes in affective state. Finally, note that this investigation represents only a narrow slice of the multifaceted construct of emotional responding and does not capture the dynamic and reciprocally determined nature of emotional responding as it occurs in ongoing streams of such cycles.[13] Specifically, within a process-oriented framework, the emotions one experiences and how these emotions are modulated feed into a new emotion cycle (e.g., worrying about being sad). Moreover, one's present mood state can affect how one responds to new emotional stimuli (e.g., already feeling sad might increase negative reactions to yet another disappointment). Clearly, future research is

needed, which examines emotional responding using more extended temporal frames.

Notwithstanding these limitations, the findings of this study contribute to the extant knowledge base on the linkage between depressive symptoms and emotional responding in school-aged children. First, results point to differences in how depressive symptoms are linked with the activation versus regulation of emotions, lending some support to the view that emotion activation and ER may be distinguishable processes see.[2] Second, the data suggest that the linkage between depressive symptoms and emotional activation may differ for online versus noncurrently obtained reports. Third, this study provides preliminary evidence to suggest that elevated depressive symptoms may be differentially associated with two distinct forms of emotion dysregulation; i.e., deficits in the maintenance of mood improvement over time versus deficits in the up-regulating of mood decline over time. Finally, the findings imply that elevated depression may be more influential in the regulation of positive affect, relative to negative affect.

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