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## Emotional dysregulation in dysphoria: Support for emotion context insensitivity in response to performance-based feedback

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### ABSTRACT

The Emotion Context Insensitivity (ECI) hypothesis predicts that individuals experiencing a sad mood will show diminished reactivity to emotionally evocative stimuli and will not differentiate emotional responses across contexts. Previous work has primarily been limited to studying depressed individuals' emotional responses to film clips, images, and autobiographical memories. The current study builds upon this work by examining emotional reactivity of dysphoric ( $n = 47$ ) and non-dysphoric ( $n = 54$ ) individuals to positive and negative feedback about their performance on a task they were led to believe measured social intelligence. Overall, dysphoric individuals reported higher negative emotion and lower positive emotion than non-dysphoric individuals before, during, and after feedback. However, consistent with ECI, dysphoric individuals displayed attenuated emotional reactivity to negative feedback compared to controls. Further, dysphoric individuals' emotional response did not differ to positive and negative feedback, whereas the non-dysphoric group appropriately differentiated their emotional response across these contexts. Findings support the ECI hypothesis and broaden its scope to include emotional reactivity to self-relevant performance feedback.

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Emotion dysregulation has been implicated in various forms of psychopathology such as substance abuse disorders, anxiety disorders, and externalizing disorders (e.g., Gross, 2007). Difficulty regulating emotions is also thought to play a key role in the maintenance and etiology of several mood disorders, such as Major Depressive Disorder. Examples of emotional dysfunction in depression include persistent sad mood, anhedonia, increased crying, and blunted affect. As a result, depression is often conceptualized as a dysfunction of emotion regulation (e.g., Kring & Bachorowski, 1999). This has also led to a closer exploration of the interaction between emotions and mood disorders such as depression (e.g., Bylsma et al., 2007; Kring & Bachorowski, 1999, for reviews).

The terms emotion and mood, although often used interchangeably colloquially, have been precisely defined (Gross, 2007; Rottenberg & Gross, 2003; Watson, 2000). Mood is commonly defined as a state that is slow moving, weakly linked to specific elicitors, and capable of lasting anywhere from hours to days. Generally, moods are less intense than emotions. Conversely, emotion describes responses that are more adaptive, briefer in duration, yet stronger, and occur in response to a meaningful stimulus. Emotions are generally displayed through subjective experience (e.g., excitement), physiological arousal (e.g., elevated heart rate), or behavior (e.g., running from a feared stimulus).

Initially, the interaction between mood and emotion was characterized by the mood congruency hypothesis. According to this hypothesis, emotional reactions are strengthened (or potentiated) when mood state and emotional state are congruent and are weakened (or attenuated) when they are incongruent (Rosenberg, 1998). Following this conceptualization, a depressed individual would experience a diminished positive reaction to a pleasant stimulus (positive attenuation), while showing increased sadness in response to a sad or negative stimulus (negative potentiation).

Support for mood congruency in depression has been limited, however, particularly for negative stimuli (Bylsma et al., 2007; Rottenberg, Gross, & Gotlib, 2005a). Rather than experiencing negative potentiation in response to negative stimuli, depressed individuals appear to experience the opposite—an attenuated response. Depressed individuals also report smaller changes in subjective sad emotion in response to a sad film (Rottenberg, Kasch, Gross, & Gotlib, 2002). Further, depressed criers showed smaller changes in emotional experience than non-depressed criers (Rottenberg, Gross, Wilhelm, Najmi, & Gotlib, 2002). Attenuated emotional responses among depressed individuals have also been observed in subjective response to visual images and participants' own thoughts (Rottenberg et al., 2005a). Although there are instances when depressed and non-depressed individuals respond similarly to evocative stimuli (e.g., emotional response to sad images, Dunn, Dalgleish, Lawrence, Cusack, & Ogilvie, 2004; ability to imagine negative future events, Holmes, Lang, Moulds, & Steele, 2008), a recent meta-analysis indicated that depressed individuals in general report a reduced emotional response to negative stimuli (Bylsma et al., 2007).

Interestingly, depressed individuals also seem to have an attenuated emotional response to positive stimuli. For example, depressed individuals have reduced subjective emotional responding when viewing hedonically pleasant stimuli, such as food and erotic coeds (Sloan, Strauss, Quirk, & Sajatovik, 1997), amusing film stimuli (Rottenberg et al., 2005a; Rottenberg et al., 2002), and pleasant slide images (Dunn et al., 2004; Sloan, Strauss, & Wisner, 2001). Berenbaum & Oltmanns (1992) found that, in addition to pleasant films, depressed individuals displayed a diminished response to appetitive stimuli, such as sweetened drinks. Based on this literature, Bylsma et al. (2007) and Rottenberg et al. (2005a) have concluded that depression also attenuates emotional responding to positive experiences.

Attenuated emotional reactivity appears to have consequences for how depressed individuals regulate their emotions across contexts. Kaviani et al. (2004) found that depressed patients displayed less change in affect from positive to negative film clips, and rated them more similarly than non-depressed controls. Additionally, although depressed individuals reacted with more happiness to normative stimuli than to idiographic stimuli, Rottenberg et al. (2005a) observed no differences in depressed individuals' self-report of sadness after viewing an acutely sad film of themselves compared to viewing a pleasant film of themselves. Depressed individuals also reported less happiness than non-depressed individuals across all valence contexts, suggesting their emotional responding was

insensitive to context (Rottenberg et al., 2005a). Attenuated emotion reactivity across emotional contexts is now referred to as Emotion Context Insensitivity (ECI; Rottenberg & Gotlib, 2004; see Bylsma et al., 2007 for review).

The current study was designed to examine whether the ECI hypothesis applies to a previously untested (but important) context: positive and negative performance feedback. Previous research testing the ECI hypothesis has used a number of different types of stimuli (e.g., slides, films, and drinks), but these require relatively minimal active participation, are not usually personally relevant, and may not reflect experiences in which an individual in a depressed mood receives feedback from others. Healthy and dysphoric people may encounter a number of evaluative situations, such as receiving negative feedback, being rejected by a friend or co-worker, or having an argument with a friend or family member. Each of these situations is personally relevant and requires the person to be actively involved in the situation—not just passively viewing stimuli.

Rottenberg et al. (2005a) attempted to address this limitation by videotaping individuals while they discussed both their most happy and most sad life events. Although personally relevant, this type of stimuli lacked an evaluative feedback component. These life events were discussed using an interview that was approximately 15 min in duration. Probes were used during the interview to clarify the personal meaning this event had on the person as well as to clearly articulate the emotional state. Participants were instructed to make their descriptions of the event detailed enough so it would be obvious to an observer why this event was significant. These videos were then shown to participants and emotional reactivity was assessed. Results of this study partially supported ECI for sadness; however, no group differences were observed for happiness reactivity. This suggests that for personally relevant tasks, ECI may be particularly relevant for negative stimuli but perhaps not for positive stimuli. Further, although the stimuli were clearly personally relevant, participants still passively viewed the film clips, and the stimuli lacked an evaluative component, as participants were given no feedback regarding how well they were able to discuss these memories.

To build on this work, the current study tested the ECI hypothesis using stimuli that were personally relevant, evaluative, and required active performance by the participant. Specifically, participants engaged in a social intelligence test and then received highly positive or highly negative feedback about their performance. Several theories of depression highlight the importance of disruptions in achievement and performance for precipitating and maintaining a depressive episode (e.g., Arieti & Bemporad, 1978; Beck, 1983; Blatt, 1974). Further, Elliot, Sahakian, Herrod, & Robbins (1997) and Paykelt et al. (1997) found that when depressed individuals were given direct negative feedback, they demonstrated a significant decrease in performance as compared to non-psychiatric patients and schizophrenics. They suggest that this abnormal response to negative feedback could be related to an adverse emotional response (Elliot et al., 1997). Thus, responses to external feedback about performance may be an important mechanism in depression maintenance. Testing emotional reactivity to failure or success experiences may therefore be a powerful circumstance in which to test the ECI theory.

Our hypotheses encompassed the two integral components of ECI—lack of reactivity and context insensitivity. First, with regard to reactivity, we hypothesized that highly positive or highly negative performance evaluations would not elicit an emotional reaction among dysphoric individuals, whereas non-dysphoric, healthy controls would react emotionally to the stimuli. Second, to test context insensitivity, we hypothesized that dysphoric individuals would display similar emotional responses to both types of feedback. Healthy controls, alternatively, would appropriately differentiate their emotional reactions across feedback conditions.

## 1. Method

### 1.1. Participants

Participants were recruited through an introduction to psychology course and through flyers and advertisements around the campus of a large southwestern university. Participants who scored above a 10 or below a 4 on the short-form of the Beck Depression Inventory (BDI-SF) during a screening

**Table 1**  
Demographic information of participants.

	Dysphoric	Non-dysphoric
<i>n</i>	47	54
BDI-II (SD)	26.64 (8.17)	2.98 (2.42)
Age (SD)	18.57 (0.90)	18.94 (0.94)
Gender	77% Female	49% Female
Ethnicity		
Asian	13%	13%
African American	2%	4%
White	62%	66%
Hispanic	18%	16%
Other	4%	2%

Note: No statistically significant differences between dysphoria groups were observed for age or ethnicity.

assessment prior to testing were invited to the lab to participate. The mean age of participants was 18.8 years ( $SD = 1.05$ ); 40% were male and 60% were female.

Participants were classified as dysphoric or non-dysphoric based on Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) scores obtained during the laboratory session. For the dysphoric groups, previous research has shown that a cut-off score of 16 or greater on the BDI-II yielded the best trade off in terms of sensitivity and false positive rate for predicting the presence of a mood disorder among a college student sample (Sprinkle et al., 2002). We used a score of 9 or less for the non-dysphoric group to ensure separation between our dysphoria groups. Descriptive statistics and demographic information for each group are presented in Table 1. Dysphoric ( $n = 47$ ) and non-dysphoric ( $n = 54$ ) groups did not significantly differ in age ( $t = 1.82$ ,  $p = 0.07$ ) or ethnicity ( $\chi^2 = 0.81$ ,  $p = 0.94$ ). However, the groups did significantly differ on gender ( $\chi^2 = 7.26$ ,  $p = 0.01$ ) with the dysphoric group having more women; therefore, gender was entered as a covariate in all analyses.<sup>1</sup> The dysphoric group was, on average, reporting depressive symptoms in the moderate range. The non-dysphoric group reported relatively few symptoms of depression. Further, high or low depression symptoms were required to be present during both the screening assessment and at the time of the experiment, suggesting stability in the depressive symptoms. One individual in the dysphoric group was on anti-depressant medication.

## 1.2. Questionnaires

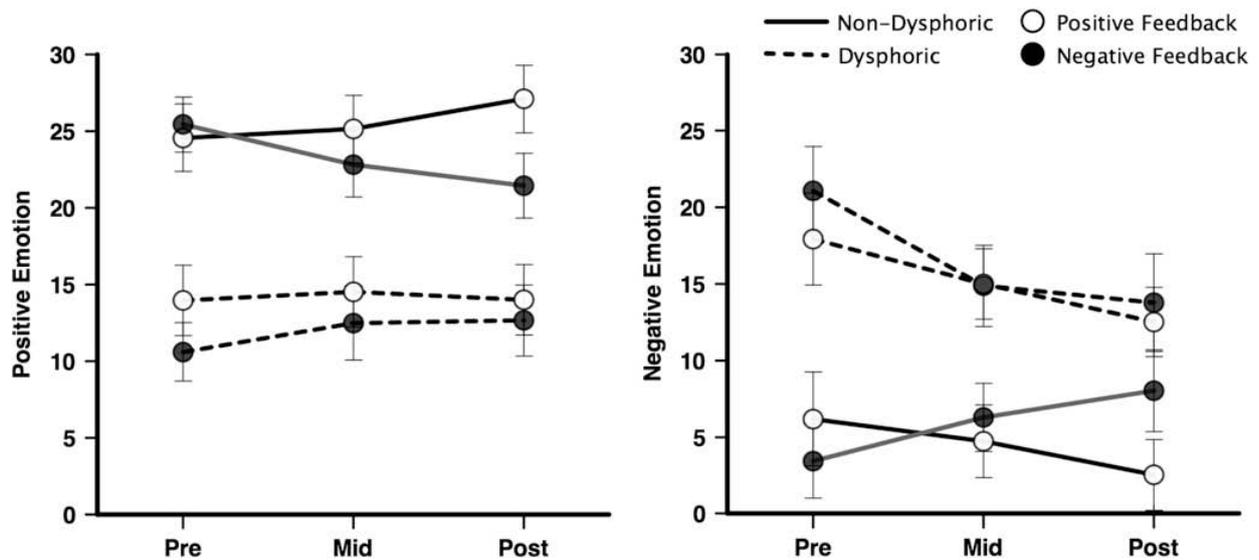
### 1.2.1. Beck depression inventory – II (BDI-II)

The BDI-II consists of 21 items and measures the presence and severity of cognitive, motivational, affective, and somatic symptoms of depression. Internal reliability for the BDI-II is good ( $\alpha = 0.92$ ) and its test-retest reliability is adequate (Beck et al., 1996). The BDI-II has been found to be valid among undergraduate samples (Beck et al., 1996). The BDI-II is a widely used self-report measure of depression.

### 1.2.2. Beck depression inventory-short form (BDI-SF)

This is a shortened version of the BDI with 13 questions and has been shown to have satisfactory reliability in a college sample ( $\alpha = 0.78$ ; Gould, 1982). This assessment was used during pre-screening ( $N = 1750$ ) to identify individuals with high and low symptoms of depression. At the request of our Institutional Review Board, we omitted the suicidality item of the BDI-SF for the pre-testing assessment.

<sup>1</sup> Given the significant gender difference, gender was included as a covariate in all analyses. However, gender did not have a significant main effect in any analyses. In the negative feedback condition, gender interacted with time for negative emotion only; however, the critical dysphoria group  $\times$  time interaction was also significant and these values are reported in the results section. For clarity purposes, the effect of gender was not reported. Additionally, given the marginally significant difference in age between dysphoria groups, age was also initially included as a covariate in all analyses but it was consequently dropped because it had minimal impact on all analyses.



**Fig. 1.** Mean emotional responses to positive and negative feedback for dysphoric ( $n_s = 23$ , and 19, respectively) and non-dysphoric individuals ( $n_s = 24$ , 24). Error bars represent standard error of the mean.

### 1.2.3. Demographics

All participants completed a demographics information form that included items such as age, gender, ethnicity, and annual income earned.

### 1.2.4. Subjective emotion rating questionnaire

A self-report assessment of emotion was used that was identical to that used by Rottenberg et al. (2005a). Participants were asked to rate how well 18 different adjectives (e.g., sadness, happiness, amusement) described their current emotional state using a 9-point scale ranging from 0 = not at all to 8 = extremely. Although Rottenberg et al. (e.g., 2005a) only used two adjectives from this list (e.g., happiness and sadness), we expected our feedback manipulation to generate a response that encompassed a number of both positive and negative emotions. Thus, we performed a factor analysis of the responses to the entire emotional adjective list. Initially, we used eigenvalues greater than 1 as a criterion. The scree plot suggested retaining two factors: positive emotion and negative emotion, explaining 57.7% of the total variance. Adjectives that did not clearly load on either factor (i.e., factor loadings of 0.3 or greater on more than one factor) were dropped from the analyses. Three adjectives, disgust, contempt, and surprise, were consequently dropped. Positive emotion adjectives were love, pride, happiness, joy, amusement, and interest ( $\alpha = 0.90$ ). Negative emotion adjectives were anxiety, sadness, guilt, shame, confusion, unhappiness, anger, fear and embarrassment ( $\alpha = 0.90$ ). At baseline, the positive and negative emotion factors were not strongly correlated ( $r = -0.22$ ), implying that they were not opposite ends of the same dimension.<sup>2</sup>

### 1.2.5. Bogus social intelligence task (BSIT)

The BSIT was presented to participants as a measurement of social intelligence. This task requires participants to view a variety of facial expressions and identify the emotion each face depicts (cf. Pollak & Kistler, 2002). For the present purposes, we selected highly ambiguous images. More specifically, two prototype facial expressions of a specific emotion from the same actor were selected and morphed to produce a new image (Beevers, Wells, Ellis, & Fischer, 2008, for more detail). The stimuli were taken

<sup>2</sup> The adjectives used to define positive and negative emotion in the current study depart somewhat from other definitions (e.g., Watson, Clark, & Tellegen, 1988). For instance, an anonymous reviewer suggested that the adjectives of sadness and unhappiness may reflect low levels of positive affect, rather than high levels of negative affect. In an attempt to clarify this conceptual issue, we performed additional analyses that excluded sadness and unhappiness from our negative emotion variable. We re-ran all of our critical repeated measures ANOVAs using the newly computed negative emotion variables and the results remained unchanged.

from the Ekman emotional face collection (Ekman & Friesen, 1976). The emotions of happy, sad, anger, disgust, surprise, and fear were paired and used for the morphing. The morphed images were created to reflect either 50% of each prototype emotion or a 40% and 60% combination of each emotion using FantaMorph 3.0. This software allowed for identifying pertinent anatomical areas such as the mouth, eyes, nose, chin, and hairline to use as control areas to facilitate smooth morphing. This created highly ambiguous images where the emotion displayed was virtually impossible to determine. Indeed, pilot testing revealed that participants took 63% longer to identify images used in BSIT (mean = 2871.7 ms) than prototype emotions (mean = 1766.2 ms).

Participants viewed 100 emotional faces and were asked to identify which emotion the face depicted by pressing a corresponding response box button. Three response options were presented beneath each stimulus. Two response options were the emotions used to create the morphed image. An additional filler emotion response was also included to increase task difficulty. The “correct” response was intentionally ambiguous, which then allowed us to provide participants with bogus but believable feedback. Participants were asked following completion of study procedures if they were aware of the element of deceit. Only one participant indicated any awareness and those data were not included in analysis.

#### 1.2.6. Feedback

Instructions informed participants that the average score on this task was 73% correct and they were instructed to do their best. Feedback was provided via computer screen after each set of 25 slides for a total of four feedback slides. Final feedback included percentile-ranking scores (with an interpretation of their percentile score) to enhance impact. In the positive feedback condition, participants were told that their accuracy was 89%, 92%, 93%, and 93%. At the end of the task, participants were presented with the following feedback: “You answered a total of 93% which puts you in the 97th percentile. This means that you scored higher than 97% of people who take this test.”

In the negative feedback condition, participants were told their accuracy was 27%, 31%, 29%, and 29% and they were presented with the following feedback: “You answered a total of 29% correct. This puts you in the 17th percentile. This means that you scored lower than 83% of the people who take this test.” Task performance was unrelated to actual performance, as participants were randomly assigned to feedback condition. Within each condition, participants received identical feedback.

#### 1.2.7. Procedure

Individuals who met pre-screening criteria were invited to participate. Following a brief orientation to the lab and an overview of the experiment, participants gave written informed consent, and then completed questionnaires and a demographic form. Participants were seated in a comfortable chair in front of a computer and were randomly assigned to one of the two feedback conditions. Random assignment was completed by experimental software in order to keep the experimenter unaware of condition assignment. Prior to viewing the instructions, participants were given the Subjective Emotion Rating Questionnaire.

As part of the instructions, participants were informed that they were taking part in a study examining social intelligence. Specifically, they were told that this task of social intelligence had been completed at many other universities, and the experimenters were interested in the performance of the students at this particular university. They were also told that it was a challenging task and to try their best. Because of the “difficulty” of the task, participants were informed that they would be receiving feedback periodically in order to track their achievement. They were given instructions via the computer to identify the emotion present in each face. In the middle of the task, and upon completion of the task, participants were again asked to complete the Subjective Emotion Rating Questionnaire. Following this, participants were debriefed about the bogus nature of the feedback used in the BSIT, and then thanked for their participation.

#### 1.2.8. Data analysis plan

In line with recommendations by Rosnow and Rosenthal (1989, 1995) and an APA task force (Wilkinson, 1999), analyses focused on a priori predictions rather than testing all possible main effects

and interactions. Our first hypothesis was that dysphoric individuals would show less emotion reactivity over time compared to non-dysphoric participants. We thus expected a significant time  $\times$  dysphoria group interaction within each feedback condition. Our second hypothesis predicted that the emotional response of the non-dysphoric group would differ across feedback conditions whereas the emotional response would not vary across feedback conditions for the dysphoric group. We thus expected a significant time  $\times$  feedback condition interaction within the non-dysphoric group but not within the dysphoric group. Greenhouse-Geisser adjustments were made due to the violations of normality in each of the analyses; the corrected statistical values are given throughout.

## 2. Results

### 2.1. Emotion reactivity

#### 2.1.1. Positive feedback condition

We examined whether change in positive and negative emotion differed between dysphoria groups within each feedback condition, controlling for gender. This was tested with a 3 (time: pre, mid, post)  $\times$  2 (dysphoria group: dysphoric, non-dysphoric) mixed plot ANOVA for each feedback condition. For positive emotions, analyses indicated a non-significant main effect for time,  $F(1.68, 68.76) = 0.05$ ,  $p = 0.95$ ,  $\eta^2 < 0.01$ , and a significant main effect for dysphoria group status,  $F(1, 41) = 13.88$ ,  $p = 0.00$ ,  $\eta^2 = 0.25$ . That is, the dysphoric group reported less positive emotion than the non-dysphoric group. Contrary to predictions, the two-way interaction for time  $\times$  dysphoria group status was non-significant,  $F(1.68, 68.76) = 1.28$ ,  $p = 0.28$ ,  $\eta^2 = 0.03$ . This indicates that positive feedback did not elicit a significant change in positive emotions for the dysphoric or non-dysphoric individuals.

For negative emotions, analyses indicated a non-significant main effect for time,  $F(1.18, 47.26) = 0.04$ ,  $p = 0.96$ ,  $\eta^2 < 0.01$ , and a significant main effect for dysphoria group status,  $F(1, 40) = 9.42$ ,  $p = 0.00$ ,  $\eta^2 = 0.19$ , indicating that the dysphoric group reported more negative emotion. There was also no significant two-way interaction for time  $\times$  dysphoria group status,  $F(1.18, 47.26) = 0.29$ ,  $p = 0.75$ ,  $\eta^2 = 0.01$ . Therefore, in response to positive feedback, the dysphoric and non-dysphoric groups did not significantly differ in positive emotional reactivity (see Fig. 1).

#### 2.1.2. Negative feedback condition

Analyses of positive emotions indicated a non-significant main effect for time,  $F(1.48, 59.19) = 0.67$ ,  $p = 0.52$ ,  $\eta^2 = 0.02$ , and a significant main effect for dysphoria group status,  $F(1, 40) = 15.18$ ,  $p < 0.01$ ,  $\eta^2 = 0.28$ , with dysphoric individuals reporting lower positive emotion. There was also a significant interaction of time  $\times$  dysphoria group status,  $F(1.48, 59.19) = 6.96$ ,  $p = 0.01$ ,  $\eta^2 = 0.15$ . Follow-up analyses of this interaction indicated that the dysphoric group displayed no change over time in positive emotions,  $F(1.35, 24.23) = 0.97$ ,  $p = 0.39$ ,  $\eta^2 = 0.05$ , whereas the non-dysphoric group displayed a significant reduction in positive emotion after receiving negative feedback about their performance,  $F(1.60, 36.85) = 8.24$ ,  $p < 0.01$ ,  $\eta^2 = 0.26$ .

For negative emotion, analyses indicated a significant main effect for time,  $F(1.37, 51.91) = 4.98$ ,  $p = 0.01$ ,  $\eta^2 = 0.12$ , and a significant main effect for dysphoria group status; dysphoric individuals reported significantly more negative emotion,  $F(1, 38) = 9.18$ ,  $p < 0.01$ ,  $\eta^2 = 0.20$ . This was qualified by a significant two-way interaction for time  $\times$  dysphoria group status,  $F(1.37, 51.91) = 10.07$ ,  $p < 0.01$ ,  $\eta^2 = 0.21$ . Follow-up analyses of this interaction indicated that the non-dysphoric group reacted with a significant increase in negative emotion,  $F(1.24, 28.55) = 6.19$ ,  $p = 0.01$ ,  $\eta^2 = 0.21$ . Conversely, the dysphoric group showed no significant change in negative emotion in response to negative feedback,  $F(1.33, 21.20) = 2.60$ ,  $p = 0.11$ ,  $\eta^2 = 0.14$ . Thus, in response to negative feedback, non-dysphoric individuals reported a decrease in positive emotion and an increase in negative emotion, whereas the dysphoric individuals displayed no change in either emotion (see Fig. 1).

#### 2.1.3. Context insensitivity

We next examined whether change in positive and negative emotion significantly differed across feedback conditions within each dysphoria group.

**2.1.3.1. Dysphoric group.** This was tested with a 3 (time: pre, mid, post)  $\times$  2 (feedback condition: positive, negative) mixed plot ANOVA within each dysphoria group. For positive emotion, we observed a non-significant main effect for time,  $F(1.65, 61.00) = 0.56, p = 0.54, \eta^2 = 0.02$ , a non-significant effect for condition,  $F(1, 37) = 0.10, p = 0.76, \eta^2 = 0.00$ , and a non-significant time  $\times$  condition interaction,  $F(1.65, 61.00) = 0.24, p = 0.75, \eta^2 = 0.01$ . These results indicate that positive and negative feedback produces similar levels of positive emotion among dysphoric individuals.

For negative emotions, we observed a non-significant main effect for time,  $F(1.26, 45.22) = 2.93, p = 0.06, \eta^2 = 0.06$ , condition,  $F(1, 36) = 0.09, p = 0.76, \eta^2 = 0.00$ , and time  $\times$  condition interaction,  $F(1.26, 45.22) = 0.26, p = 0.73, \eta^2 = 0.00$ . As with positive emotions, the dysphoric group responded with no significant change in negative emotions to both positive and negative feedback. These results suggest that the emotional responses of the dysphoric group were not sensitive to the valence of the feedback.

**2.1.3.2. Non-dysphoric group.** For positive emotions, analyses revealed a non-significant main effect for time,  $F(1.58, 69.37) = 0.12, p = 0.85, \eta^2 = 0.03$ , and a non-significant effect for condition,  $F(1, 44) = 1.37, p = 0.25, \eta^2 = 0.03$ . However, a significant time  $\times$  condition interaction effect was observed,  $F(1.58, 69.37) = 12.33, p < 0.01, \eta^2 = 0.22$ , indicating that positive emotional response differed across feedback conditions. Non-dysphoric individuals showed a significant increase in positive emotions after receiving positive feedback,  $F(1.54, 33.76) = 5.29, p = 0.02, \eta^2 = 0.19$ , and a significant decrease in positive emotions after receiving negative feedback,  $F(1.60, 36.85) = 8.24, p < 0.01, \eta^2 = 0.26$ .

For negative emotions in the non-dysphoric group, analyses revealed a non-significant effect for time,  $F(1.37, 57.50) = 0.97, p = 0.36, \eta^2 = 0.02$ , and a non-significant effect for condition,  $F(1, 42) = 1.27, p = 0.26, \eta^2 = 0.03$ . However, a significant time  $\times$  condition interaction effect was revealed,  $F(1.37, 57.50) = 10.43, p < 0.01, \eta^2 = 0.20$ , indicating a differential negative emotional response across the feedback conditions. The non-dysphoric group showed a significant decrease in negative emotion after receiving positive feedback,  $F(1.28, 25.68) = 4.78, p = 0.03, \eta^2 = 0.19$ , and reported a significant increase in negative emotion after receiving negative feedback,  $F(1.24, 28.55) = 6.19, p = 0.01, \eta^2 = 0.21$ . Unlike the dysphoric individuals, the emotional response of non-dysphoric individuals significantly differed according to the type of feedback they received.

### 3. Discussion

The current study was designed to extend previous research on the Emotion Context Insensitivity (ECI) hypothesis by specifically manipulating emotions with positive or negative feedback about participants' performance on a task purportedly designed to measure social intelligence. Previous research on the ECI hypothesis had mainly assessed emotional responses to static images and film stimuli. The findings of the current study, using personally evaluative performance feedback, were generally consistent with ECI theory. Specifically, the results suggest that dysphoric individuals have attenuated emotional responses to emotional stimuli and that their emotional responding does not appear to differ across emotional contexts. We next discuss each of these findings in more detail.

#### 3.1. Attenuated emotional reactivity

As hypothesized, for the negative feedback condition, emotional responses of the dysphoric and non-dysphoric groups significantly differed. Non-dysphoric individuals showed a significant decrease in positive emotions and a significant increase in negative emotions after receiving highly negative performance evaluations. In contrast, negative and positive emotions did not significantly change in response to negative feedback for the dysphoric group.

For response to positive feedback, our results were not consistent with our hypotheses, as there were no differences in positive or negative emotional reactivity between our dysphoria groups. Consistent with work demonstrating lower levels of positive emotion across contexts in depression (e.g., Bylsma, 2007, Rottenberg et al., 2005a), the dysphoric group reported overall lower levels of positive emotion and higher levels of negative emotion than the non-dysphoric group. However,

emotional reactivity to the positive feedback did not differ between groups. This finding may be due in part to the potency of our positive feedback manipulation. In response to positive feedback, the main effect of time was significant for negative but not positive emotion. These findings suggest that our positive feedback manipulation may have been more successful in decreasing negative emotion than increasing positive emotion.

Nevertheless, the lack of differential reactivity in response to positive feedback is consistent with previous research. Depressed and non-depressed individuals did not differ in happiness reactivity when viewing positive idiographic film clips (Rottenberg et al., 2005a). Taken together, these results suggest that positive experiences can influence the emotional responses of individuals experiencing a depressed mood. This may imply that treatment techniques which focus on increasing positive experiences (e.g., Behavioral Activation; Dimidjian et al., 2006) may be a particularly effective way to alleviate some of the negative emotion experienced during an episode of depression.

### 3.1.1. *Emotion context insensitivity*

Our results were consistent with the component of ECI that describes inappropriate emotional responses across different contexts among individuals with a depressed mood. Specifically, we observed no differences in the emotional responses of the dysphoric group between the positive and negative feedback conditions. They reported similar levels of both positive and negative emotions across the differing feedback conditions, suggesting a more general deficit in appropriate emotional responding. Alternatively, in the non-dysphoric group, we observed an increase in positive emotion in response to a positive evaluation and an increase in negative emotion in response to a negative evaluation of their performance. This finding is consistent with Rottenberg et al. (2005a) who also found failure to modulate negative emotion in differing contexts. Specifically, using idiographic film stimuli, they found that depressed individuals reported similar levels of sadness in response to films that varied in emotional valence.

### 3.2. *Future directions*

Given that dysphoric individuals appear to have a dysfunction in their emotional responding across contexts, understanding how this contributes to emotion dysregulation in depression is critical. Emotion regulation has been defined by Gross (1998) as a combination of complex processes by which an individual is able to influence, either consciously or unconsciously, their emotional experience and expression. Further, according to Gross's (1998) conceptualization, emotions are dysregulated when their experience or expression has negative consequences either psychologically (e.g., greater duration of negative emotion) or physically (e.g., elevated heart rate and hypertension).

There is evidence that an attenuated emotional response to evocative stimuli may have important, clinically relevant, consequences for depressed individuals. Rottenberg et al. (2002) found that depressed persons reporting the most similar reactions to neutral and sad stimuli (i.e., greatest emotion context insensitivity) had the greatest depression severity. These individuals also had the lowest psychosocial functioning and longest durations for their current depressive episode. Depressed individuals who reported the least sad emotion and showed lower emotional intensity in response to their saddest memories also showed the least improvement of symptoms and predicted higher levels of depressive symptoms at a one-year follow-up (Rottenberg, Joormann, Brozovich, & Gotlib, 2005b). These results suggest that ECI may contribute to the maintenance of an MDD episode.

With this in mind, another promising research direction may be to identify the mechanisms through which ECI occurs by studying the strategies dysphoric and non-dysphoric people use to regulate their emotions. Gross and John (2003) suggest that there are two distinct types of emotion regulation strategies which may be effective for altering an emotional response—antecedent-focused and response-focused. Antecedent-focused strategies occur before emotions are fully generated, while response-focused strategies are strategies that are implemented after the generation of an emotional response and are aimed specifically toward alerting an already elicited emotion. They posit that regulation strategies can be implemented at either of these points (Gross & John, 2003).

Joormann, Siemer, and Gotlib (2007) examined the effects of a response-focused strategy, recall of positive memories, on emotional responding of depressed individuals. They observed that currently

depressed individuals were unable to effectively use this particular strategy to regulate sad mood, suggesting that this response-focused strategy may be less effective for depressed individuals. Given this difficulty with emotion regulation, it seems likely that dysphoric individuals are using maladaptive regulation strategies that attenuate emotion reactivity and enhance emotion context insensitivity.

Suppression, a strategy where an individual tries not to experience a particular thought or emotion, is a common form of emotion regulation used by many people with mood disorders (Cambell-Sills & Barlow, 2007). Suppression is a response-focused strategy and may contribute to the emotional dysfunction evident in depression. Appearing innocuous and even adaptive initially (cf. Anderson & Green, 2001; Beevers & Scott, 2001), trying to avoid or suppress unwanted emotions may ironically serve to maintain depressive symptomology if relied on consistently (Beevers, Wenzlaff, & Hayes, 1999). This form of emotion regulation may also interfere with accurate appraisal of feedback and contribute to an inflexible style of emotion regulation (Clark & Isen, 1982; Nolen-Hoeksema, 1993; Zillman, 1988). In fact, in a sample of socially anxious individuals, a disorder highly comorbid with depression, those individuals who were more likely to suppress their negative emotion displayed greater amounts of anhedonia, measured by number of pleasurable experiences reported (Kashdan & Steger, 2006). These studies suggest that suppression of emotional responses may contribute to maintaining symptoms of depression. Future work should begin to identify whether certain emotion regulation strategies contribute to emotion context insensitivity, as well as exploring strategies aimed at alleviating these dysfunctions.

Finally, future research should more closely examine the effect of negative feedback on positive emotion. Our results indicated that dysphoric individuals displayed a non-significant increase in positive mood when they received negative feedback. This paradoxical pattern is consistent with work in other domains indicating that, under some circumstances, depressed individuals prefer to receive negative rather than positive self-evaluative information (i.e., self-verification; e.g., Swann, Wenzlaff, Krull, & Pelham, 1992). However, in the current study, it should be noted that this effect was subtle and non-significant. Nevertheless, this may be an interesting direction for future work.

### 3.3. Study limitations and strengths

Several limitations of the current study should be noted. The current study examined the subjective emotional response of participants. Emotions influence responding on other levels of analysis, such as the physiological and behavioral, and incorporating such assessments into studies of emotion could produce a more comprehensive understanding of emotion regulation in dysphoria. However, it should be noted that the ECI effects appear to be most robust for self-reported ratings of emotion (e.g., Bylsma et al., 2007). Further, self-reported emotion is typically measured at discrete intervals during an emotional response and may interfere with the regulation of emotion. Other techniques, such as dial methodologies, which assess emotion more continuously and allow for immediate affective rating responses (Fredrickson & Kahneman, 1993), and are perhaps less disruptive, are suggested for future work in this area.

Another study limitation is the lack of a neutral feedback condition. If an additional group had been exposed to the task without any feedback, it would allow for inferences regarding the effect of the social intelligence task on each group. Without this condition, we are unable to confirm if the observed group differences are due to the social intelligence test itself or the performance feedback associated with the task. However, if the task were solely responsible for the observed effects, we would expect emotion change to be unassociated with feedback condition. That is, emotional responses should be similar across the feedback conditions because the social intelligence task was identical across feedback conditions. Instead, we observed mood improvement in the positive feedback condition and mood deterioration in the negative feedback condition (among the non-dysphoric individuals), suggesting that the feedback was indeed responsible for the observed effects.

Additionally, participants were recruited from a convenient sample, comprised mostly of college age participants. This limits the generalizability of findings to less educated or older adults. Further, classification of dysphoric or non-dysphoric was based on self-reported depression severity and not a diagnostic interview. Although the dysphoric group, on average, had BDI-II scores which would place them in the moderate to severe range of depressive symptomology, we cannot determine whether

these results generalize to a clinically depressed population. Also important to note is the possibility that other psychopathology may influence the present findings. Future work should include a diagnostic clinical interview to rigorously assess for additional Axis-I and Axis-II pathology in order to rule-out the effects of more general distress that may present in high scoring individuals on the BDI-II. Finally, the current study is also limited by using an ad hoc measure of emotional states rather than a measure with established psychometric properties. Future work should consider using other such measures (e.g., PANAS; Watson, Clark, & Tellegen, 1988) to assess emotion reactivity.

In addition to these limitations, there are notable strengths of the study. Perhaps a primary strength of this study is our use of a laboratory procedure designed to elicit negative and positive emotion based on feedback about participants' performance. Personal relevance and negative self-views are a central feature of many theories of depression (e.g., Beck, Rush, Shaw, & Emery, 1979); using stimuli which specifically focus on these particular themes allow for a broader, more ecological view the ECI theory. Along these lines, the current study used performance feedback to manipulate emotional states. This is particularly important, as most of the research in this area has examined emotion reactivity to static images or emotional film clips.

#### 4. Summary

In conclusion, the current study supports the two aspects of the ECI hypothesis: dysphoric individuals display diminished emotional reactivity as well as insensitivity to emotional context. Taken together, these results suggest that disturbances in emotion regulation may be a critical mechanism that maintains dysphoria. Continuing to explore emotion regulation strategies, as well as how these strategies influence the experience of emotion may provide important insight into mood regulation strategies that are effective and ineffective for dysphoric populations. A better understanding of emotion regulation in dysphoria holds the promise of improving our understanding of the factors that may maintain an episode of depression.

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