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EVENT PREDICTION AND AFFECTIVE FORECASTING IN DEPRESSIVE COGNITION: USING EMOTION AS INFORMATION ABOUT THE FUTURE

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Abstract

Depression is characterized by a bleak view of the future, but the mechanisms through which depressed mood is integrated into basic processes of future-oriented cognition are unclear. We hypothesized that dysphoric individuals' predictions of what will happen in the future (*likelihood estimation*) and how the future will feel (*affective forecasting*) are attributable to individual differences in incorporating present emotion as judgment-relevant information. Dysphoric individuals ($n = 77$) made pessimistic likelihood estimates and blunted positive affective forecasts relative to controls ($n = 84$). These differences were mediated by dysphoric individuals' tendencies to rely on negative emotion as information more than controls—and on positive emotion less—independent of anhedonia. These findings suggest that (1) blunted positive affective forecasting is a distinctive component of depressive future-oriented cognition, and (2) future-oriented cognitive processes are linked not just to current emotional state, but also to individual variation in using that emotion as information. This role of individual differences elucidates basic mechanisms in future-oriented cognition, and suggests routes for intervention on interrelated cognitive and affective processes in depression.

The mental ability to imagine one's future is a rich component of the human experience (Wilson & Gilbert, 2003), but among depressed individuals, this ability produces a pessimistic view of the future. At its worst, this bleak outlook contributes to hopelessness, depression severity, and suicide attempts (e.g., Abramson, Metalsky, & Alloy, 1989). By definition, depressed individuals' pessimistic predictions of the future exist within a context of affective disturbance. But despite the fact that interrelationships between cognition and emotion are central to depression and treatment (Joormann & Gotlib, 2010), little research has examined how depressed or dysphoric individuals incorporate state emotion into future-oriented cognition. In the present study, we suggest that future-oriented cognition in depression may arise not simply as a function of mood state itself, but also through trait differences in the degree to which individuals use state emotion as information about the future.

BEYOND EVENT PREDICTION: FORECASTING HOW THE FUTURE WILL FEEL

It is well established that depressed individuals hold pessimistic expectations about what the future holds. When depressed and dysphoric individuals are asked to imagine the future, they generate more negative events and fewer positive events than controls (MacLeod & Byrne, 1996) and rate negative events as likely to occur and positive future events as unlikely to occur (MacLeod, Byrne, & Valentine, 1996; Strunk, Lopez, & DeRubeis, 2006). They also feel especially certain in these predictions (Andersen & Lyon, 1987) and make them relatively automatically (Andersen, Spielman, & Bargh, 1992).

However, when people envision the future, they do more than simply assess the likelihood of future events. They also form experiential projections for how those events will feel. These projections—termed *affective forecasts*—depend on error-prone cognitive processes that, even in healthy individuals, typically result in inaccurate and seemingly self-defeating predictions (Wilson & Gilbert, 2003). In healthy populations, people typically overestimate how good positive events will make them feel and how bad negative events will make them feel.

Affective forecasting, in addition to likelihood estimation, may also be implicated in the depressive view of the future. Depressed inpatients rate hypothetical positive events as less pleasurable than healthy controls (MacLeod & Salaminiou, 2001), and dysphoric individuals predict less happiness for winning money in a laboratory lottery task (Yuan & Kring, 2009). When predicting reactions to upcoming events (e.g., Valentine's Day), individuals higher in depressive symptoms make more extreme negative emotion forecasts and less extreme positive emotion forecasts (Hoerger, Quirk, Chapman, & Duberstein, 2012; Wenzel, Gunthert, & German, 2012).

Importantly, people take actions based on what they expect to happen *and* how they expect to feel (Mellers & McGraw, 2001). If depressed individuals predict that future negative events are not only likely but will also feel especially bad, and that future positive events are not only unlikely but also will not feel good even if they were to occur, such affective forecasts may fuel withdrawal, hopelessness, and self-defeating behavior (Marroquín, Nolen-Hoeksema, & Miranda, 2013). As such, a comprehensive view of future-oriented cognition in depression should account for both what people expect to happen and how they expect events to feel.

USING AFFECT AS INFORMATION TO PREDICT THE FUTURE

Depression is a disorder of sadness and dulled positive emotion, so depressed individuals' high-negative, low-positive view of future events follows mood-congruent patterns, just as healthy individuals in negative moods predict negative things in the future (e.g., De-Steno, Petty, Wegener, & Rucker, 2000). Beyond direct mood effects, however, little is known about underlying mechanisms through which affective disturbances are incorporated into future-oriented cognition.

One plausible mechanism is that even in a similar emotional state, depressed and nondepressed individuals *use* emotion differently when predicting the future. Although early theories of mood effects on judgments in nonclinical populations emphasized mood-congruency (e.g., Isen, Shalker, Clark, & Karp, 1978), subsequent investigations advocate a more dynamic affect-as-information approach (see Schwarz & Clore, 2007). This perspective argues that people employ a relatively automatic “How do I feel?” cognitive heuristic when making judgments, and this heuristic is affected by features of the situation (e.g., the judgment-relevance or informational value of the mood source; DeSteno et al., 2000; Schwarz & Clore, 1983, 2007).

Increasingly, evidence suggests that whether individuals use affect as information in cognition depends not just on features of the situation, as has been emphasized in the literature. People also differ in the extent to which they consult (or ignore) emotions as relevant data to guide thinking and behavior, an individual difference that Gasper and Bramesfeld (2006) have labeled *following feelings*. People who pay close attention to their emotions are more responsive to emotional stimuli, more susceptible to mood effects on judgments, and make more mood-congruent likelihood estimates for future events (Gasper & Clore, 2000; Gohm, 2003). Moreover, people’s tendencies to follow feelings—in other words, to notice their emotions, attend to them, and rely on them as informative for judgments and behaviors—are valence-specific. Following negative feelings and following positive feelings are independently and differentially associated with psychological wellbeing, approach and avoidance orientation, and noticing and responding to emotional stimuli in valence-specific patterns (Gasper & Bramesfeld, 2006).

There are reasons to suspect that depressed individuals dispositionally give more weight to negative emotion and less weight to positive emotion, in ways that could account for their cognition about the future. First, tendencies to follow negative feelings more and positive feelings less are associated with subclinical and personality constructs implicated in depression, including self-esteem, neuroticism, motivation, and rumination (Gasper & Bramesfeld, 2006). Second, depressed individuals have difficulty understanding their own emotions (Mennin, Holaway, Fresco, Moore, & Heimberg, 2007) and commonly engage in ruminative cognition to gain insight into the causes and implications of their negative affect (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Finally, depressive psychopathology is characterized by a host of cognitive biases in which attention, memory, and interpretation are oriented toward negative and away from positive information (Joormann & Gotlib, 2010). If individual differences in use of emotion as information—and not just mood state itself—influence the view of the depressive view of the future, this has implications for both basic mechanisms of future-oriented cognition, and how they go awry.

THE PRESENT STUDY

We sought to test whether the bleak view of the future in depression—including affective forecasting—is explained in part by dysphoric individuals’ hypothesized tendency to use emotion differently as information. We had four predictions:

1. Dysphoric individuals would not only make pessimistic predictions of future event occurrence (*likelihood estimation*), but also make blunted positive *affective*

forecasts for future positive events. Due to conflicting findings in the literature (Hoerger, Quirk et al., 2012; MacLeod & Salaminiou, 2001; Wenzel et al., 2012; Yuan & Kring, 2009), we did not have a strong hypothesis for affective forecasting for negative events.

2. . Dysphoric individuals would endorse using negative emotion as information (i.e., following negative feelings) more than nondysphoric controls, and using positive emotion as information less than controls.
3. . Dysphoric versus control differences in use of emotion as information would statistically mediate group differences in likelihood estimation and affective forecasting.
4. . The mediational role of using emotion as information would be independent of mood-congruent effects of anhedonia, a cardinal mood disturbance in depression.

Affective forecasting research in healthy populations frequently examines forecasting accuracy for specific, upcoming events (i.e., the degree to which eventual emotional experience lines up with one's predictions). In depressive cognition, however, the predictions themselves are particularly important, so we instead sought to capture affective forecasts as an event-general component of future-oriented cognition (i.e., what one expects life to feel like when looking out into the future at any given time, irrespective of accuracy). That is, our aim was to examine individuals' current view of the future, and not to examine whether predictions were biased or erroneous relative to actual future outcomes.

METHOD

Participants and Procedure

Participants were recruited for a study on "Personality, Mood, and Memory" from the student body and community surrounding a private university in the northeastern United States. Respondents to advertisements completed the Beck Depression Inventory (BDI-II; Beck, Steer, & Brown, 1996) as a screening measure to determine their eligibility in either the dysphoric group (BDI ≥ 16 , corresponding to at least mild depressive symptoms) or nondysphoric control group (BDI ≤ 5). Of 211 people who participated based on screening score, those who met group criteria during the study session were retained for analysis ($N = 161$).

The final sample included 77 dysphoric individuals (BDI $M = 25.2$, $SD = 7.6$, corresponding to moderate depression levels) and 84 nondysphoric controls ($M = 1.6$, $SD = 1.6$). The sample included 48 men (30%) and 113 women (70%) with an average age of 20.9 years ($SD = 3.1$; range = 18–31). Self-reported ethnicities were White (52%), Asian/Asian-American (26%), Multi-ethnic (8%), Black/African-American (7%), Hispanic (6%), and other (2%).

Participants completed the study online via a secure web server. To obscure hypotheses, measures were embedded among filler tasks. Measures included here were part of a battery of questionnaires measuring anhedonia, future-oriented cognition, depression, and

suicidality; this sample is a subset of a larger study reported in Marroquín et al. (2013). All participants were debriefed and received information on mental health resources.

Measures

Depression Symptoms—The BDI-II (Beck et al., 1996) is a 21-item measure of depressive symptoms, and was used to assign participants to the dysphoric or control group. Participants rated symptoms over the last two weeks from 0 (e.g., I have as much energy as ever) to 3 (e.g., I don't have enough energy to do anything), resulting in a score ranging from 0 to 63. The BDI-II has demonstrated good psychometric properties in clinical and nonclinical samples (Beck et al., 1996). Internal consistency in this sample was excellent (Cronbach's $\alpha = .96$).

Likelihood Estimation—The Future Events Questionnaire (FEQ; Miranda & Mennin, 2007), adapted from work by Andersen and colleagues (e.g., Andersen et al., 1992), measures the individual's perceived likelihood that 17 negative events (e.g., Be rejected by a significant other) and 17 positive events (e.g., Be honored for a major achievement) will happen at some point in the future. In this study, the measure was modified so that participants rated likelihood from -5 (certain that it will not happen) to $+5$ (certain that it will happen). Likelihood estimation scores were calculated separately for negative and positive events by averaging ratings across items of each valence. The estimated likelihood of negative events (FEQ-Neg), and estimated likelihood of positive events (FEQ-Pos) both showed excellent internal consistency (FEQ-Neg $\alpha = .89$; FEQ-Pos $\alpha = .93$).

Affective Forecasting—An affective forecasting task was developed for the present study and measured affective forecasting for 36 hypothetical future events, 18 negative (e.g., A group of friends plans a trip out of town and doesn't invite you) and 18 positive (e.g., A family friend comes to town and takes you to a fancy dinner). Participants were instructed to imagine each event actually happening a month from today, immerse themselves in the experience, and rate how they would feel from 1 (unhappy) to 7 (very happy).

The 36 items were selected from a larger pool of 81 items, including 8 items adapted from Strunk et al. (2006), 42 items adapted from Miranda (2004), and 31 novel items. To minimize effects of event probability and valence ambiguity on affective forecasting, a pre-testing sample of undergraduates rated these items on valence and likelihood of occurrence; the final 36 items were those with a clear negative or positive valence and moderate-to-high likelihood of occurrence. Affective forecasting scores for negative events (AF-Neg) and positive events (AF-Pos) were computed by averaging ratings across the constituent items of each valence. Both showed very good internal consistency (AF-Neg $\alpha = .83$; AF-Pos $\alpha = .90$).

Following Feelings—Individual differences in use of emotion as information (following feelings) were measured with the Following Negative Feelings and Following Positive Feelings subscales of the Following Affective States Test (FAST; Gasper & Bramesfeld, 2006). The FAST has shown good convergent and discriminant validity, predicting valence-specific attention, responsiveness to affective stimuli, and use of affect in decision-making,

and adds incremental validity to valence-general measures of attention to emotion (Gasper & Bramesfeld, 2006). Each subscale includes 4 items (e.g., Following Negative: I pay attention to my negative feelings; Following Positive: When I am feeling good about something, I often pursue it). Responses for each item range from 0 (strongly disagree) to 6 (strongly agree); subscale scores are computed by averaging across constituent items. Both subscales showed adequate internal consistency in this sample (Following Negative $\alpha = .82$; Following Positive $\alpha = .74$).

Anhedonia—The Snaith-Hamilton Pleasure Scale (SHAPS; Snaith et al., 1995) is a 14-item measure of state anhedonia. Participants rated how much pleasure they would receive from various activities in the last few days on a 4-point scale; higher scores indicate higher anhedonia. The SHAPS has good psychometric properties in both nonclinical and patient samples, and showed very good internal consistency in this sample (Cronbach's $\alpha = .89$).

RESULTS

Dysphoria Group Differences

To test our primary hypotheses, we first compared dysphoric and control groups on all study variables. Consistent with prior literature, dysphoric individuals estimated future negative events to be significantly more likely than controls (dysphoric $M = 1.34$, $SD = 1.38$; nondysphoric $M = -0.58$, $SD = 1.48$), $t(159) = 8.47$, $p < .01$, $d = 1.34$; and positive events significantly less likely (dysphoric $M = 1.24$, $SD = 1.65$; nondysphoric $M = 2.88$, $SD = 1.16$), $t(159) = 7.38$, $p < .01$, $d = -1.14$.

Supporting our affective forecasting hypothesis, dysphoric individuals made significantly blunted positive forecasts for future positive events ($M = 5.76$, $SD = 0.69$) relative to nondysphoric individuals ($M = 6.07$, $SD = 0.44$), $t(159) = 3.40$, $p < .01$, $d = -0.53$. Groups did not differ in forecasts for negative events (dysphoric $M = 2.30$, $SD = 0.54$; nondysphoric $M = 2.32$, $SD = 0.44$), $t(159) = 0.25$, $d = -0.04$.

Supporting predictions regarding differential use of emotion as information, dysphoric individuals reported following negative feelings significantly more ($M = 4.05$, $SD = 1.22$) than nondysphoric controls ($M = 2.36$, $SD = 1.15$), $t(159) = 9.02$, $p < .01$, $d = 1.42$, and following positive feelings significantly less ($M = 3.60$, $SD = 1.08$, versus $M = 4.36$, $SD = 0.81$), $t(159) = 5.08$, $p < .01$, $d = -0.79$. As expected, dysphoric individuals reported significantly higher anhedonia ($M = 28.09$, $SD = 6.73$, versus $M = 20.54$, $SD = 4.76$), $t(159) = 8.28$, $p < .01$, $d = 1.28$.

Correlations Among Study Variables

Correlations among variables, stratified by dysphoria group, are presented in Table 1, with dysphoric individuals above the diagonal. As predicted, among dysphoric individuals, following negative feelings was associated with estimating negative events to be more likely and feeling worse, and positive events as less likely. Following positive feelings was associated with viewing positive events as more likely and feeling better, but not with predictions for negative events. Among nondysphoric individuals, following positive feelings showed the same pattern regarding positive future events, but following negative

feelings was significantly associated only with viewing negative events as more likely. As hypothesized, following positive feelings was associated with more extreme affective forecasts for positive events among dysphoric and nondysphoric participants. Unexpectedly, however, among dysphoric individuals, following negative feelings was also associated with more positive affective forecasts for positive events.

Does Use of Emotion as Information Account for Differences in Future-Oriented Cognition?

We hypothesized that differences in use of emotion as information would help account for group differences in future-oriented cognition, above and beyond effects of state anhedonia. We conducted a series of hierarchical linear regressions, each predicting a future-oriented cognition variable (Table 2). The first step of each regression included dysphoria group (with controls as the reference group), representing the group differences reported above. Following negative feelings and following positive feelings were entered in the second step, and anhedonia in the third. To formally test mediation, we employed the bootstrapping method recommended by Preacher and Hayes (2008) to account for multiple mediators. Estimates of indirect effects (*ab* paths) of the group difference through the potential mediators are also reported in Table 2. Estimates were based on 5,000 resamples and are interpreted as statistically significant when confidence intervals do not include 0.

Likelihood Estimation—In the model predicting negative event likelihood, when following feelings variables were added in the second step, the effect of dysphoria group decreased from $\beta = 0.56, p < .01$, to $\beta = 0.31, p < .01$, suggestive of partial mediation, and the variance accounted for was significantly increased, Adjusted $R^2 = .41$, $F(2, 157) = 14.52, p < .001$. The addition of anhedonia in the third step did not significantly explain additional variance, Adjusted $R^2 = .41$, $F(1, 156) = 0.78, p = .38$. The significant association of following negative feelings (but not following positive feelings) with negative-event likelihood estimation remained. Supporting our mediation hypothesis, bootstrapping analyses indicated that following negative feelings uniquely significantly mediated the group difference.

In the model predicting positive event likelihood, the addition of following feelings variables significantly decreased the effect of dysphoria status from $\beta = -0.51, p < .01$, to $\beta = -0.24, p < .01$, and significantly increased the variance accounted for, Adjusted $R^2 = .43$, $F(2, 157) = 25.90, p < .001$. State anhedonia further increased the variance accounted for in the third step, Adjusted $R^2 = .47$, $F(1, 156) = 11.85, p < .01$, and the group effect decreased to statistical nonsignificance, $\beta = -0.13, p = .10$. Despite this expected role of anhedonia, following negative and following positive feelings remained significant predictors of positive-event likelihood estimates, and significantly mediated the group difference, independent of anhedonia.

Affective Forecasting—In the model predicting positive-event affective forecasts, the addition of following feelings did not significantly diminish the group difference term, but did add significantly to the variance accounted for, Adjusted $R^2 = .43$, $F(2, 157) = 22.27, p < .001$. Adding anhedonia in the third step increased the variance accounted for, Adjusted R^2

$= .38$, $F(1, 156) = 32.04$, $p < .001$, and the effect of dysphoria group decreased from $\beta = -0.27$, $p < .01$, to $\beta = -0.07$, $p = .41$. The associations of following negative and following positive feelings with positive-event affective forecasts remained despite this expected contribution of anhedonia, and both significantly mediated the group difference in forecasts, beyond the mediating role of anhedonia. However, the direction of the indirect effect on positive affective forecasts through following negative feelings was contrary to hypotheses. This effect consisted of dysphoric individuals being higher in following negative feelings (a path coefficient = 1.69, $SE = 0.19$, $p < .01$), and following negative feelings being associated with more positive forecasts (b path coefficient = 0.13, $SE = 0.03$, $p < .01$).

Although groups did not differ in affective forecasting for negative events, following feelings significantly increased the variance accounted for in the full model, Adjusted $R^2 = .04$, $F(2, 157) = 5.77$, $p = .01$, and anhedonia marginally added to the variance accounted for, Adjusted $R^2 = .05$, $F(1, 156) = 3.33$, $p = .07$. The full model suggested that following negative feelings, but not following positive feelings or anhedonia, was associated with negative-event forecasts, relatively independently of dysphoria status.

DISCUSSION

Our findings support the hypothesis that the pessimistic view of the future in depression is attributable not merely to the dysphoric state itself, but also to the tendency to use negative emotion as information more—and positive emotion less—in cognition. Individuals high in depressive symptoms not only saw the future as full of negative events and lacking in positive events—consistent with previous research—but also expected future positive events to feel less positive even if they were to occur. As hypothesized, these predictions were mediated by individual differences in use of emotion as information, beyond the role of mood congruence.

These findings suggest that individuals high in depressive symptoms view the future pessimistically not only in terms of what events will happen, but also how those events will feel if they do happen. They extend previous research on individuals high in depressive symptoms by showing affective forecasting is blunted not just for immediately upcoming events (e.g., Hoerger, Quirk et al., 2012; Yuan & Kring, 2009), but across a range of hypothetical future positive events. Because behavior is guided by both what individuals expect to happen and how they expect those events to feel (Mellers & McGraw, 2001), blunted affective forecasts may be implicated in the self-defeating, avoidant, and escapist behaviors common to depressive episodes (Marroquín et al., 2013). Indeed, the curious pattern of overestimated positive affect observed in healthy populations (Wilson & Gilbert, 2003) may be adaptive in part because it promotes the pursuit of rewarding outcomes impaired in depression.

Moreover, our mediation findings suggest that dysphoric individuals' distinct approaches to weighing positive and negative emotion as relevant data are underlying cognitive traits through which current distress is (or is not) incorporated into the view of the future. Their relatively high tendency to follow negative feelings mediated group differences in likelihood estimation and affective forecasting, whether the events themselves were negative or

positive. By contrast, their tendency not to follow positive feelings accounted for likelihood estimation and affective forecasting specifically for positive events. This specificity may be important, in light of the specific role of low positive-event prediction in depressive cognition (versus high negative expectancies; Miranda & Mennin, 2007).

The present findings suggest that dysphoric individuals' tendency not to use positive emotion may be a cognitive mechanism distinguishing depressive future-oriented thinking from more general mood effects. Moreover, the tendency to under-use positive emotion played a role independent of anhedonia. Thus, the alternative explanation that the dysphoric view of the future is explained by blunted positive emotion in the present alone (i.e., mood congruency) is insufficient. It seems that both blunted positive emotion and the cognitive tendency to not use positive emotion as information are implicated in the depressive view of the future.

Our finding that dysphoric individuals did not make more negative affective forecasts for negative events is consistent with studies of depressed clinical samples or dysphoric analogues, as in the present study (MacLeod & Salaminiou, 2001; Yuan & Kring, 2009), but contradicts others examining depressive symptoms in unselected samples (Hoerger, Quirk et al., 2012; Wenzel et al., 2012). These mixed findings in the literature may exemplify the specific importance of positively-valenced events in depressive future-oriented cognition (e.g., Miranda & Mennin, 2007), or point toward clinically significant symptoms as an important moderator of forecasting effects. Importantly, this study did not seek to examine forecasting accuracy. It may be that because healthy individuals typically overestimate negative affect, their forecasts for negative events are more like dysphorics', but less accurate.

Our overall hypotheses regarding emotion as information about the future were supported, but the finding that dysphoric individuals' tendency to follow negative feelings was associated with increased positive affective forecasts is counterintuitive. One speculation for future research is that this effect represents a more global, valence-general construct of following feelings in affective forecasting (e.g., a general tendency to rely on emotion leading to overprediction of all future affect). Another is that using emotion as information depends on other meta-emotional abilities as inputs for cognitive processing, abilities that are also implicated in psychopathology (e.g., emotional clarity; Vine & Aldao, 2014). The tendency among dysphorics to follow negative feelings may thus capture broader misuse of affective states when forecasting affect (see Hoerger, Chapman, Epstein, & Duberstein, 2012).

Several limitations of the present study should be addressed in future work. First, experimental work manipulating perceived relevance of emotion in dysphoric samples is required to support causation. Second, prospective work can examine how chronic differences in following feelings interact with shorter-term emotional experience among healthy and depressed individuals. Together, such designs can help determine whether following feelings represents a cognitive vulnerability to depression, a correlate of the depressive state, or both. Consistent with a trait vulnerability/protection account, in an unselected sample Marroquín and Nolen-Hoeksema (under review) found that individuals'

tendencies to follow negative and positive feelings interacted with induced state sadness to produce the pattern of future-oriented cognition found in dysphoric and depressed samples, including the present study. Future research in this vein can examine the role individuals' use of emotion as information plays alongside situational factors (e.g., emotion-eliciting events) and other internal factors plausibly relevant to predicting the future (e.g., emotion intensity; history of depressive episodes).

An additional concern for future research is that use of emotion as information was measured here by self-report. Gasper and Bramesfeld (2006) showed correlations between self-reported following feelings and behavior, but future work might employ performance-based measures to capture individual differences. Importantly, mood disturbance is part of the dysphoric state itself; future research (e.g., Marroquín & Nolen-Hoeksema, under review) should rule out other components of the depressive state, rather than mood disturbance per se, that may have contributed to effects. Finally, dysphoric participants in the present study endorsed moderate levels of depressive symptoms, but future research might establish whether these processes extend to clinically diagnosed individuals.

Cognitive approaches to depression and treatment have long emphasized how biased cognitive processes exacerbate emotional disturbance (e.g., Beck, 1967). Individual differences in using affect as information have not been emphasized in the basic literature until recently (Gasper & Bramesfeld, 2006; Gasper & Clore, 2000). Similarly, affective forecasting research has only recently begun to examine individual differences (e.g., Hoerger, Chapman et al., 2012), including psychopathology. The relations among individual cognitive differences, changing mood states, and situational contexts can elucidate both adaptive and maladaptive processes of future-oriented cognition. Understanding the mechanisms and cognitive vulnerabilities through which emotional distress in the present results in a depressive view of the future may not only illuminate avenues for intervention, but also elucidate the basic human capacity to imagine the future, for better or worse.

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TABLE 1

Zero-Order Correlations among Study Variables

	Following Negative Feelings	Following Positive Feelings	SHAPS	FEQ-Neg	FEQ-Pos	AF-Neg	AF-Pos
Following Negative Feelings	—	-.14	.04	.41**	-.36**	-.32**	.39**
Following Positive Feelings	-.34**	—	-.42**	-.11	.47**	-.17	.40**
SHAPS	.09	-.24*	—	.12	-.35**	.21	-.51**
FEQ-Neg	.38**	-.18	.09	—	-.29*	-.35**	.14
FEQ-Pos	-.19	.46**	-.41**	-.08	—	.11	.27*
AF-Neg	-.02	-.04	.12	-.001	-.14	—	-.37**
AF-Pos	-.17	.38**	-.42**	-.07	.35**	-.50**	—

Notes. Dysphoric group ($N = 77$) above the diagonal; control group ($N = 84$) below the diagonal. Following Negative and Following Positive = subscales of Following Affective States Test. SHAPS = total score on Snaith-Hamilton Pleasure Scale. FEQ = Predicted likelihood of future negative and positive events on Future Events Questionnaire; AF = Affective forecasts for future negative and positive events in affective forecasting task.

*
 $p < .05$;

**
 $p < .01$.

TABLE 2
Using Emotion as Information Mediates Group Differences in Likelihood Estimation and Affective Forecasting

Predictor	FEQ-Neg		FEQ-Pos		AF-Neg		AF-Pos	
	β	Model Adj R^2	β	Model Adj R^2	β	Model Adj R^2	β	Model Adj R^2
Hierarchical Linear Regressions								
<i>Block 1</i>								
Dysphoria Group	.56**	.31 ⁺	-.51**	.25 ⁺	-.02	< .001	-.26**	.06 ⁺
<i>Block 2</i>								
Dysphoria Group	.31**	.41 ⁺	-.24**	.43 ⁺	.07	.04 ⁺	-.27**	.26 ⁺
Following Negative	.39**		-.20**		-.27**		.32**	
Following Positive	-.05		.39**		-.18**		.47**	
<i>Block 3</i>								
Dysphoria Group	.28**	.41 ⁺	-.13	.47 ⁺	-.01	.05 ⁺	-.07	.38 ⁺
Following Negative	.39**		-.21**		-.26**		.31**	
Following Positive	-.03		.31**		-.12		.33**	
Anhedonia	.07		-.25**		.18		-.45**	
Indirect Effects of Dysphoria Group Difference through Mediators								
Following Negative								
<i>b</i> (SE)	0.78 (0.19)*		-.39 (0.15)*		-.015 (0.07)*		0.21 (0.06)*	
95% CI	[0.45, 1.19]		[-0.72, -0.13]		[-0.29, -0.03]		[0.10, 0.36]	
Following Positive								
<i>b</i> (SE)	0.03 (0.10)		-.37 (0.10)*		0.04 (0.03)		-.14 (-0.04)*	
95% CI	[-0.15, 0.24]		[-0.62, -0.20]		[-0.01, 0.12]		[-0.24, -0.08]	
Anhedonia								
<i>b</i> (SE)	0.14 (0.14)		-.46 (0.14)*		0.10 (0.06)		-.29 (0.07)*	
95% CI	[-0.13, 0.42]		[-0.76, -0.19]		[-0.01, 0.21]		[-0.44, -0.16]	

Coefficients in bold correspond to statistically significant mediators. Estimates of indirect effects are based on 5,000 bootstrap resamples, reported with 95% bias-corrected and accelerated confidence intervals. Dysphoria group coded with nondysphoric controls as the reference group. FEQ = Predicted likelihood of future negative and positive events on Future Events Questionnaire; AF = Affective forecasts for future negative and positive events in affective forecasting task; Anhedonia = total score on Snaith-Hamilton Pleasure Scale; Following Negative and Following Positive = subscales of Following Affective States Test.

+ Denotes statistically significant model *F* change from previous block.

.1

*

.5

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