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Anticipation of affect in dysthymia: Behavioral and neurophysiological indicators

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Abstract

Anticipation for future affective events and prediction uncertainty were examined in healthy controls and individuals with dysthymia (DYS) using behavioral responses and the contingent negative variation (CNV) and post-imperative negative variation (PINV) event-related potential (ERP) components. Warning stimuli forecasted the valence of subsequently presented adjectives (“+”, positive; “=”, neutral; “−”, negative), and participants indicated whether each adjective would describe them over the next two weeks. Controls expected fewer negative, and individuals with DYS expected fewer positive, adjectives to apply to them. CNV amplitudes were enhanced in controls prior to positive versus other adjectives. Response times and PINV amplitudes were greater following neutral compared to other adjectives, and PINV was larger overall in dysthymics compared to controls. In sum, healthy controls and individuals with DYS exhibit different behavioral and neurophysiological biases in anticipation for future affective events. These results are discussed in the context of cognitive theories of depression.

Keywords: Dysthymia; Depression; Affective bias; Anticipation; Event-related potentials

Cognitive theories posit that individuals with unipolar mood disorders have biased processing of affective events (Abramson et al., 1978, 1989; Beck, 1967, 1987). In particular, individuals with depressive disorders may expect to experience more negative outcomes and fewer positive outcomes than psychologically healthy individuals. Mood-congruent processing of past or current affective events has been demonstrated using measures of both behavior (for meta-analyses see Casement et al., in preparation; Matt et al., 1992) and brain activity (for review see Shestyuk and Deldin, in press). However, there is less empirical evidence that expectations for *future* affective events are biased in mood disorders. The present research evaluates future-oriented affective biases in individuals with dysthymia (DYS) and healthy controls using both behavioral and neurophysiological indices. Cognitive biases are particularly pronounced in individuals with chronic mood disorders such as DYS (McCullough et al., 1988, 1994; Riso et al., 2003), and the continuation of depressive symptoms over a period of years may be especially likely to change expectations for future affective experience.

Participants in this study completed a two-stimulus imperative response task. A symbol forecasted the affective valence of a subsequently presented adjective (“+”, positive; “=”, neutral; “−”, negative), and participants indicated whether each adjective would likely describe their general feeling about themselves over the next two weeks. The percent of positive, neutral, and negative adjectives anticipated to be self-referent provided a behavioral measure of future-oriented affective bias,

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and the time taken to make these judgments provided a behavioral measure of response uncertainty. Existing research using a similar procedure indicates that individuals with major depression expect more negative and fewer positive adjectives to apply to them than healthy controls, but the amount of time taken to make self-reference judgments did not vary significantly as a function of depressive state or adjective valence (Serfaty et al., 2002).

Event-related potential (ERP) components elicited during the response task were examined to determine the extent of neurophysiological biases in affect anticipation and response uncertainty. In particular, potential biases in affective stimulus anticipation and response preparation were examined using the contingent negative variation (CNV) component preceding an imperative stimulus (for a review, see Fabiani et al., 2007; McCallum, 1988; Rockstroh et al., 1989). Potential differences in uncertainty during indications of adjective future self-reference were examined using the post-imperative negative variation (PINV) component following an imperative stimulus (for a review see McCallum, 1988; Rockstroh et al., 1989). Very few studies have used CNV or PINV to index affective processing biases in mood disorders, and existing research fails to find an effect of affective valence on these ERP components (Serfaty et al., 2002; Yee and Miller, 1988). Rather, individuals with major depression generally demonstrate non-valence-specific decreases in CNV amplitudes (less anticipation and response preparation; Ashton et al., 1988; Giedke and Bolz, 1980; Timsit-Berthier, 1993), and increases in PINV amplitudes (more response uncertainty; Kessler et al., 1992; Knott et al., 1991; Serfaty et al., 2002; Thier et al., 1986), compared to healthy controls.

The present study addresses a need for further research on chronic forms of depression such as DYS, and is unique in its combined use of behavioral measures and the CNV and PINV ERP components to examine future-oriented, self-referent affective biases. Consistent with evidence for a positive bias in non-depressed individuals (Abramson et al., 1978, 1989), healthy controls were hypothesized to have increased anticipation and response certainty for positive events (i.e., more indications of adjective future self-reference, larger CNV, shorter response times, smaller PINV), and decreased anticipation and response certainty for negative events (i.e., fewer indications of adjective future self-reference, smaller CNV, longer response times, larger PINV), compared to neutral events. Consistent with evidence for a negative bias in depressed individuals (Abramson et al., 1978, 1989; Beck, 1967, 1987), participants with DYS were expected to have increased anticipation and response certainty for negative events, and decreased anticipation and response certainty for positive events, compared to neutral events. Furthermore, these mood-congruent anticipation biases were expected to differentiate individuals with DYS from healthy controls.

1. Method

1.1. Participants

Participants included 15 healthy controls and 12 individuals with current DYS between 18 and 65 years of age. Participants were recruited through newspaper advertisements and fliers placed in outpatient psychiatric clinics within the greater Boston area. Diagnoses were determined using the Structured Clinical Interview for the DSM-IV (SCID; First et al., 1995) administered by a doctoral level clinician (PJD) or research assistants trained in SCID administration. Twenty-five percent of the SCID interview tapes were reviewed by a second rater to confirm diagnoses. Five DYS participants had comorbid major depressive disorder. Groups were balanced for sex, handedness (Edinburgh Handedness Questionnaire; Oldfield, 1971), age, and education, and differed predictably on measures of depression (Beck Depression Inventory; BDI; Beck et al., 1961; Beck Hopelessness Scale; BHS; Beck et al., 1974) and anxiety (State/Trait Anxiety Inventory; STAIS/STAIT; Spielberger et al., 1970; see Table 1). Individuals taking psychiatric medications and those with a history of cognitive impairment, major medical illness, substance abuse or dependence, head injury with loss of consciousness over 10 min, or seizure disorder were excluded from the study. All participants provided written informed consent and were paid $10/h.

1.2. Materials

Emotional adjectives were selected from a list of 310 adjectives rated by 146 undergraduates for valence and arousal using two 5-point Likert scales ranging from very positive (1) to very negative (5), and very arousing (1) to very calm (5), respectively. Adjectives were then ranked according to mean valence ratings, and the 40 most positive (e.g., ‘‘vivacious’’, ‘‘thrilled’’, ‘‘creative’’, ‘‘loved’’), neutral (e.g., ‘‘acceptable’’, ‘‘silent’’, ‘‘tolerable’’, ‘‘unchanging’’), and negative (e.g., ‘‘miserable’’, ‘‘humiliated’’, ‘‘wretched’’, ‘‘guilty’’) adjectives were selected for use in the present study. Adjectives in each valence condition were balanced for word length, $F(2, 117) = 0.34$, $p > 0.1$, and

Table 1
Group Demographics and Self-Report Questionnaire Scores

	CTL ($n = 15$)	DYS ($n = 12$)	χ^2/F	p
Gender	10♀, 5♂	6♀, 6♂	χ^2 (1) = 0.8	>0.10
Handedness	13 R, 2 L	9 R, 2 L, 1 A	χ^2 (2) = 1.4	>0.10
Age	31.6 (11.7)	35.8 (15.2)	$F(1, 25) = 0.9$	>0.10
Education	16.3 (1.3)	15.3 (2.0)	$F(1, 23) = 4.3$	>0.10
BDI	2.6 (3.5)	22.6 (9.9)	$F(1, 25) = 53.2$	<0.001
BHS	1.6 (1.2)	12.4 (4.7)	$F(1, 25) = 73.7$	<0.001
STAIS	26.3 (5.4)	38.1 (12.5)	$F(1, 25) = 10.8$	<0.01
STAIT	30.1 (5.4)	57.1 (10.0)	$F(1, 25) = 80.1$	<0.001

Note: Handedness was assessed using the Edinburgh Handedness Questionnaire (Oldfield, 1971; R = right handed, L = left handed, A = ambidextrous). Means (and standard deviations) are provided for age, number of years of education, and self-report questionnaire scores (Beck Depression Inventory; BDI; Beck et al., 1961; Beck Hopelessness Scale; BHS; Beck et al., 1974; State/Trait Anxiety Inventory; STAIS/STAIT; Spielberger et al., 1970). Post-hoc testing for all self-report questionnaire scores indicates that healthy controls (CTL) differed significantly from individuals with DYS. Education was unavailable for two control participants and these data are therefore omitted from this select demographic analysis.