



Research report

## Cross-sectional and longitudinal relations between affective instability and depression

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### ARTICLE INFO

*Article history:*

Received 5 June 2010

Received in revised form 13 September 2010

Accepted 18 September 2010

Available online 16 October 2010

*Keywords:*

Major depressive disorder

Affective instability

Affect intensity

Affect lability

Mood variability

### ABSTRACT

**Background:** There is a growing recognition that emotional traits are important for understanding many mental health disorders, including major depressive disorder (MDD). The present research examined (a) the relation between MDD and the emotional trait of affective instability, and (b) whether individual facets of affective instability, affect intensity and affect variability, exhibited unique relations with anhedonic depression.

**Methods:** In Study 1, affective instability and MDD were both assessed via clinical interviews in an adult community sample ( $n = 288$ ). In Studies 2 and 3, the relations between anhedonic depression and affect variability and affect intensity were assessed cross-sectionally using self-report measures in a college student sample ( $n = 142$ ; Study 2) and a female community sample ( $n = 101$ ; Study 3). Study 3 also prospectively examined whether affect variability and/or intensity predicted changes in anhedonic depression over two months.

**Results:** In Study 1, affective instability and MDD were significantly associated, even after excluding individuals experiencing a current major depressive episode. In Studies 2 and 3, affect variability but not affect intensity was significantly, positively associated with anhedonic depression. In Study 3, affect variability but not affect intensity prospectively predicted increases in anhedonic depression.

**Limitations:** Future studies should assess the entire Bipolar Disorder spectrum and utilize event sampling, permitting the examination of other facets of affective instability (e.g., temporal dependency) and address other limitations of retrospective measures (e.g., recall bias).

**Conclusions:** These findings suggest that affective instability and particularly affect variability are associated with MDD and anhedonic depression. The tendency to experience frequent fluctuations in mood may constitute an important risk factor for depression.

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Research examining Major Depressive Disorder (MDD) and emotional experiences has mostly focused on the valence of emotion, or the extent to which one feels negative affect (NA) or positive affect (PA). The finding that individuals diagnosed with MDD exhibit elevated levels of NA and diminished levels of PA is widely documented (e.g., Jolly et al., 1994; Watson et al., 1988a). There is a growing recognition, however, that other emotional traits are important for

understanding the etiology and course of psychopathology, including depressive disorders (e.g., Akiskal et al., 2006b; Berenbaum et al., 2003; Gratz and Roemer, 2004; Mennin et al., 2007). For example, lower levels of clarity of emotion are associated with MDD (Ehring et al., 2008; Loas et al., 1998). The present research examined the association between depression and the emotional trait of affective instability. Although there is no agreed upon definition of affective instability (e.g., Trull et al., 2008; Miller and Pilkonis, 2006), we define affective instability as a multi-faceted construct composed of frequent and intense fluctuations in emotion in response to both pleasant and unpleasant events.

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Affective instability and depression share several common correlates, which suggest that they are likely to be associated with each other. First, affective instability is positively related to trait NA (e.g., Miller et al., 2009) and neuroticism (Miller and Pilkonis, 2006), both of which are associated with depression (NA: e.g., Jolly et al., 1994, Watson et al., 1988a; neuroticism: e.g., Roberts and Kendler, 1999). Second, it is estimated that 10 to 30% of individuals diagnosed with MDD have borderline personality disorder (e.g., Corruble et al., 1996), of which affective instability is a symptom (American Psychiatric Association, 2000).

There are also theoretical reasons to expect affective instability to be associated with depression. High levels of affective instability may lead to stressful life events (e.g., break-up, getting fired from a job). For example, affective instability has been linked to interpersonal impairment (e.g., romantic relationships; Miller and Pilkonis, 2006). Past research has found that individuals with MDD appear to play a role in the generation of stressful life events (e.g., Daley et al., 1997). High levels of affective instability may be contributing to these stressful life events. Affective instability could also be associated with depression via cognitive biases (see Joormann, 2009, for a review). Individuals vulnerable to and diagnosed with MDD exhibit a variety of negative cognitive biases in attention, memory and the interpretation of ambiguous information (e.g., Mathews and MacLeod, 2005; Alloy et al., 2006). In effect, daily events are experienced through a negative lens, which may lead to stronger and/or more frequent changes in emotional reactions. Finally, our own clinical observations suggest that individuals with MDD in major depressive episodes often provide qualitative descriptions of their mood which seem to be indicative of affective instability (e.g., experiencing a “rollercoaster” of emotions).

Both affect intensity and affect variability are considered to be facets of affective instability by many researchers (Henry et al., 2001; Koenigsberg et al., 2002; Larsen, 1987; Miller and Pilkonis, 2006; Thompson et al., 2009). One way to better understand the relation between affective instability and depression may be to examine the relations between facets of affective instability and depression. Affect intensity refers to the magnitude with which individuals typically experience pleasant and unpleasant emotions (Diener et al., 1985; Larsen and Diener, 1987). Affect variability is the frequency in which one's emotional reactions change, irrespective of the nature or valence of these reactions.

Though the relation between MDD and affect intensity has not been examined, several studies have examined relations between depressive symptoms and affect intensity. Affect intensity is frequently measured via self-report instruments like the Affect Intensity Measure (AIM; Larsen et al., 1986). Though previous research has found statistically significant associations between affect intensity and depressive symptoms, the correlation coefficients between various measures of affect intensity and depressive symptoms have varied and tended to be fairly small (ranging from 0.06 to 0.23; Flett et al., 1996; Mennin et al., 2005; Mennin et al., 2007; Oliver and Simons, 2004; Thorberg and Lyvers, 2006). Further, to the best of our knowledge to date no research on affect intensity has taken into account NA or gender, both of which are highly

correlated with depression (NA: Watson et al., 1988a; gender: Kessler et al., 2003).

Although more research has examined the relation between MDD and affect variability than the relation between MDD and affect intensity, the results of such research have been inconsistent. Some research has found positive relations between affect variability and depressive symptoms. A series of studies with student samples have found that affect variability was positively associated with depressive symptoms (Kuppens et al., 2007, McConville and Cooper, 1996, Oliver and Simons, 2004). Similarly, in a community sample, Angst et al. (2003) reported that the rates of ‘ups and downs of mood’ was the strongest risk factor for diagnoses of depressive disorders even after taking into account gender. In an experience sampling study, Peeters et al. (2006) found that depressed individuals reported more variability in state NA but not state PA than did controls.

Other research has found either a weak relation or an inverse relation between affect variability and depression. To assess individual's eligibility for participation, Solhan et al. (2009) assessed mood variability among individuals with MDD or dysthymia receiving outpatient treatment for MDD; less than 4% met their criteria for affective instability. Because the comparison group included individuals with borderline personality disorder, how this rate compares to healthy control participants remains unclear. Compared to a healthy control group, Cowdry et al. (1991) found that individuals with MDD had lower levels of ‘mood variability.’ Golier et al. (2001) found that individuals with MDD did not differ from healthy controls in ‘mood variability’ measured using one bipolar item with anchors of ‘sad’ and ‘happy’. The groups did differ, however, on ‘mood variability’ measured using another bipolar item with anchors of anxious and relaxed, with individuals with MDD reporting less variability. Inconsistencies in past research could be due to a variety of reasons, including: 1) the use of different measures; 2) not distinguishing among facets of affective instability; or 3) not examining other critical variables (e.g., trait NA, current mood, gender) associated with depression.

In a series of three studies, we systematically examined the relation between affective instability and depression. Specifically, we tested the associations between affective instability and MDD (Study 1) and depressive symptoms (Studies 2 and 3). Based on our theorizing above, we hypothesized that affective instability would be positively associated with MDD and depressive symptoms. In Study 1, we examined the relation between MDD and affective instability as assessed with a clinical interview in a community sample. In Study 2, we examined whether two facets of affective instability, affect variability and affect intensity, were associated with depressive symptoms in a large cross-sectional study with college students. In Study 3, which utilized a prospective longitudinal design, we examined whether affect variability and/or affect intensity predicted changes in depressive symptoms in a sample of community women.

Because elevated levels of trait negative emotionality have been found to be associated with most forms of psychopathology, particularly forms of distress such as depression (e.g., Watson et al., 2005), we also explored whether affective instability would be associated with MDD/depressive symptoms even after taking into account NA (Studies 1 and 2) or

baseline depressive symptoms (Study 3). Furthermore, we examined the relation between depression and affective instability after taking into account gender, which is also a strong predictor of MDD and depressive symptoms (e.g., Kessler et al., 2003).

## 2. Study 1

### 2.1. Method

#### 2.1.1. Participants and procedure

Participants were 288 adults from a large project examining pathways to disturbed emotions, perceptions, and beliefs (Berenbaum et al., 2008). Recruitment procedures were intended to result in higher levels of psychopathology than would be found in an unselected community sample. Additional details regarding recruitment and the nature of the sample can be found in Study 2 of Berenbaum et al. (2008). For the purposes of this paper, individuals who were given bipolar disorder diagnoses were excluded ( $n=15$ ). The participants were approximately evenly split by gender (54.2% female), and ranged in age from 18 to 89 ( $M=43.5$ ,  $SD=17.6$ ). The sample was 79.9% European American, 9.5% African American, 4.9% Asian American, 2.5% Latino/a, 1.4% Native American, and 1.8% Biracial or “other”. Procedures for this study were approved by the university’s Institutional Review Board. Participants provided informed consent and received monetary compensation in exchange for their participation. Participants completed the diagnostic interviews listed below over two sessions occurring within two weeks of each other. Between the two sessions, participants completed a series of self-report instruments.

#### 2.1.2. Materials

We used the *Personality Disorder Interview-IV* (PDI-IV; Widiger et al., 1995) borderline personality disorder module to assess the criterion of affective instability due to a marked reactivity of mood. In this semi-structured interview, participants are asked a series of questions (e.g., “Does your mood tend to shift from one feeling to another, even during the same day?”, and “When you feel angry (happy), do you tend to feel *really* angry (happy)?”). These questions are followed up as needed for clarification, with the interviewers making dimensional ratings of affective instability (0 = absent; 1 = subthreshold<sup>1</sup>; 2 = present; 3 = severe). A second member of the research team listened to recorded interviews and independently rated them. Interviewers and those making reliability ratings were graduate students trained by Thomas Widiger, Ph.D., the lead developer of the PDI-IV. When raters disagreed about whether the diagnostic criterion was above or below threshold, or disagreed by more than one point, the research team discussed the case and resolved the disagreement by consensus. Other disagreements (e.g., one rater assigned a score of 2, and the second rater assigned a score of 3) were resolved by using the mean of the two raters. Interrater reliability, measured using the intraclass correlation coefficient, treating raters as random effects and the

mean of the raters as the unit of reliability (Shrout and Fleiss, 1979), was 0.90. The PDI-IV borderline personality disorder interviewers (and reliability raters) were blind to participants’ levels of NA and MDD status.

To test whether associations we might find with affective instability might merely reflect associations with borderline personality disorder symptoms (rather than being associated specifically with affective instability), we computed a score summing across the eight diagnostic criteria other than affective instability (rated on the same dimensional scale). Interrater reliability of this borderline personality disorder eight-criterion score, measured using the intraclass correlation coefficient, treating raters as random effects and the mean of the raters as the unit of reliability, was 0.96. As expected, in the present sample, affective instability and the borderline personality disorder eight-criterion score were significantly correlated,  $r=0.51$ ,  $p<0.01$ .

Trained interviewers administered the mood disorders module of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I; First et al., 2001) to examine whether the participants met criteria for MDD and Bipolar I. A second research assistant assigned mood disorder diagnoses based on recordings of the SCID-I interview. Any diagnostic disagreements were discussed by the research team and resolved by consensus. Interrater reliabilities for current and past history of major depressive episode(s) were excellent ( $\kappa=0.94$  and  $0.98$ , respectively). The SCID-I interviewers (and reliability raters) were blind to participants’ levels of affective instability, borderline personality disorder symptoms, and NA.

Levels of NA were measured using the 10-item NA scale from the Positive and Negative Affect Scale (PANAS; Watson et al., 1988b). Participants indicated, using a 5-point scale, the degree to which they felt each of 10 negative mood states (e.g., upset) in the past month. Internal consistency in this sample was  $\alpha=0.90$ .

### 2.2. Results and discussion

The sample of participants with a lifetime diagnosis of MDD ( $n=157$ ) did not differ significantly from those without a history of MDD ( $n=131$ ) in age,  $t(286)=1.81$ ,  $p=0.07$ , or race,  $\chi^2(6, N=284)=3.76$ ,  $p=0.71$ . However, compared to men, women were more likely to have a history of MDD,  $\chi^2(1, N=288)=8.07$ ,  $p<0.01$ .

To address the central question of this paper, we began by comparing the affective instability scores of those individuals with lifetime histories of MDD with those individuals without lifetime histories of MDD. As predicted, those with lifetime histories of MDD had significantly higher levels of affective instability ( $M=0.6$ ;  $SD=0.8$ ) than did those without lifetime histories of MDD ( $M=0.2$ ;  $SD=0.5$ ),  $t(286)=5.31$ ,  $p<0.001$ .

Next, we tested whether the group difference could be accounted for by any of the following: (a) demographic variables (specifically gender and age); (b) trait NA; or (c) the remaining symptoms of borderline personality disorder. This was accomplished by conducting binary logistic regression analyses in which MDD history was the dependent variable, the potential confounding variables (e.g., age and gender) were entered in the first step, and affective instability was entered in the second step. In all three analyses, the addition

<sup>1</sup> In consultation with Thomas Widiger, Ph.D., we changed the original PDI-IV 3-point rating scale (absent, present, severe) to a 4-point scale by adding a subthreshold point to the continuum.

of affective instability significantly improved the prediction of lifetime history of MDD ( $\chi^2(1)=22.71, p<0.001$ , when taking into account demographics;  $\chi^2(1)=11.73, p<0.001$  when taking into account NA; and  $\chi^2(1)=6.88, p<0.01$ , when taking into account the remaining symptoms of borderline personality disorder).

Finally, we tested whether the significant difference in affective instability between individuals with versus without lifetime histories of MDD was merely the result of including individuals with current depressive episodes ( $n=27$ ) in the positive lifetime MDD group. Even after excluding these 27 individuals, those with lifetime histories of MDD had significantly higher levels of affective instability ( $M=0.5$ ;  $SD=0.7$ ) than did those without lifetime histories of MDD ( $M=0.2$ ;  $SD=0.5$ ),  $t(259)=4.07, p<0.001$ .

As expected, a significant relation between MDD and affective instability was found in Study 1. Notably, this relation remained significant when comparing the affective instability of individuals without a history of MDD to those with remitted depression, which suggests that the positive relation was not being driven by individuals in current depressive episodes. The method of assessing affective instability used in Study 1 did not permit a further examination of specific facets of affective instability, however. In Study 2, we examined the relations between depressive symptoms and both affect variability and affect intensity in a college sample.

### 3. Study 2

#### 3.1. Method

##### 3.1.1. Participants and procedure

Participants were 142 introductory psychology students at a large Midwestern university. The participants were approximately evenly split by sex (47.8% female), and ranged in age from 18 to 23 years ( $M=19.0, SD=1.1$ ). The sample was 69.5% European American, 5.7% African American, 12.8% Asian American, 6.4% Latino/a, 4.2% Biracial or "other", and 1.4% Native American. The procedures for this study were approved by the university's Institutional Review Board. Participants provided informed consent and received partial course credit for their participation. Participants completed a variety of self-report instruments.

##### 3.1.2. Materials

The 54-item Affective Lability Scale (ALS; Harvey et al., 1989) was used to assess affect variability. Using a 4-point scale (1 = very characteristic of me, 2 = rather characteristic of me, 3 = rather uncharacteristic of me, 4 = very uncharacteristic of me), participants rated the extent to which their mood shifts between what they consider to be their normal baseline to affective domains of anger, depression, elation, and anxiety, as well as their tendency to oscillate between depression and elation or between depression and anxiety. Sample items include "One minute I can be feeling O.K. and the next minute I'm tense, jittery and nervous," and "I frequently switch from being able to control my temper very well to not being able to control it very well at all." The ALS has been shown to have good internal consistency, as well as suitable test-retest reliability and discriminant validity

(Harvey et al., 1989). For ease of interpretation, all items were scored so that higher scores indicated greater affect variability; the total score was computed by summing across all items to reflect the total variability in affect. Internal consistency in this sample was 0.96.

Affect intensity was assessed using the 40-item Affect Intensity Measure (AIM; Larsen et al., 1986). Using a 6-point scale (1 = never, 6 = always), participants indicated the extent to which they would react as described. Sample items from the AIM include the following: "When I feel guilt, this emotion is quite strong," and "My emotions tend to be more intense than those of most people." The AIM has been shown to have good internal consistency, test-retest reliability, and good discriminant validity (Larsen et al., 1986). Further, it has not been found to be redundant with neuroticism (Larsen and Diener, 1987). Internal consistency in this sample was 0.89.

Because our hypotheses were specific to depression, we examined anhedonic depression, a construct that focuses on symptoms that distinguish depressive disorders from anxiety disorders (Watson et al., 1995a,b). We measured anhedonic depression using the 22-item anhedonic depression scale of the Mood and Anxiety Symptoms Questionnaire (MASQ; Watson et al., 1995a,b). Sample items include "felt like nothing was very enjoyable," "felt really slowed down," and "thoughts about death or suicide." Participants indicated how much they felt or experienced things this way within the past week (1 = not at all, 5 = extremely). The MASQ anhedonic depression subscale has good convergent and discriminant validity (e.g., Nitschke et al., 2001; Reidy and Keogh, 1997). Internal consistency in this sample was 0.91.

State NA was assessed using the PANAS (Watson et al., 1988b). Participants indicated the degree to which they felt each of 10 negative mood states (e.g., upset) at the moment. Internal consistency in this sample was  $\alpha=0.77$ .

#### 3.2. Results and discussion

We began by examining the relations between anhedonic depression and components of affective instability: affect intensity and affect variability. As can be seen in Table 1, anhedonic depression was significantly correlated with affect variability; individuals with higher levels of anhedonic depression tended to have higher levels of affect variability. In contrast, anhedonic depression was not significantly associated with affect intensity.

To rule out the possibility that current negative affect was responsible for the association between affect variability and anhedonic depression, we examined the association between affect variability and anhedonic depression removing shared

**Table 1**  
Correlations between variables in Study 2.

	Affect variability	Affect intensity	Neuroticism
1. Affect variability	–		
2. Affect intensity	0.20*	–	
3. Negative affect	0.17	0.08	–
4. Anhedonic depression	0.25**	–0.14	0.19*

\*  $p<0.05$ .

\*\*  $p<0.01$ .

variance with NA. Affect variability continued to be significantly associated with anhedonic depression even after NA was taken into account ( $pr = 0.22$ ,  $p < 0.05$ ). Next, because gender is a significant predictor of depression (Kessler et al., 2003), we also tested whether the relation between affect variability and anhedonic depression would remain after taking gender into account. Similarly, even after accounting for shared variance with gender, the relation between affect variability and anhedonic depression remained significant ( $pr = 0.26$ ,  $p < 0.01$ ).

The results of Study 2 suggest that anhedonic depression is significantly associated with affect variability but not with affect intensity. Importantly, the relation between anhedonic depression and affect variability remained even after taking into account shared variance with NA or gender, both of which are strongly associated with depression. The cross-sectional design of Study 2, however, was a methodological limitation. Thus, it is unclear from these findings whether affect variability would predict changes in anhedonic depression over time. To this end, the goals of Study 3 were to replicate our findings from Study 2 and test whether the relation between affect variability and anhedonic depression (assessed two months later) would remain once shared variance with baseline levels of anhedonic depression was taken into account.

## 4. Study 3

### 4.1. Method

#### 4.1.1. Participants and procedure

A total of 101 community women participated in Study 3.<sup>2</sup> Women ranged in age from 21 to 37 years ( $M = 23.1$ ;  $SD = 2.7$ ). Their ethnic/racial make-up was 70.3% European American (white), 12.9% Asian American/Pacific Islander, 6.9% Latina, 5.9% African American, and 4.0% indicated biracial or the category of “other.” Participants were recruited for a larger project examining depression and rejection in the context of romantic relationships (Thompson et al., 2009). To be eligible, participants had to be at least 21 years old and in a serious romantic relationship for one year or less. Participants who were previously married or had children were not eligible. Participants were recruited through fliers, newspaper advertisements, and email lists. Procedures for this study were approved by the university’s Institutional Review Board. Women provided informed consent and received monetary compensation for their participation. This study employed a prospective longitudinal design, and results are reported from the initial assessment and a follow-up assessment conducted two months later. A total of 91 (92%) participants completed the second assessment.

#### 4.1.2. Materials

The same instruments used in Study 2 to assess affect variability and affect intensity, the ALS (Harvey et al., 1989),  $\alpha = 0.96$ , and AIM (Larsen et al., 1986),  $\alpha = 0.87$ , respectively,

**Table 2**  
Correlations between variables in Study 3.

	T1 Affect variability	T1 Affect intensity	T1 Anhedonic depression
T1 Affect variability	–		
T1 Affect intensity	0.45**	–	
T1 Anhedonic depression	0.29**	0.02	–
T2 Anhedonic depression	0.41**	0.01	0.61**

Note. T1 = Time 1; T2 = Time 2.

\*  $p < 0.05$ .

\*\*  $p < 0.01$ .

were administered at Time 1.<sup>3</sup> Depressive symptoms were once again assessed using the anhedonic depression scale of the MASQ (Watson et al., 1995a,b) at both Time 1 and Time 2. Internal consistency for the MASQ anhedonic depression subscale was 0.93 at Time 1 and 0.95 at Time 2.

### 4.2. Results and discussion

The mean anhedonic depression score was 49.8 ( $SD = 12.5$ ) at Time 1 and 52.8 ( $SD = 14.1$ ) at Time 2. As can be seen in Table 2, anhedonic depression scores were relatively stable across time ( $r = 0.61$ ,  $p < 0.01$ ). Both assessments of anhedonic depression (i.e., Times 1 and 2) were significantly positively correlated with affect variability at Time 1, replicating the results of Study 2. Also, as in Study 2, neither assessment of anhedonic depression was significantly associated with affect intensity at Time 1.

Next, we examined whether affect variability at Time 1 would be associated with anhedonic depression at Time 2 after taking into account levels of anhedonic depression at Time 1. Using centered variables, we conducted a multiple regression analysis predicting anhedonic depression at Time 2. We entered anhedonic depression at Time 1 in the first step and affect variability at Time 1 in the second step. Even after taking into account anhedonic depression at Time 1, affect variability was significantly associated with anhedonic depression at Time 2,  $\beta = 0.24$ ,  $p = 0.01$ . Not surprisingly, given the cross-sectional results of Studies 2 and 3, affect intensity did not predict anhedonic depression at Time 2 after taking into account anhedonic depression at Time 1,  $\beta = 0.03$ , *ns*.

## 5. General discussion

In a series of three studies, we found consistent evidence of affective instability (broadly defined) being associated with depression. Specifically, we found that a broad measure of affective instability was associated with MDD and that a specific facet of affective instability, affect variability, was associated with depressive symptoms. In Study 1, the significant relation between affective instability and MDD remained even after removing shared variance with age and gender, NA, or the remaining criteria of borderline personality disorder. Further, after excluding individuals who were currently in major depressive episodes, the association between affective instability and MDD remained. Notably,

<sup>2</sup> One individual who was exhibiting psychotic features was not included in the present sample of 101 participants.

<sup>3</sup> Due to time constraints, only 98 participants completed the AIM, and 87 participants completed the ALS.

this is the first study to our knowledge to demonstrate that relations between affective instability and MDD are not being driven by individuals in a current major depressive episode. Our findings from Studies 2 and 3 also provided new evidence that the relation between depressive symptoms and affective instability is unique to one of the two facets of affective instability that we examined, affect variability. In fact, affect variability and depressive symptoms were not only related cross-sectionally but also longitudinally. Affect variability predicted changes in levels of depressive symptoms over two months in Study 3, suggesting that elevated levels of affect variability could confer risk for depression. Unlike affect variability, affect intensity was not significantly associated with anhedonic depression in either Study 2 or Study 3.

The finding that affect variability but not affect intensity was associated with depression may seem counterintuitive given the strong relations that were found between affect variability and affect intensity in both the present and previous research (Emmons and King, 1989; Larsen, 1987; Larsen and Diener, 1987; Oliver and Simons, 2004). Nevertheless, these two dimensions are distinguishable and have been found to be differentially associated with other key variables. For example, recent work has found notable differences in the associations that affect intensity and affect variability have with components of emotional awareness. Affect variability but not affect intensity was negatively associated with clarity of emotions or the extent to which one is clear about which emotions are being experienced (Thompson et al., 2009). In fact, lower levels of emotional clarity have consistently been found to be associated with MDD (e.g., Ehling et al., 2008; Loas et al., 1998).

As noted above, we did not find a significant association between affect intensity and depression. Past research has found significant relations between these two variables, but the magnitudes of the associations have been small (e.g., Oliver and Simons, 2004). A related line of research concerns emotion context insensitivity theory (e.g., Rottenberg et al., 2005), which formulates that individuals with MDD exhibit reduced emotional reactivity (which does not necessarily imply reduced variability) to both positive and negative stimuli. This theory has been well supported in previous research (see Bylsma et al., 2008, for a review). As noted by several researchers (e.g., Diener et al., 1985; Larsen, 1987; Schimmack et al., 2000), however, emotional experiences can be parsed into a number of different facets including but not limited to valence, intensity, variability, and temporal dependency. It will be important for future research examining depression and emotional responses/reactivity, to examine the relations between depression and individual facets of emotion.

Even though the prospective longitudinal data in Study 3 suggest that affective variability contributes to depression, we cannot be certain about the causal nature of this relationship. It is possible that affective variability predicted later depression not because of a causal relation but because affective variability is associated with a third variable that contributes to depression. For example, affect variability has been found to be associated with instability in self-perceptions (Dizen and Berenbaum, *in press*), and labile self-esteem is a vulnerability factor for developing depression (Roberts and Monroe, 1994). Thus, additional research is still needed

to explore whether affect variability and MDD are causally related, and if they are, to elucidate the precise mechanisms involved. It will also be important to examine whether the findings from Study 3 replicate with a sample that also includes men.

Employing alternative means of measuring affective instability, such as behavioral observations and peer reports, may help us to better understand the relations between affective instability and depression. Future studies should also utilize event sampling (e.g., Solhan et al., 2009; Trull et al., 2008), which would permit the examination of other facets of affective instability that were not captured in our assessment techniques (e.g., temporal dependency; Larsen, 1987) and address other limitations of retrospective methods (e.g., recall bias).

In the present research we did not assess cyclothymia and other portions of the “soft spectrum” of Bipolar disorders (e.g., Akiskal and Pinto, 1999). Given the positive links between Bipolar II ½ (i.e., Cyclothymia and Major Depressive Episode) and mood instability (Akiskal et al., 2006a), subsequent research examining affective instability and mood disorders needs to carefully assess the entire mood disorder spectrum, including all the variants of bipolar disorder. Consequently, we cannot rule out the possibility that our finding linking affective instability and MDD can be at least partially accounted for by individuals with a disorder along the soft spectrum of bipolar (Akiskal et al., 2003).

Although some questions remain unanswered, our findings may have important clinical implications. Specifically, these findings may help to explain rates of comorbidity between depressive disorders and borderline personality disorder, as well as our clinical observation that depressed individuals often describe their mood as being very unstable during depressive episodes. Furthermore, our results suggest that affective instability may play an important role in the etiology of depression. Thus, addressing affect variability and/or factors that contribute to affect variability in preventative or intervention efforts to treat depression might be fruitful.

#### Role of funding source

Funding for Study 1 was provided by NIMH Grant MH62552 to HB, and funding for Study 3 was provided by the American Psychological Association Dissertation Research Award to RJT; neither the NIMH or the American Psychological Association had a further role in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication.

#### Conflict of interest

All authors declare that they have no conflicts of interest.

#### Acknowledgements

We thank Barrett Kern, Britt Refakes, Bryan Calip, and Kelly Mann for their help with data management.

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