AFFECTIVE INSTABILITY AND SUICIDAL IDEATION AND BEHAVIOR IN PATIENTS WITH BORDERLINE PERSONALITY DISORDER

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This study employed an Experience Sampling Methodology (ESM) to test whether various elements of affective instability can predict future suicide ideation in patients with borderline personality disorder (BPD) and a history of recurrent suicidal behavior.

Eighty-two individuals with BPD and a history of recurrent suicidal behavior were followed prospectively for one month during which time they recorded their current mood states, 6 times daily over three weeks. Accounting for a set of robust suicide risk factors in multiple regression analyses, only negative mood intensity was significantly related to intensity of self-reported suicide ideation and to number of suicidal behaviors over the past year. Other elements of affective instability examined (e.g., mood amplitude, dyscontrol, and reactivity) were not associated with future suicide ideation or with recent suicidal behavior.

Affective instability in patients with BPD is highly variable from one individual to another and is characterized by high levels of intense negative mood. These negative mood states, versus other aspects of mood variability, seem to be more closely tied to the occurrence of suicidal ideation and behavior.

The risk of suicide is a significant concern in patients with borderline personality disorder (BPD). Findings from psychological autopsy studies of deaths by suicide estimate that 9–33% of those who died by suicide met criteria for BPD at the time of their death (Kullgren, Renberg, & Jacobsson, 1986; Runeson & Beskow, 1991). The lifetime risk for suicide may be as high as 10% in individuals with BPD (Paris & Zweig-Frank, 2001). Understanding factors that increase the risk of suicide, suicidal behavior, and suicidal ideation is key to altering the course of the disorder.
Affective instability has been theoretically and empirically related to the risk of suicidal behavior. Linehan theorized that emotional dysregulation, which results from the transaction of invalidating environmental experiences and a biological predisposition to emotion vulnerability, underlies suicidal behavior in persons with BPD (Linehan, 1993). Indirect support for the effectiveness of interventions targeting emotion dysregulation was established when Linehan’s therapy, Dialectical Behavior Therapy, effectively reduced the risk of repeated suicidal behavior in women with BPD versus those receiving treatment as usual (Linehan, Armstrong, Suarez, Allmon, & Heard, 1991). Yen and colleagues (2004) prospectively examined DSM-IVTR criteria for BPD as predictors of suicidal behavior (with or without intent to die) or attempts only (with intent to die) in the Collaborative Longitudinal Personality Disorders Study. Six hundred and twenty-one individuals chosen for the presence of one of the following disorders: BPD, avoidant personality disorder, schizotypal personality disorder, obsessive compulsive personality disorder, and major depression without comorbid personality disorder, were followed over two years and the occurrence of suicidal behavior and suicide attempts were recorded. Affective instability, if endorsed during the diagnostic assessment for BPD, significantly predicted both suicidal behaviors and attempts; the presence of Major Depressive Disorder did not.

Given that affective instability may be related to suicide risk in patients with BPD, specifying the nature of the associated affective disturbance may enhance the development of risk-reducing clinical interventions. Affective instability in BPD is characterized in the DSM-IVTR as being “due to marked reactivity of mood (e.g., intense episodic dysphoria, irritability, or anxiety usually lasting a few hours and only rarely more than a few days)” (APA, 2000). Links, Boggild, and Sarin (2000) hypothesized that the risk of suicide might be related to four elements of affective instability: changes in mood amplitude, affective dyscontrol or disinhibition as reflected by the variability of one mood rating to the next, negative mood intensity, and mood reactivity to environmental triggers.

The aim of this study was to employ real-time mood measures to test the association of four elements of affective instability with suicidal ideation in patients with BPD and a history of recurrent suicidal behavior. The four elements of affective instability are operationalized below:

1. Mood amplitude—the magnitude of mood change from high to low
2. Affective dyscontrol/disinhibition—the variability from one mood measurement to the next
3. Negative mood intensity—the average of daily negative mood ratings
4. Mood reactivity—the proportion of mood ratings triggered by environmental factors

The predictive validity of these four mood measures was examined with respect to future suicidal ideation, controlling for a set of robust suicide
risk factors: depressive symptoms, hopelessness, impulsivity, and recent life events.

METHODS
Clinicians from psychiatric outpatient programs at three urban academic medical centres: St. Michael’s Hospital, Toronto, St. Joseph’s Healthcare Hamilton, and the Centre for Addiction and Mental Health, Toronto, referred patients to be assessed for possible study inclusion. The study was approved by each site’s research ethics board. Participants were included if they were 18–65 years of age, had clinical evidence of BPD, and had engaged in two or more lifetime suicide attempts with at least one attempt having occurred within the preceding 2 years. Screening interviews were conducted to establish whether participants met these initial eligibility criteria. After obtaining the individual’s informed signed consent, ineligibility was determined based on the Structured Clinical Interview for DSM-IV Axis I disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997), which assessed the presence of diagnoses of current Major Depressive Episode, Cyclothymic Disorder, Bipolar Affective Disorder Type I, or substance dependence disorder. The presence of BPD was assessed with the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II; First, Spitzer, Gibbon, & Williams, 1995). To remove the potential confounds of major depressive episodes, psychosis, substance withdrawal, or bipolarity, individuals were excluded from the study if they had a psychotic disorder, a current Major Depressive Episode, active substance dependence, Cyclothymic Disorder, or Bipolar Affective Disorder Type I. Further exclusionary criteria were: low levels of intellectual functioning, early-onset dementia, history of neurological impairment, and significant visual impairment. Informed consent was obtained from 139 participants; 82 (59%) completed the study, 7 (5%) withdrew prior to the study data collection phase, 13 (9%) were lost to follow-up, and 57 (41%) did not meet study inclusion criteria. Assessments were conducted by experienced interviewers with a minimum of Masters level training. The inter-rater reliability for BPD diagnosis yielded a Kappa of 1.0 (n = 10) and for current Major Depressive Episode, Kappa of 0.5 (n = 5) with 75% agreement between raters.

PROCEDURE
Upon entry, eligible participants completed baseline questionnaires (Time 1) assessing a set of suicide risk factors (depression, impulsivity, hopelessness, stressful life events); the same set of questionnaires was repeated four weeks later at the end of the data collection phase (Time 2).

DATA COLLECTION PHASE
We utilized an Experience Sampling Methodology (ESM) to capture the various elements of affective instability in study participants. ESM employs signaling devices, such as telephone beepers, pagers, or handheld
electronic units to sample participants’ subjective experience at random points in time within the context of their natural environment. When signaled, participants are instructed to complete measures describing their surroundings and subjective experiences at that moment in time.

Prior to data collection, participants were oriented to the data collection procedure. They were given binders containing Visual Analogue Scales (VAS; based on Teasdale & Fogarty, 1979) and diary log sheets, and a handheld electronic organizer unit. Participants were asked to carry these materials with them at all times during the three-week data collection phase. The electronic organizer units were programmed to ring randomly six times per day for the three-week study duration. Random times were generated using a computerized randomization program. Random times were utilized to approximate the daily range of a participant’s affective intensity within the context and flow of the participant’s daily experience. The organizers were programmed to ring once in every 160 minute block between 8:00 AM and 12:00 midnight for a total of 126 times during the study. Each time the organizer rang participants completed Visual Analogue Scales of 26 discrete mood states (e.g., dysphoria, hostility, anxiety, shame, suicidality, positive affect, guilt). Participants also used the diary log sheets to record specific details about the current situation including: time of day, location, number and identities of people present, type of situation, recent use of prescribed or non-prescribed substances, and whether the current or recent events (within the past couple of days) “triggered” their current mood state.

Participants were given $50.00 in compensation for their time and expenses upon completion of the study. The response rate to the signaling times ranged between 5%-97%, with a mean completion rate of 58.1% (SD 22.7%) and median completion rate of 61.9%. A similar mean completion rate (69%) was reported in a study using ESM with normal adolescents (Larson & Csikszentmihalyi, 1983). Participants’ compliance with the study procedures was not significantly related to the primary outcomes of self-reported suicidal ideation, interview-rated suicidal ideation, or to the number of suicidal events in the past year.

MEASURES
Affective instability was assessed using multiple measures. We assessed affective instability categorically as a diagnostic construct (present vs. absent) using the SCID-II affective instability item from the BPD DSM-IV diagnostic criteria. The SCID-II, a widely-used semi-structured interview for diagnosing personality disorders, has demonstrated test-retest reliability in both patient and non-patient samples with kappa values for joint reliability ranging from 0.58 to 1.0 (First, Spitzer, Gibbon, & Williams, 1995; First et al., 1995). Affect lability was assessed as a personality disorder trait using the subscale on the Dimensional Assessment of Personality Pathology-Basic Questionnaire (DAPP-BQ). The DAPP-BQ is a 290-item self
report measure consisting of 18 scales. The DAPP-BQ has demonstrated satisfactory psychometric properties. Internal consistency ranges from 0.83 to 0.94, and test-retest reliability over a three-week period ranges from 0.81 to 0.93 (Livesley & Jackson, 2002).

The four elements of affective instability were measured in the following manner:

(1) Mood amplitude: This measure was obtained by computing the magnitude of change in VAS mood scores from high to low and calculating the successive difference mean square, a statistic assessing the degree of variability across the temporal order of observations (Heslegrave, Ogilvie, & Furedy, 1979).

(2) Affective dyscontrol/disinhibition: This value was obtained by assessing the variability of mood ratings from one rating to the next by measuring the autocorrelation between successive observations completed.

(3) Negative mood intensity: This value was based on the intensity of negative mood ratings from the average VAS score across all observations completed over the three-week sampling period.

(4) Mood reactivity: A value representing environmental triggering or reactivity was obtained by determining the proportion of mood ratings for which the participant reported having experienced a current triggering event.

Impulsivity was assessed with the Barratt Impulsivity Scale (BIS-11) and with the Buss-Durkee Hostility Inventory (BDHI). The BIS includes subscales assessing motor, cognitive, and non-planning aspects of impulsivity. The BIS-11 has demonstrated internal consistency (Cronbach’s alpha ranging from 0.89 to 0.92 for all the three subscales), clinical utility, and trait specificity (Barratt, Stanford, Kent, & Felthous, 1997). The Buss-Durkee Hostility Inventory, a measure of impulsivity and aggression, has demonstrated temporal stability (test-retest correlation ($r$) ranges from 0.82 over 2-week period to 0.92 over a 7-day period) (Buss & Durkee, 1957) and good construct validity with a measure covering similar domains ($r = 0.83$) (Foulds, Caine, & Creasy, 1960).

Global stress was assessed with the Subjective Response to Events Scale (SRES), a 10-item inventory assessing a respondent’s subjective response to a set of stressful life events. At Time 1, participants were asked to rate their responses to events that had occurred over the past 12 months. To capture stressful life events over the intervening period of study, participants were asked at Time 2 to provide ratings for events that had occurred over the past month. The SRES has demonstrated acceptable psychometric properties with high reliability (alpha = 0.89). Construct validity was demonstrated by significant Pearson correlations between event variables and participants’ symptom index scores ($r = 0.38, p = .001$ for psychiatric patients and $r = 0.39, p = .001$ for nonpatients) (Marziali & Pilkonis, 1986).

Satisfaction with Life was measured with the Satisfaction with Life Scale (SWLS), a 5-item measure of the cognitive judgmental component of sub-
jective well-being. The SWLS has demonstrated internal consistency, test-retest reliability ($r = 0.82$ over periods of two-months) and both convergent and discriminant validity (Pavot & Diener, 1993).

**Depression** was measured with the Beck Depression Inventory-Second Edition (BDI-II), a 21-item self-report questionnaire that assesses different aspects of depressive symptomatology. The BDI-II has demonstrated internal consistency (Cronbach’s alpha for psychiatric populations’ ranges from 0.76 to 0.95), convergent validity with hopelessness and suicidal ideation, and a strong positive association with an earlier version of the measure (Beck, Ward, Mendelsohn, Mock, & Erbaugh, 1961; Beck, Steer, & Brown, 1996).

**Hopelessness** was measured with the Beck Hopelessness Scale (BHS), a 20-item true or false measure pertaining to the global experience of hopelessness. The BHS has demonstrated internal consistency (Cronbach’s alpha ranges from 0.82 to 0.93) (Beck, Weissman, Lester, & Trexler, 1974; Beck, Steer, Kovacs, & Garrison, 1985), and convergence with clinician ratings of hopelessness (correlation coefficients ranges from $r = 0.62$ (inpatients) to 0.74 (medical patients), and with measures of depression and suicide intent ($r = 0.68$).

**Suicide ideation** was assessed with the Scale for Suicide Ideation (SSI), a 19-item interviewer-administered measure of the presence and severity of death ideation and suicidal ideation, presence of suicide plan, deterrents to suicidal behavior, preparation for a suicide attempt, and anticipation of attempting suicide. The SSI has demonstrated moderate internal consistency (Cronbach’s alpha ranged from 0.61 to 0.89), and a reported inter-rater reliability coefficient of 0.83, concurrent validity with measures of depression (Beck, Kovacs, & Weissman, 1979) and predictive validity with respect to death by suicide (Brown, Beck, Steer, & Grisham, 2000).

**Suicidal behavior** was assessed with the Suicidal Behavior Questionnaire (SBQ; Linehan, 1996), a measure of the presence and intensity of past suicidal behavior and likelihood of future suicidal behavior. The SBQ has demonstrated high internal reliability with coefficient ranging from 0.73 to 0.92 (Linehan, 1996).

**Discrete mood states** were assessed with a Visual Analogue Scale (VAS) adapted from Teasdale & Fogarty’s (1979) measure Mongrain, Vettese, Shuster, & Kendal, 1998). The VAS contains items assessing the intensity of current discrete mood states that are combined to produce global scores for dysphoria, anxiety, hostility, and positive affect. For the purpose of the present study, items assessing constructs with demonstrated relevance to suicidal ideation and behavior were added to the VAS: suicidal ideation, shame (e.g., Linehan, 1993), impulsivity (e.g., Mann et al., 1999), dissociative tendencies (e.g., Herman, Perry, & Van der Kolk, 1989), and perception of meaning in life (e.g., Heisel & Flett, 2004; Petrie & Brook, 1992). The current report focused on the VAS item that measured global mood on a 100 mm line extending from anchors of “Worst I’ve ever felt” to “Best I’ve ever felt.” To simplify the analyses the scoring
on the VAS item was later reversed so that the higher score indicated a worse mood rate.

STATISTICAL ANALYSES

Descriptive statistics of continuous variables are described in this paper utilizing means, standard deviations, and medians. Categorical variables are described utilizing frequencies and percentages. The correlation between personal risk factors and outcome variables were tested by two-tailed Spearman's rank correlation.

Mood amplitude was calculated using successive difference mean square as per Heslegrave et al. (1979). We calculated the autocorrelation over the sequence of participant’s VAS mood ratings by correlating each mood rating with the next successive rating (lag = 1) over the full series of responses. Since a strong overall departure from normality was identified, the Spearman rank correlation coefficient was used to calculate participants’ autocorrelation score.

We completed three sets of linear regressions analyses to test the associations between the independent variables (the elements of affective instability, suicide risk factors, and suicidal behavior at Time 1) and dependent variables (self-reported VAS suicidal ideation ratings, observer-rated Time 2 SSI scores, and number of suicidal events reported in the past year on the SBQ). Independent variables were included in the regression analyses based on significant univariate correlation between personal risk factors and outcome measures. We employed backwards selection, on each of the regression models, removing sequentially variables with p values of less than .10 to identify the most parsimonious predictive model. All of the statistical analyses were performed with SPSS 13.0 for Windows.

RESULTS

SAMPLE CHARACTERISTICS

The majority of participants (82.9%) were female and the mean age was 33.5 years (SD 10.3). No data was collected regarding ethnicity. Nearly two-thirds of the participants (64.6%) were single, 17.1% were married or co-habiting with a partner and 18% reported they were either separated or divorced. The majority of the sample (68.3%) had no biological children, 62.2% were living in rental accommodations, 9.5% own their own dwellings, and 17.1% lived with their parents or other family members. In terms of residential stability, 47.6% lived at the current address over 36 months, 28.1% between 12–24 months, and nearly one quarter of participants (24.4%) resided at their current address less than 12 months. The majority of the sample (58.5%) had some college or university education and nearly one quarter (23.2%) of the participants reported they had only completed high school. Despite their overall reasonably high level of education, over
three quarters of the sample (75.9%) was unemployed due to disability, and 61% reported their sources of income as provincial or federal disability pension plans. Again, compared to their educational attainment, participants reported low personal annual income levels: nearly a quarter of the sample (22%) had reported personal income of less than $4999.00 and 40% reported income between $10,000.00–$19,999.00.

Ninety three percent had a previous psychiatric hospitalization; over one third of the sample reported 1–3 hospitalizations, and almost one-third of the sample (32.9%) reported 7 or more. Hospitalization ranged in duration: less than a week (17.1%), 1–4 weeks (26.8%), 1–2 months (18.3%), 2–3 months (12.2%), and longer than 3 months (18.3%). Nearly all of the participants (93.9%) were receiving outpatient treatment with the majority (72%) for duration of longer than one year.

The vast majority of participants (87.8%) endorsed 7 or more SCID-II Borderline Personality Disorder diagnostic criteria items (mean = 7.89, SD = 1.1). The affective instability item on the SCID-II was endorsed by nearly all of the participants (81 of 82; 98.8%), precluding analyses with this variable as outcome. Most of the participants (92%) reported suicidal behavior in the past year. The mean number of suicidal events was 18.1 (SD = 46.4), with a median of 6 events.

**AFFECTIVE INSTABILITY**

Participants showed considerable variability across the four elements of affective instability: mood amplitude (mean = 386.18, SD = 242.49, Range: 46.96 to 1171.84); affective dyscontrol/disinhibition (using autocorrelation: mean = 0.33, SD = 0.23, Range: −0.18 to 0.82); negative mood intensity (mean = 53.65, SD = 10.30, Range: 26.6 to 81.58); and mood reactivity (using the proportion of current triggers for mood scores: mean = 31.8%, SD = 24.51%, Range: range 0% to 97%). To illustrate the variability between subjects, Figures 1 and 2 demonstrate the VAS mood item ratings collected for two participants, a 28-year-old female and a 37-year-old male, who both endorsed having affective instability during the assessment to establish the diagnosis of BPD.

Table 1 presents zero-order correlations among the four elements of affective instability and the DAPP affect lability subscale. Mood amplitude was significantly inversely related to the autocorrelation coefficient ($r = −0.38$), suggesting that greater variability in mood amplitude is related to a smaller association between one mood rating and the next. No other significant relationships were found among the four elements examined. The only significant correlation with the DAPP affect lability subscale was with the mean negative mood intensity rating ($r = 0.24$).

Table 2 presents the correlations between the four elements of affective instability and measures of suicidal ideation and behavior. Mood amplitude and affective dyscontrol/disinhibition were not associated with suicidal ideation or behavior; daily negative mood intensity was associated
with suicidal ideation and behavior; mood reactivity (i.e., the proportion with current triggering events) was only associated with higher levels of self-reported daily ratings of suicidal ideation.

We next explored the unique contributions of the mean negative mood intensity ratings and mood reactivity (e.g., proportion of current triggering events) to the prediction of observer-rated SSI at Time 2, self-rated daily

FIGURE 1. Daily Ratings of Mood Over Three Weeks—28 y.o. female

FIGURE 2. Daily Rating of Mood Over Three Weeks—37 y.o. male
suicidal ideation, and the number of suicidal events in the last year after controlling for other suicide risk factors. The following independent variables were considered for inclusion in a stepwise regression model: SRES Life Events; SWLS; impulsivity as measured by BDH1 total score and BIS total score; BDI time 1, BHS, and DAPP affect lability subscale. The only measure of previous suicidal behavior included in the model was the SBQ 5-item summary score. For each stepwise regression, risk factors that were significantly correlated with each of the outcome variables; observer-rated SSI at Time 2, self-rated daily suicidal ideation and the number of suicidal events in the past year, in the univariate analyses were entered as independent variables into the following regression models. For the prediction of observer-rated SSI at time 2, the negative mood intensity rating, SRES, BHS time 1, and SBQ-5 items were entered as independent variables into a stepwise regression analysis. Only BHS time 1 significantly contributed to the regression model and explained about 10% of variance in observer-rated suicidal ideation one month later (B = 0.40, β = 0.28, t = 2.55, p < 0.05; R² = 0.08, F change(1,75) = 6.50, p < 0.05). For the prediction of self-rated daily suicidal ideation, SRES, DAPP affect lability subscale, BDI time 1, SBQ-5 item scale, mean negative mood intensity ratings, and mood reactivity were entered as independent variables. As indicated in Table 3, only the mean negative mood intensity ratings and the BDI time 1 scores significantly contributed to the model and together explained about

### TABLE 1. Intercorrelations Among Elements of Affective Instability (N = 82)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Affective Mood Affect Amplitude</th>
<th>Affective dyscontrol/ intensity</th>
<th>Mood Intensity</th>
<th>Mood Reactivity</th>
<th>DAPP Affect Lability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood amplitude</td>
<td>0.09</td>
<td>0.07</td>
<td>0.13</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Affective dyscontrol/ disinhibition</td>
<td>0.08</td>
<td>0.06</td>
<td>0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative mood intensity</td>
<td>0.19</td>
<td>0.24*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mood Reactivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** Correlations were computed utilizing Spearman’s rho coefficient. DAPP = Dimensional Assessment of Personality Pathology–Basic Questionnaire.

*p < 0.05; **p < 0.01.

### TABLE 2. Intercorrelations Between Elements of Affective Instability and Suicidal Items (N = 82)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Daily Suicidal Mean</th>
<th>SSI Time 2</th>
<th>DAPP Self-Harm</th>
<th>SBQ # of Suicidal events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood amplitude</td>
<td>0.09</td>
<td>-0.06</td>
<td>0.03</td>
<td>0.16</td>
</tr>
<tr>
<td>Affective dyscontrol/disinhibition</td>
<td>0.12</td>
<td>-0.09</td>
<td>0.00</td>
<td>-0.01</td>
</tr>
<tr>
<td>Negative mood intensity</td>
<td>0.62**</td>
<td>0.22*</td>
<td>0.25*</td>
<td>0.44**</td>
</tr>
<tr>
<td>Mood reactivity</td>
<td>0.22*</td>
<td>0.12</td>
<td>-0.03</td>
<td>0.05</td>
</tr>
</tbody>
</table>

**Note:** Correlations were computed utilizing Spearman’s rho coefficient. SSI = Scale for Suicide Ideation; DAPP = Dimensional Assessment of Personality Pathology–Basic Questionnaire; SBQ = Suicidal Behavior Questionnaire.

*p < 0.05; **p < 0.01.
TABLE 3. Stepwise Regression to Predict Self-Rated Suicidal Ideation (Daily Mean Rating)

<table>
<thead>
<tr>
<th>Variables</th>
<th>B</th>
<th>β</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1–SRES</td>
<td>7.13</td>
<td>0.21</td>
<td>1.84</td>
</tr>
<tr>
<td>Step 2–SRES</td>
<td>3.37</td>
<td>0.10</td>
<td>0.96</td>
</tr>
<tr>
<td>BDI Time 1</td>
<td>0.84</td>
<td>0.48</td>
<td>4.67***</td>
</tr>
<tr>
<td>Step 3–BDI Time 1</td>
<td>0.88</td>
<td>0.50</td>
<td>5.02***</td>
</tr>
<tr>
<td>Step 4–BDI Time 1</td>
<td>0.53</td>
<td>0.30</td>
<td>3.11**</td>
</tr>
<tr>
<td>Negative mood intensity</td>
<td>1.00</td>
<td>0.46</td>
<td>4.77***</td>
</tr>
</tbody>
</table>

Note: \( R^2 = 0.04 \) (adjusted \( R^2 = 0.03 \)), \( F_{(1, 75)} = 3.38, p > 0.05 \) for Step 1; \( R^2 = 0.26 \) (adjusted \( R^2 = 0.24 \)), \( F_{(1, 74)} = 21.80, p < 0.001 \) for Step 2; \( R^2 = 0.25 \) (adjusted \( R^2 = 0.24 \)), \( F_{(1, 74)} = 21.80, p < 0.001 \) for Step 3; \( R^2 = 0.43 \) (adjusted \( R^2 = 0.41 \)), \( F_{(1, 74)} = 22.73, p < 0.001 \) for Step 4. SRES = Subjective Response to Events Scale; BDI = Beck Depression Inventory from Time 1.

**p < 0.01, ***p < 0.000.

forty percent of the variance in self-reported daily ratings of suicidal ideation. Mean negative mood intensity ratings significantly predicted self-rated suicidal ideation over and above BDI depression scores. For the prediction of number of suicidal events in the past year, BIS time 1, DAPP affect lability subscale, BDHI total score, and the mean negative mood intensity ratings were entered as independent variables. Only the mean negative mood intensity rating significantly contributed to the model and explained about 10% of variance in suicidal events in the past year (\( B = 1.45, \beta = 0.32, t = 3.04, p < 0.01; R^2 = 0.10, F_{(1,74)} = 9.23, p < 0.01 \)).

DISCUSSION

The present study adds to our understanding of the risk of suicidal ideation and behavior in suicidal patients with borderline personality disorder by studying real time ratings of daily mood variation. Two new findings arose from the Experience Sampling Methodology utilized in this research. First, an assessment of mood variability which is based on patients’ report of affective instability at a single point-in-time is not a reliable indicator of the daily rating of mood variation. As indicated from these results, all but one participant endorsed affective instability as part of the diagnostic assessment for BPD; however, there was marked variability in the four elements of mood variability assessed. Although several measurement issues may be involved, characterizing mood variability based on a single cross-sectional rating may not reliably capture the participants’ experience of daily mood variability. These results are consistent with our earlier findings that the Affective Lability Scale, a cross-sectional measure of mood variability, did not measure daily variation in mood but was most significantly related to the daily mean intensity of mood (Links, Heisel, & Garland, 2003). We proposed the four elements of affective instability measured in this study anticipating that differing emotional components may have unique relationships to the risk of suicide (Links et al., 2000). As only
the mean negative mood intensity was significantly related to the cross-sectional measure of the DAPP affective lability subscale, our findings suggest that various emotional elements contribute to affective instability. Therefore, the use of measures based on a single point-in-time assessment of affect instability, particularly to capture mood variation, is unreliable, and suggests the need for future studies to include ESM along with cross-sectional measures. We would suggest the following clinical and research implications of these findings: clinicians might consider employing continuous ratings of affective instability, such as daily logs, to better assess this feature in patients with BPD. Researchers are advised to utilize multiple ratings of mood over time to better assess the presence and degree of affective instability in borderline patients.

Another important finding in this research was the positive associations among mean negative mood intensity and suicidal ideation and behavior. The mean negative mood intensity ratings significantly contributed to the prediction of daily self-reported suicidal ideation and were modestly related to the number of suicidal events over the past year, even after controlling for other risk factors. These findings are divergent from existing research on the relation between affective instability and suicide risk. Yen and colleagues (2004) found that a single-item measure of affective instability was more strongly related to suicidal behavior than was the presence of major depression, and concluded that affective instability rather than negative mood states was related to risk of suicidal behavior. This finding may have been affected by the use of the single point-in-time measurement of affective instability that might not reflect daily mood variation. However, it must be remembered that Yen et al. used a different type of sample drawn from people with a variety of personality disorders, while we were explicitly studying those with BPD and a history of suicidal behavior. In addition, they also looked at presence versus absence of Major Depressive Disorder while we assessed mood using continuous measures and excluded individuals with current Major Depressive Episodes. The current study recommends that conclusions from the study by Yen et al. need replication using Experience Sampling Methodologies rather than a single item measure of affective instability.

The current findings are also somewhat divergent from Linehan's (1993) theoretical formulation to explain suicidal behavior in patients with BPD. According to Linehan's model, suicidal behavior is a maladaptive coping strategy which functions to help a person regulate emotions or is a by-product of dysregulated emotional responses. Individuals with BPD are hypothesized to be extremely sensitive to stimuli, have heightened reactions and difficulty bringing their mood back to baseline. Utilizing real time recording of mood variation did not support the contention that these patients commonly react to current external triggering events as, on average, only thirty percent of the mood states were considered triggered by a current external event. In addition, the proportion of moods triggered by current events was not related to any of the measures of suicidal ideation or
behavior examined, controlling for other measures of affective instability and suicide risk factors. The finding that mean negative mood intensity was significantly related to suicidal ideation and behavior is in keeping with Linehan's formulation of difficulties with emotional regulation as a defining feature of BPD. Zanarini and colleagues (1998) found that level of dysphoric affect differentiated patients with BPD from patients with other personality disorders. The current findings suggest that the affective instability of patients with BPD is characterized by high levels of intense negative mood and these negative mood states, versus other aspects of mood variability, seem to be most closely tied to the occurrence of suicidal ideation and behavior. Preliminary work suggests that patients with repeated suicidal behavior can benefit from psychoeducational group therapy that focuses on helping patients identify, process, and communicate their emotions.

The current study is limited in several respects and these limitations must be acknowledged. Due to the relative infrequency of suicidal acts even in patients with recurrent suicidal behavior, the investigators chose to use self-rated and interviewer-rated suicidal ideation as the primary outcome. Although suicidal ideation appears to be an antecedent to suicidal behavior (Links, Heisel, & Quastel, 2005), the causal relationship between affective instability, as measured using ESM, and the future occurrence of suicidal behavior will require a larger study and with a much longer period of follow up. In this study, our independent variables of previously established risk factor for suicide accounted for only modest or none of the variance in our measures of suicidality. Most likely these associations have been attenuated compared to previous studies because of the homogeneity of our sample and because of our greater focus on suicidal ideation rather than behavior as the outcome of interest. As the aim of the current study was to examine the role of affective instability versus other personal risk factors in predicting suicidal ideation in patients with BPD and recurrent suicidal behavior, there was no provision to include a normal or psychiatric comparison group. The inclusion of comparison groups in future studies using ESM is encouraged. Our sample would be generalizable to those patients with BPD who are seen in outpatient psychiatric clinics; however, because the vast majority of these patients are female, our findings may not be applicable to males with BPD.

In conclusion, patients with BPD who endorse affective instability are characterized by a wide variety of patterns of mood variability based on real-time recordings. Of the four elements of affective instability examined, negative mood intensity was significantly related to patients’ self-reported suicidal ideation and to suicidal behavior over the past year. Clinicians are encouraged to monitor and aggressively treat patient reports of intense negative moods and hopelessness, given the apparent association of these variables with heightened suicide risk. In a broader context, these results indicate that need for research to understand the role of emotion in the etiology of suicidality and in the management of patients at risk for sui-
cide. Greater understanding is required of everything from the developmental and psychopathologic aspects emotion to the possible role of positive emotion in mediating psychotherapeutic gains (Joiner et al., 2001).

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