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Emotion Dynamics and the Association With Depressive Features and Borderline Personality Disorder Traits: Unique, Specific, and Prospective Relationships

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Abstract

Patterns of emotional change in daily life have been consistently linked to depressive and borderline personality disorder (BPD) features. However, dynamic measures and average affect show considerable statistical overlap, and depressive and BPD features are comorbid. Moreover, the prospective nature of these relationships is unclear. We used a measurement burst design in which 202 young adults with varying levels of psychopathological features participated in a week-long experience sampling at baseline and 1-year follow-up. Taking overlap into account, we found that BPD traits were uniquely and specifically linked to higher levels of variability in negative affect (NA). For depressive features, indications were found for a specific association with inertia of NA, but these results were not robust and consistent. In fact, overall, incremental predictive power of the dynamic measures above mean affect was limited, especially for depressive features. Prospective relationships showed that psychopathological features predicted stronger emotion dynamic patterns 1 year later rather than the other way around.

Keywords

emotion dynamics, depressive features, borderline personality disorder traits, daily life, emotional variability, emotional inertia

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Emotions play an important role in our everyday life. Besides adding spice to everyday experiences, they enable us to respond appropriately to changes in the environment (Koole, 2009; Kuppens & Verduyn, 2015). Thus, the experience of emotions is important for everyday functioning and plays a central role in determining our psychological well-being and mental health.

When researchers examine the exact relationship between the experience of emotions and mental health, not only the habitual experience of positive or negative emotions or the quality of the emotional experience in response to specific stimuli (e.g., in a lab setting) but also the way emotions unfold over time are very informative of our psychological well-being (Kuppens & Verduyn, 2017). Indeed, the way our emotions change and fluctuate over time reflects how we emotionally respond and deal with everyday situations, which is arguably more closely a reflection of the actual function of emotions than that afforded by the focus on mere habitual or single transient emotional experiences. In response to these insights, an increasing numbers of studies have started examining the relation between emotion dynamics, or patterns of emotional change over time, and psychological well-being.

A recent meta-analysis (Houben, Van Den Noortgate, & Kuppens, 2015) of these studies was able to identify three types of dynamic patterns that have been most frequently examined in response to psychological well-being and psychopathology. First, many researchers focused on the average deviation or dispersion of emotional states around a person's average habitual emotional

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level using within-person standard deviation or variance measures. These measures capture the degree to which emotions tend to fluctuate or deviate over time around average levels (i.e., the degree of overall *variability*). Second, researchers examined the magnitude of changes from one point to the next, capturing more abrupt and frequent emotional ups and downs over time using the mean square successive difference (MSSD) or related metrics. Such measures reflect the *instability* of emotions over time. Third, researchers in several studies examined how well emotions are self-predictive as measured by an autocorrelation or autoregressive effect. Such patterns capture emotional *inertia*, or resistance to change in the intensity of emotional states. Highly inert emotions linger, get stuck, and have low regulatory recovery.

Results from this meta-analysis (Houben et al., 2015) demonstrated that these patterns of emotion dynamics are indeed moderately but consistently linked to several indicators of psychological well-being and psychopathology. These associations were found to be particularly strong for two types of psychopathology that have mood disturbances at their core and have specific dynamic patterns of affect listed as main defining features: depression and borderline personality disorder (BPD). Depression is typically associated with the experience of ongoing low levels of positive affect (PA) and high levels of negative affect (NA; American Psychiatric Association, 2013). Still, this meta-analysis demonstrated that depressive features (in clinical and nonclinical populations) are linked to more variable, unstable, and inert positive and negative emotions. These patterns were more pronounced for negative emotions in cases of clinical diagnosis of depression: Major depressive disorder was linked to more variable negative emotions (and less variable positive emotions), more unstable negative emotions, but also more inert negative emotions that linger and are resistant to change. At first sight, the finding that depression is linked to more variable and unstable emotions seems rather surprising because depression is linked to prolonged experience of low mood (American Psychiatric Association, 2013). The association with more inert emotions is in line with the idea of emotional and cognitive rigidity and resistance to change that has been linked to depression (Meiran, Diamond, Toder, & Nemets, 2011; Pe et al., 2015).

BPD is typically associated with instability in several life domains, including interpersonal relations and identity, but certainly also in affect (American Psychiatric Association, 2013). In fact, profound emotional dysregulation is often assumed to be at the core of BPD (Carpenter & Trull, 2013; Linehan, 1993). In line with these characteristics, the meta-analysis demonstrated that BPD traits in clinical and nonclinical populations were associated with more variable and unstable but not more inert positive and negative emotions. A clinical BPD diagnosis was consistently linked to more variable negative emotions, more unstable positive and negative emotions, and also more inert negative emotions. Again, these findings are in line with the idea of BPD as the unstable personality disorder (World Health Organization, 1992).

These findings clearly illustrate that emotion dynamics are informative for a person's mental health. Still, several important questions remain regarding the exact nature of these relationships. First, as indicated by, for instance, Jahng, Wood, and Trull (2008), these measures of emotions dynamics are statistically and empirically not independent. Because of this fact, it is not clear to what degree the found associations between one pattern of emotion dynamics and psychopathology could be driven by relationships with other dynamic measures. One previous study that took overlap between different dynamic measures of affect into account was the study by Koval, Pe, Meers, and Kuppens (2013). They showed that in daily life, depressive features were related to more variable, unstable, and inert negative emotions. However, after correction for overlap between the measures and for overlap with mean NA, depressive features were only uniquely associated with higher variability of NA, and not instability and inertia of NA. Likewise, research has indicated that dynamic measures such as measures of variability can be severely confounded by mean levels of the same variable, especially if the measures are bounded (which is almost always the case for psychological data; Mestdagh et al., 2018). To illustrate, very high average levels of a variable over time can only be obtained if each of the repeated measurements of that variable is very high, and thus very similar, resulting in lower variability. Still, defining the maximum variability of a variable as a function of the mean is not straightforward (Mestdagh et al., 2018). However, because of this overlap, statistical corrections for mean affect levels are needed to obtain robust relationships between emotion dynamic patterns and psychopathological symptoms.

Second, not only are the dynamic measures statistically related but also several indicators of well-being and psychopathology are closely tied. Relevant to the current comparison, depressive features are highly comorbid with BPD traits (Leichsenring, Leibing, Kruse, New, & Leweke, 2011). Moreover, different indicators of psychopathology (e.g., depression and BPD) were often linked to the same dynamic patterns (Houben et al., 2015). Therefore, again it is not clear to what degree the found associations are driven by the interrelations among mental health indicators and to what degree these dynamic measures are specifically linked to different psychopathologies after correcting for potential overlap.

Last, most research has investigated the relation between emotion dynamics and psychopathology in a cross-sectional way. However, questions remain regarding the direction of the relationship or the order of influence. Do emotion dynamic measures reflect early signs of dysregulation that act as precursors or risk factors for the development of psychopathology? Do increased levels of these dynamic patterns and psychopathology simply co-occur? Or might psychopathology precede and result in altered dynamics of emotions? Some first research has suggested that in case of depression, increased levels of emotional inertia might precede and predict the onset of depression. For example, a study by Kuppens et al. (2012) demonstrated that higher inertia of happy, dysphoric, and angry behavior during a social interaction task prospectively predicted the emergence of major depressive disorder 2.5 years later. Leemput et al. (2014) showed that signs of critical slowing down in the emotional system, as indicated by elevated levels of variance and temporal autocorrelation in emotional states over time, predicted the occurrence of a tipping point into clinical depression. These studies are in line with the idea that patterns of emotion dynamics could reflect early warning signs of psychopathology. In case of BPD, theoretical and empirical work has suggested that emotion dysregulation might play an etiological role for the development of BPD (Linehan, 1993) and lead to dysregulated behavioral and cognitive reactions to emotional situations. This possibility suggests that emotional dysregulation precedes the development of BPD traits. On the other hand, altered emotion dynamical patterns might be a manifestation of this dysregulation after more BPD features further developed. Thus, these dynamical patterns could also be a result of BPD features. Still, to our knowledge, little empirical research has examined the bidirectional relationship between emotion dynamical patterns and BPD traits so far.

The goal of our study was to further clarify the nature of the relationship between different emotion dynamical patterns that are frequently examined (i.e., emotional variability and inertia) and two indicators of psychopathology that have been shown to be associated with these dynamic patterns: depressive and BPD traits. We focused only on emotional variability and emotional inertia and excluded emotional instability in the main analyses.[1] We took this action because Jahng et al. (2008) indicated that measures of emotional variability, instability, and inertia are interrelated and that one measure can be expressed as a function of the two other measures. For example, a high value of temporal instability of a time series of a person is obtained when the series has high variability and low autocorrelation.

First, we examined which dynamic patterns were *uniquely* linked to depressive features on the one hand and to BPD traits on the other hand if we corrected for overlap between the different dynamic measures and levels of average emotionality. Second, we examined which patterns were *specifically* linked to depressive features and BPD traits if we correct for overlap between the two types of psychopathological traits. Third, we examined whether dynamic patterns were prospectively *predictive* of (change in) psychopathological features or the other way around. This method will provide more insight into the direction of a possible prospective relationship between emotion dynamics and psychopathological traits. We focused on dynamic measures of both positive and negative affect because both were linked to depressive and BPD traits in previous studies (Houben et al., 2015).

We examined these relationships in a nonclinical population of young adults with varying intensities of BPD traits and depressive features that represented the full range of possible depressive and BPD traits rather than persons with clinical diagnoses. This decision was made because we were interested in (change in) psychopathology that has not reached the clinical diagnosis (yet). This enabled us to examine processes that possibly predict increases in the intensity of psychopathological traits that in the end could potentially reach clinical intensities. This prediction might be relevant for prevention in the future.

To answer these questions, we used data from a multiwave longitudinal experience sampling study in which 202 young adults with varying degrees of BPD and depressive features completed an experience sampling week at baseline and 1-year follow-up. This method enabled us to examine concurrent relationships in the first wave of data, replicate these relationships 1 year later, and examine prospective relationships across the time span of 1 year.

Although one previous study has indicated that after correction for overlap depressive features were uniquely associated only with higher variability of NA, depression has been linked theoretically to emotional and cognitive inflexibility (Meiran et al., 2011; Pe et al., 2015), and emotional rigidity is also part of the key diagnostic features of depression (American Psychiatric Association, 2013). Therefore, on the basis of these theoretical considerations, we expected, after correction for overlap between the different dynamic measures and for overlap with average affect levels, mainly emotional inertia to be linked to depressive features, which would reflect emotional inflexibility and resistance to change. Following the finding that emotional dysregulation and instability are key features of BPD traits (Carpenter & Trull, 2013), we mainly expected emotional variability to be a defining feature of those with high levels of BPD traits. Regarding our second research question concerning specificity after

correction for overlap between depressive features and BPD traits, we likewise hypothesized inertia to be uniquely linked to depressive features and not BPD traits and variability to BPD but not depressive features. Regarding our last research question, we hypothesized that emotion dynamic patterns would predict change in the severity of psychopathological features rather than the other way around because we expected altered dynamical patterns to precede psychopathology, such as depression and BPD.

Method

Participants

Participants were 202 students (55% female[2]) commencing their first year of tertiary education at a Belgian university or higher education institute. Participants were recruited through advertisement at local secondary schools, universities, and local bars and festivals. Because we wanted to obtain a sample of participants with a broad range of different psychological well-being levels, initially 686 (65.7% female) students first completed an online version of the Center for Epidemiologic Studies–Depression Scale (CES-D; Radloff, 1977) as prescreening. Next, using a stratified sampling approach (Ingram & Siegle, 2009), 180 students scoring within different subranges of possible depression scores were selected to approximate a normal distribution of depression scores as much as possible and to sufficiently include students scoring in the high range of depression scores, including 69 participants scoring at or above the clinical cutoff score of 16, as originally proposed by Radloff (1977), and 18 students scoring at or above the more conservative cutoff score of 27 as proposed by Gotlib, Lewinsohn, and Seeley (1995). However, to obtain a sample of 200 participants, an additional 22 students were included in the study without completing the prescreening. Mean age of the total sample was 18.32 years (SD = 0.957) at baseline. Ninety-six percent of the sample was European, 1.5% were African or from Middle-East, and 1% was Asian. Of 202 participants at baseline, 177 participants also completed a follow-up wave 1 year later.[3] Participants received up to €60 for participation in each of the waves, with an extra bonus of €60 for those who competed the entire study.

Procedure

The study consisted of three waves and a fourth follow-up assessment. Waves 2, 3, and the follow-up moment occurred, respectively, 4, 12, and 24 months after Wave 1. In each of the first three waves, participants completed several computer tasks and an interview that are not relevant for the current study, and several self-report questionnaires during one of two test sessions. In between the two test sessions that were conducted in the lab, participants completed 1 week of experience sampling (ESM) in their everyday lives, in which they carried a smartphone (Defy Plus; Motorola, Chicago, IL) running custom-built ESM software with them. During this week, smartphones emitted a beep signal, 10 times each day between 10 a.m. and 10 p.m., according to a stratified random interval scheme. The beep prompted participants to complete a short questionnaire. In the fourth follow-up assessment, only self-report questionnaires were completed at home using an online link. For the current study, we were interested in change in psychopathological features and dynamic measures across the largest time interval available to allow more time for change to occur. Therefore, we focused only on Waves 1 and 3, which were exactly 1 year apart. Note that the fourth follow-up assessment occurred 2 years after Wave 1 but contained only self-report questionnaires and no ESM assessments. Therefore, no bidirectional prospective relationships could be examined across the time span of 2 years. The focus on Wave 1 (baseline) and Wave 3 (1-year follow-up) enabled us to examine concurrent relationships at baseline, then examine whether these findings were replicated exactly 1 year later under similar environmental and academic circumstances, and, finally, to examine prospective relationships 1 year later, which is sufficient time to expect changes in psychopathological traits. In the remainder of the article we used *baseline* and *1-year follow-up* or *follow-up* to refer to Wave 1 and Wave 3, respectively.

Measures

CES-D. Depressive features were assessed using the CES-D (Radloff, 1977), which is a 20-item self-report questionnaire assessing the frequency of several depressive features during the past week (e.g., "In the past week, I felt depressed") rated on a scale from 0 (*rarely or none of the time*) to 3 (*most or all of the time*). The Dutch translation of the CES-D scale was used, which is shown to be a valid and reliable measure of depressive features (Bouma, Ranchor, Sanderman, & van Sonderen, 2012; Schroevers, Sanderman, van Sonderen, & Ranchor, 2000). The sum of all the CES-D items was used to measure depressive features. Internal consistency was good at baseline (α = .88) and 1-year follow-up (α = .88). Exploratory factor analyses also confirmed one underlying depression factor in both waves, which is in line with a larger study by Wu, Erbas, Brose, Kuppens, and Janssen (2016) that examined the factor structure of this scale in a Dutch-speaking Belgian population.

Assessment of DSM–IV Personality Disorders (ADP-IV)-BPD scale. BPD traits were assessed using the BPD scale of the ADP-IV (Schotte, De Doncker, Vankerckhoven, Vertommen, & Cosyns, 1998). This measure is a Dutch self-report questionnaire that consists of 10 trait items, each capturing one of the diagnostic criteria for BPD from the fourth or fifth editions of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM–IV*, American Psychiatric Association, 1994; *DSM–V*, American Psychiatric Association, 2013), which participants score on a scale from 1 (*totally disagree*) to 7 (*totally agree*; e.g., "I have repeatedly threatened or attempted to end my life"). Although most items assess one diagnostic criterion, the diagnostic criterion of self-injurious and/or suicidal behaviors and threats are assessed using two separate items to disentangle self-injury and suicidality. For ratings higher than 4 on the trait item, an additional distress rating is required ("To what degree has this trait caused distressed to oneself or others?") and is scored on a scale from 1 (*not at all*) to 3 (*very much*). A dimensional BPD score is obtained by summing the scores on the individual trait items. Internal consistency was acceptable at baseline ($\alpha = .69$) and 1-year follow-up ($\alpha = .75$). Exploratory factor analyses on BPD items in each wave confirmed one underlying BPD factor. Moreover, the ADP-IV has been shown to possess good validity (Schotte et al., 2004).

ESM items. On average, participants completed 61.12 ESM assessments (*SE* = 0.51) at baseline, which resulted in an average compliance rate of 86.78% (*SE* = 0.72), and 62.16 ESM assessments (*SE* = 0.50) at 1-year follow-up, which resulted in an average compliance of 88.14% (*SE* = 0.68). During the experience sampling part, participants repeatedly rated to what degree they were currently experiencing each of five different negative emotions (sad, angry, anxious, depressed, stressed) and three positive emotions (happy, relaxed, and cheerful) using a continuous slider scale ranging from 0 (*not at all*) to 100 (*very much*). Scores on these items were averaged to form composite negative affect and positive affect; following reliability measures proposed by Nezlek (2017) good reliability estimates were measured at baseline and 1-year follow-up (for NA, estimate = .63 and .63 at the level of the measurement occasion, estimate = .97 and .98 at the person level, respectively; for PA, estimate = .68 and .55 at the level of the measurement occasion, estimate = .95 and .97 at the person level). Using these repeated PA and NA scores for each person separately, measures of variability and inertia were obtained (see analyses).

Statistical analyses

For each person, measures of variability and inertia were obtained separately for PA and NA. Variability of PA and NA were calculated by taking the within-person standard deviation of repeated PA or NA scores, respectively, per person. Inertia measures were obtained by estimating a multilevel model in which PA or NA was predicted by a random intercept and a time-lagged version of itself (i.e., random autoregressive slope) excluding overnight changes. Next, estimates of this slope for each person separately were extracted and used as measures of inertia. These multilevel approaches were used because these models provide more accurate estimates of the parameters of interest because data from multiple people are combined in one model (Bulteel, Mestdagh, Tuerlinckx, & Ceulemans (2018). Next, these measures were used in several sets of hierarchical regression models.

In a first set of analyses, we examined unique relationships between dynamic measures and psychopathological features with correction for overlap between the dynamic measures and correction for mean affect. In a first step, both emotional variability and emotional inertia were entered as predictors of depressive features or BPD traits. In a second step, average affect levels were always added. Tolerance and variance inflation factor (VIF) values were carefully checked for indications of multicollinearity (VIF was always considerably smaller than 10, and tolerance values were always larger than .2), and standardized regression coefficients were computed on the basis of standardized predictors and outcomes. Then, separate models were estimated for dynamic measures of PA and NA. Next, models were estimated including dynamic measures of PA and NA simultaneously. This step was performed because several theoretical models assume that PA and NA are orthogonal (Diener & Emmons, 1984; Watson, Clark, & Tellegen, 1988). However, on the momentary level, PA and NA might be negatively correlated (Schmukle, Egloff, & Burns, 2002). Separate models were estimated with depressive features and BPD traits as outcome.

In a second set of analyses, we examined specific relationships between dynamic measures and psychopathological features, with correction for overlap between psychopathological features, by adding both depressive and BPD traits as simultaneous predictors of each dynamic measure. Again, we also corrected for mean affect levels. Note that again, tolerance and variance inflation factor measures were carefully checked for indications of multicollinearity, and standardized regression coefficients were computed on the basis of standardized predictors and outcomes.

In a final set of analyses, we examined prospective analyses, in which we examined whether psychopathological features prospectively predicted emotion dynamic measures 1 year later, correcting for concurrent dynamic measures, and the other way around. Again, additional correction of mean affect levels was

included. To avoid running multiple models, we tested these models only for relationships that were found to be specific and unique in the first two steps.

Results

Participant characteristics

The average ADP-IV borderline score in our sample was 27.63 (median = 27, *SD* = 7.61, *SE* = 0.54) at baseline and 25.16 (median = 24, *SD* = 7.63, *SE* = 0.57) at follow-up; scores between 17 and 30 were considered average according to norm scores in a Dutch-speaking Belgian population (Schotte & De Doncker, 1996; Schotte et al., 1998). According to these norm scores, at baseline, 5% of participants scored within the low range, 59% scored within the average range, 30% scored in the high range, and 6% scored within the very high range. At follow-up, 1% scored within the very low range, 9% scored within the low range, 69% scored within the average range, 19% scored within the high range, and 3% scored within the very high range.

The average CESD-D score at baseline and 1-year follow-up was 12.48 (median = 10, *SD* = 7.72, *SE* = 0.54) and 9.59 (median = 9, *SD* = 7.03, *SE* = 0.53), respectively. This score is higher than the average depressive scores found in a Dutch-speaking Belgian population (Wu et al., 2016), which is likely a result of our sampling procedure. At baseline, 32% of participants scored at or above the cutoff of 16 (Radloff, 1977), and 6% scored at or above the more stringent cutoff score of 27 (Gotlib et al., 1995). At follow-up, this finding was the case for 20% and 2%, respectively. Distributions of CES-D scores and ADP-IV borderline scores at baseline and at follow-up approximated a normal distribution.

Descriptive statistics

Before estimating our hierarchical regression models, we examined simple concurrent correlations (not correcting for overlap in any way) between the dynamic measures, gender, and depressive and BPD traits in each wave. Results for both waves are shown in Table S1 in the Supplemental Material available online. As expected, mean levels of NA are strongly correlated with dynamic measures of NA (ranging between $r = .70$ and $r = .32$). For PA, these correlations are lower (ranging between $r = -.20$ and $r = -.42$). Moreover, the correlation between measures of emotional variability and inertia were $r = .31$ and $r = .42$. Next, in each wave, depressive features and BPD traits were also closely related ($r = .57$ and $r = .50$). Gender was only significantly related to depressive traits in both waves ($r = .23$ and $r = .26$); female participants reported more depressive traits in both waves. Longitudinal correlations between dynamic measures, mean affect, BPD traits, and depressive features assessed at baseline and at follow-up are reported in Table S2 in the Supplemental Material. Highest levels of stability were observed for mean NA ($r = .72$) and mean PA ($r = .71$). Intermediate levels of stability were observed for variability in PA ($r = .66$), BPD traits ($r = .63$), variability in NA ($r = .57$), and depressive features ($r = .48$). The lowest stability was observed for inertia of NA ($r = .29$) and inertia of PA ($r = .34$).

Regarding the concurrent association between emotion dynamics and psychopathological features, without taking overlap in any way into account, depressive features were significantly related to higher levels of mean NA ($r = .42$ and $r = .33$) and higher levels of variability in NA ($r = .34$ and $r = .30$) and inertia of NA ($r = .31$ and $r = .25$). Moreover, depressive features were linked to lower mean levels of PA ($r = -.44$ and $r = -.37$) and higher levels of variable ($r = .25$ and $r = .20$) and inert PA ($r = .28$ and $r = .21$). These results fully replicated the findings from an earlier meta-analysis (Houben et al., 2015).

For BPD traits, we found significant correlations with higher levels of mean NA ($r = .42$ and $r = .38$) and variability ($r = .42$ and $r = .41$) in NA. It was also linked to lower levels of mean PA ($r = -.30$ and $r = -.32$) and higher levels of variability of PA ($r = .24$ and $r = .16$). Significant relationships with higher levels of inertia in NA ($r = .23$) and PA ($r = .20$) were also found at follow-up but not at baseline. These results (and mainly results from baseline wave) are largely in line with the previous meta-analysis showing that BPD traits in clinical and nonclinical populations were associated with more variable positive and negative emotions but not inertia. Additional zero-order correlations between individual BPD items (e.g., abandonment anxiety) and all emotion variables under study can be found in Table S3 in the Supplemental Material.

Unique relationships with correction for overlap between the dynamic measures

We examined how the different dynamic measures were uniquely related to depressive features and BPD traits, respectively, when correcting for overlap between the different dynamic measures and for overlap with mean affect levels. We used hierarchical multiple regression analyses, each time predicting depressive or BPD traits by measures of emotional variability and inertia in Step 1 and also by mean affect in Step 2. Initially, separate models were estimated for PA and NA.

Table 1. Hierarchical Multiple Regression in Which Depressive Features Are Predicted by Dynamic Measures (Step 1) and Also by Mean Affect (Step 2)

		Baseline			1-year follow-up		
Step	Predictors	Unstandardized *b*	β	*p*	Unstandardized *b*	β	*p*
1	Variability of NA	0.46 (0.13)	0.26	< .001	0.38 (0.12)	0.24	.002
	Inertia of NA	10.88 (3.84)	0.20	.005	8.01 (4.03)	0.15	.048
2	Variability of NA	0.12 (0.16)	0.07	.455	0.16 (0.15)	0.10	.273
	Inertia of NA	7.98 (3.85)	0.15	.039	6.98 (4.00)	0.13	.083
	Mean NA	0.28 (0.08)	0.30	.001	0.19 (0.08)	0.22	.015
1	Variability of PA	0.30 (0.12)	0.18	.011	0.20 (0.11)	0.14	.072
	Inertia of PA	14.42 (4.49)	0.23	.002	9.24 (4.38)	0.16	.036
2	Variability of PA	0.23 (0.11)	0.14	.037	0.16 (0.10)	0.11	.126
	Inertia of PA	7.72 (4.35)	0.12	.078	1.99 (4.52)	0.04	.660
	Mean PA	–0.29 (0.05)	–0.37	< .001	–0.20 (0.05)	–0.33	< .001
1	Variability of NA	0.43 (0.17)	0.24	.011	0.41 (0.15)	0.26	.007
	Inertia of NA	6.92 (4.39)	0.13	.116	4.29 (4.72)	0.08	.364
	Variability of PA	0.04 (0.15)	0.03	.762	–.004 (0.13)	–0.03	.775
	Inertia of PA	10.03 (4.99)	0.16	.046	7.51 (5.00)	0.13	.135
2	Variability of NA	–0.11 (0.20)	–0.06	.575	0.12 (0.18)	0.08	.510
	Inertia of NA	6.00 (4.24)	0.11	.159	3.01 (4.59)	0.06	.512
	Variability of PA	0.19 (0.14)	0.12	.169	0.04 (0.13)	0.03	.749
	Inertia of PA	5.20 (4.91)	0.08	.291	2.94 (5.22)	0.05	.575
	Mean NA	0.23 (0.09)	0.25	.010	0.14 (0.08)	0.17	.086
	Mean PA	–0.22 (0.05)	–0.28	<.001	–0.15 (0.05)	–0.24	.004

Note. Values in parentheses are standard errors. PA = positive affect; NA = negative affect.

Results for depressive features are shown in Table 1. When variability and inertia of NA were considered together, results indicate that both are uniquely and positively linked to more depressive features in Step 1. This result was found at baseline and replicated at follow-up. After correction for mean NA levels in Step 2, only the association with inertia remained significant at baseline. At 1-year follow-up, this effect remained only marginally significant. Considering variability and inertia of PA together, in both waves, depressive features were linked to higher inertia of PA in Step 1. However, this effect was not robust after correction for mean PA levels in Step 2 in both waves. Instead, at baseline, depressive features were associated with higher variability of PA, also after correction for mean PA levels. However, this finding was not replicated at follow-up. Because gender was significantly related to the intensity of depressive features, these analyses were repeated, correcting for gender. Results and conclusions were identical with one exception: For the model with variability of NA, inertia of NA, and mean NA predicting depressive features at baseline, the unique predictive value of inertia of NA became weaker and did not reach statistical significance anymore, $b = 6.64$ ($SE = 3.76$), $\beta = 0.13$, $p = .079$, when also correcting for gender.

Next, similar models were estimated for BPD traits (Table 2). Results showed that only variability of NA and not inertia of NA was a significant predictor of BPD traits. These results were robust after correction for mean NA levels. This finding was fully replicated in the follow-up wave. Regarding PA, only variability was a significant predictor of BPD traits, even after correction for mean PA in Step 2. However, this result was only found at baseline. At follow-up, none of the measures were significantly related to BPD traits above mean PA levels.

In sum, when considering overlap between emotional variability and emotional inertia, findings indicated that depressive features were linked to higher levels of emotional inertia of PA and NA. However, these results were not robust and largely disappeared after correcting for mean affect levels. Regarding BPD traits, results indicated robust and consistent relationships with higher levels of variability of NA across both waves. Similar finding were obtained for PA but could not be replicated at follow-up.

In a following step, models were also estimated including all dynamic measures of PA and NA simultaneously, with additional correction for mean PA and NA. These models are also supported by correlations

Table 2. Hierarchical Multiple Regression in Which BPD Traits Are Predicted by Dynamic Measures (Step 1) and Also by Mean Affect (Step 2)

		Baseline			1-year follow-up		
Step	Predictors	Unstandardized *b*	β	*p*	Unstandardized *b*	β	*p*
1	Variability of NA	0.78 (0.13)	0.44	< .001	0.65 (0.13)	0.38	< .001
	Inertia of NA	–2.62 (3.74)	–0.05	.484	4.97 (4.20)	0.09	.238
2	Variability of NA	0.48 (0.16)	0.27	.003	0.46 (0.16)	0.27	.003
	Inertia of NA	–5.17 (3.76)	–0.10	.171	4.05 (4.18)	0.07	.334
	Mean NA	0.25 (0.08)	0.27	.003	0.17 (0.08)	0.18	.040
1	Variability of PA	0.39 (0.12)	0.24	.001	0.16 (0.12)	0.11	.178
	Inertia of PA	1.39 (4.55)	0.02	.760	9.85 (4.78)	0.16	.041
2	Variability of PA	0.34 (0.12)	0.21	.004	0.13 (0.12)	0.08	.274
	Inertia of PA	–3.45 (4.58)	-0.06	.452	3.05 (5.00)	0.05	.543
	Mean PA	–0.21 (0.05)	–0.27	< .001	–0.19 (0.05)	–0.28	< .001
1	Variability of NA	0.83 (0.16)	0.47	< .001	0.87 (0.16)	0.51	< .001
	Inertia of NA	–3.95 (4.31)	–0.08	.361	–0.34 (4.84)	–0.01	.944
	Variability of PA	–0.08 (0.14)	–0.05	.576	–0.31 (0.14)	–0.21	.021
	Inertia of PA	2.78 (4.90)	0.04	.572	11.23 (5.13)	0.18	.030
2	Variability of NA	0.43 (0.21)	0.24	.037	0.67 (0.19)	0.39	.001
	Inertia of NA	–5.57 (4.37)	–0.11	.204	–1.22 (4.82)	–0.02	.801
	Variability of PA	0.03 (0.14)	0.02	.837	–0.26 (0.14)	–0.17	.060
	Inertia of PA	1.11 (5.06)	0.02	.826	7.70 (5.49)	0.13	.162
	Mean NA	0.21 (0.09)	0.23	.021	0.10 (0.09)	0.11	.262
	Mean PA	–0.10 (0.06)	–0.13	.092	–0.11 (0.05)	–0.17	.037

Note: Values in parentheses are standard errors. PA = positive affect; NA = negative affect; BPD = borderline personality disorder.

found between dynamic measures of PA and NA (for variability of PA and NA, $r = .63$ and $r = .60$; for inertia of PA and NA, $r = .49$ and $r = .53$; see Table S1 in the Supplemental Material). Results for depressive features are reported in Table 1. Depressive features were significantly associated with higher levels of NA and lower levels of PA only at baseline. Similar findings were obtained at follow-up, although the relation with mean NA was only marginally significant. So in both waves, for depressive features, none of the dynamic measures had a significant predictive effect above and beyond mean affect levels. When also correcting for gender, conclusions were identical.

Results for BPD traits are reported in Table 2. When all dynamic measures and mean affect levels of PA and NA were considered simultaneously as potential predictors of BPD traits, results showed robust and significant associations with higher levels of variability in NA in both waves. At baseline, additional associations with higher levels of mean NA were found. At follow-up, additional relations were found with lower levels of PA. In sum, BPD traits were robustly associated with more variable negative emotions.

To further explore the overall predictive power of dynamic measures for psychopathological features over and above mean affect, we examined the amount of variance explained by each group of predictors. We estimated similar models as described above. This time, though, depressive features or BPD traits were predicted by mean PA and mean NA at Step 1 of the regression and then also by variability in NA, variability in PA, inertia in NA, and inertia in PA at Step 2. For depressive features at baseline, mean PA and NA explained 26% of the variance. Adding the dynamic measures significantly increased the explained variance to 29%, $F(4, 195) = 2.49$, $p = .045$. At follow-up, mean affect at Step 1 explained 18% of the variance in depressive features. Dynamic measures increased the explained variance to 20%. This increase was not significant, $F(4, 171) = 0.96$, $p = .431$. For BPD traits, mean PA and mean NA in Step 1 explained 19% of the variance. Adding dynamic measures at Step 2 increased the explained variance to 23%, which was a marginally significant increase, $F(4, 195) = 2.31$, $p = .059$. At 1-year follow-up, mean affect in Step 1 similarly explained 18% of the variance. The addition of dynamic measures significantly

Table 3. Hierarchical Multiple Regression Models Predicting Each Dynamic Measure by Mean Affect (Step 1) and Also by Depressive and BPD Traits (Step 2)

		Baseline			1-year follow-up		
Outcome and step	Predictors	Unstandardized *b*	β	*p*	Unstandardized *b*	β	*p*
Variability in NA							
1	Mean NA	0.36 (0.03)	0.70	< .001	0.34 (0.03)	0.64	< .001
2	Mean NA	0.32 (0.03)	0.63	< .001	0.30 (0.03)	0.56	< .001
	Depressive features	0.00 (0.03)	0.00	.969	–0.00 (0.04)	–0.01	.926
	BPD traits	0.09 (0.03)	0.15	.012	0.12 (0.04)	0.21	.004
Inertia in NA							
1	Mean NA	0.01 (0.00)	0.44	< .001	0.01 (0.00)	0.32	< .001
2	Mean NA	0.01 (0.00)	0.41	< .001	0.00 (0.00)	0.25	.001
	Depressive features	0.00 (0.00)	0.21	.005	0.00 (0.00)	0.12	.165
	BPD traits	–0.00 (0.00)	–0.14	.058	0.00 (0.00)	0.07	.444
Variability in PA							
1	Mean PA	–0.09 (0.03)	–0.20	.005	–0.09 (0.03)	–0.21	.005
2	Mean PA	–0.05 (0.04)	–0.10	.204	–0.07 (0.04)	–0.16	.053
	Depressive features	0.08 (0.05)	0.13	.113	0.08 (0.07)	0.11	.224
	BPD traits	0.09 (0.05)	0.15	.061	0.03 (0.06)	0.05	.614
Inertia in PA							
1	Mean PA	–0.00 (0.00)	–0.32	< .001	–0.01 (0.00)	–0.42	< .001
2	Mean PA	–0.00 (0.00)	–0.25	.001	–0.00 (0.00)	–0.39	< .001
	Depressive features	0.00 (0.00)	0.22	.009	0.00 (0.00)	0.04	.635
	BPD traits	–0.00 (0.00)	–0.09	.263	0.00 (0.00)	0.05	.572

Note: Values in parentheses are standard errors. BPD = borderline personality disorder; NA = negative affect; PA = positive affect.

raised the explained variance to 25%, $F(4, 171) = 3.81$, $p = .005$. This finding shows that overall, the incremental predictive power of the dynamic measures is limited, especially for depressive features.

Specific relationships when correcting for overlap between psychopathological symptoms

In a next set of analyses, we examined to what degree each of the dynamic measures were specifically linked to depressive features or BPD traits after correction for overlap between the two indicators of psychopathology. Moreover, we also corrected for mean affect intensity. We ran several hierarchical multiple regression analyses, each time predicting one dynamic measure by mean affect level (Step 1) and by both depressive features and BPD traits (Step 2).

Results are shown in Table 3 and indicated that BPD traits and not depressive features were significantly linked to higher levels of variability in NA above and beyond mean NA levels. This result was found in both waves. Depressive features and not BPD traits were uniquely linked to higher levels of inertia of NA and inertia of PA above average affect levels. However, this result was found only at baseline. When we also corrected for gender in Step 3, because of statistical overlap with depressive features, conclusions remained identical.

Prospective relationships between emotion dynamics and psychopathological symptoms

In a final set of analyses, we examined whether dynamic measures prospectively predict psychopathological traits and the other way around. To avoid estimating multiple models, we further explored only relationships that were shown to be unique and specific in previous analyses: We examined the bidirectional prospective relationship between BPD traits and variability of NA. Moreover, some indications were found for relationships between depressive features and inertia of NA and PA, although these results were less robust.

Results for the relation between depressive features and inertia are shown in Table 4. Inertia of NA or inertia of PA at baseline did not predict depressive features 1

year later, corrected for levels of depressive features at baseline. However, the reverse relationship was shown given depressive features predicted higher levels of inertia of NA and inertia of PA 1 year later, after correction for inertia levels at baseline, and after correction for mean affect levels at baseline. When correcting for gender by adding it as an additional predictor to the models, all conclusions remained identical with one exception: In the model in which depressive features at follow-up were predicted by depressive features at baseline, inertia of PA at baseline, and mean PA at baseline, the effect of mean PA became slightly larger and now reached statistical significance, $b = -0.11$ ($SE = 0.05$), $\beta = -0.15$, $p = .042$.

Results for the reciprocal relation between BPD traits and variability of NA are shown in Table 4. Variability of NA did not significantly predict larger levels of BPD traits 1 year later above and beyond mean NA levels. For the reverse relationship, we found that BPD traits predicted higher levels of variability in NA 1 year later, also after correction for BPD levels and mean NA at baseline.

Discussion

The goal of this study was to further explore the nature of the relationship between different dynamic measures (i.e., patterns reflecting emotional variability and emotional inertia) and two types of psychopathological features that have emotion dynamics at their core: depressive features and BPD traits. More specifically, we aimed to further explore unique relations if we corrected for overlap between different dynamic measures and average emotional levels and specific relationships if we corrected for overlap between the two types of psychopathological features. Last, we aimed to explore the direction of prospective associations that were shown to be unique and specific in the two previous sets of analyses. The three types of associations were examined using data from a multiwave experience sampling study in which 202 young adults with varying levels of depressive and BPD traits repeatedly rated their emotional states for 7 days at baseline and again at 1-year follow-up.

Regarding unique relationships between dynamic measures and psychopathological traits, if we corrected for overlap between different dynamic measures, results showed that BPD traits were uniquely linked to higher levels of variability of NA above average affect levels and emotional inertia. In turn, no such findings were obtained for depressive features. Some indications were found for unique positive associations between depressive features and levels of emotional inertia of NA, but these findings were not robust across waves and also disappeared if overlap between all dynamic measures and average levels of both NA and PA were considered simultaneously. Moreover, overall predictive power of dynamic measures above mean affect was limited, accounting for only a few percentage points of explained variance in psychopathological traits.

When further exploring the specificity of these relations, by taking overlap between the psychopathological features into account, we found that BPD traits were specifically linked to higher levels of variability in NA. Next, indications were found that depressive features were uniquely linked to higher levels of inertia in PA and NA, but these results were again less consistent across waves.

Based on findings from both sets of analyses, only very weak evidence was found regarding a unique and specific association between emotional inertia and depressive features. First, when we considered overlap with BPD traits, indications were found for specific associations between emotional inertia and depressive features but only at baseline. Results show that depressive features but not BPD traits are associated with emotions that tend to linger and drift off away from the average emotion levels even when corrected for mean affect levels. However, these findings were not consistent across measurement waves. Next, whereas a surge of previous studies showed that depressive features were linked to both more variable and more inert emotions (Houben et al., 2015), the studies typically did not correct for statistical overlap with mean affect and for overlap between the different emotion dynamic measures. Our findings now show that when we correct for overlap with other dynamic measures and mean affect, depressive features were not convincingly related to any dynamic measures above and beyond mean affect levels. This result might mean that the only reason that depressive features were related to both dynamic measures is that they are both associated with mean affect. Which shows that persons with depressive features simply experience low levels of PA and high levels of NA.

These findings are in line with a very recent study that showed that different emotion dynamic measures are highly interrelated and have limited additional predictive value over mean affect for psychological well-being (Dejonckheere et al., 2019). Indeed, we showed that emotional variability and inertia have only limited predictive value above and beyond mean affect for depressive features. Although, on the basis of our findings, we cannot make firm conclusions about the relation between all possible indications of psychological well-being and emotion dynamics, the findings suggest that complex dynamic measures are not necessarily the best way to summarize changing emotional states over

Table 4. The Bidirectional Prospective Relationship Between Psychopathological Features and Emotion Dynamic Measures

Outcome variable and step	Predictors	Unstandardized *b*	β	*p*
Depressive features 1 year later				
Step 1	Depressive features at baseline	0.43 (0.06)	0.48	< .001
Step 2	Depressive features at baseline	0.42 (0.06)	0.47	< .001
	Inertia of NA at baseline	0.70 (3.35)	0.01	.836
Step 3	Depressive features at baseline	0.39 (0.07)	0.43	< .001
	Inertia of NA at baseline	–1.56 (3.61)	–0.03	.666
	Mean NA at baseline	0.11 (0.07)	0.13	.104
Inertia of NA 1 year later				
Step 1	Inertia of NA at baseline	0.27 (0.07)	0.29	< .001
Step 2	Inertia of NA at baseline	0.19 (0.07)	0.21	.005
	Depressive features at baseline	0.01 (0.00)	0.28	< .001
Step 3	Inertia of NA at baseline	0.18 (0.07)	0.19	.016
	Depressive features at baseline	0.01 (0.00)	0.27	.001
	Mean NA at baseline	0.00 (0.00)	0.04	.660
Depressive features 1 year later				
Step 1	Depressive features at baseline	0.43 (0.06)	0.48	< .001
Step 2	Depressive features at baseline	0.43 (0.06)	0.48	< .001
	Inertia of PA at baseline	–1.85 (4.01)	–0.03	.645
Step 3	Depressive features at baseline	0.38 (0.07)	0.43	< .001
	Inertia of PA at baseline	–3.32 (4.05)	–0.06	.414
	Mean PA at baseline	–0.10 (0.05)	–0.15	.052
Inertia of PA 1 year later				
Step 1	Inertia of PA at baseline	0.35 (0.07)	0.34	< .001
Step 2	Inertia of PA at baseline	0.28 (0.07)	0.27	< .001
	Depressive features at baseline	0.00 (0.00)	0.24	.001
Step 3	Inertia of PA at baseline	0.26 (0.08)	0.25	.001
	Depressive features at baseline	0.00 (0.00)	0.19	.014
	Mean PA at baseline	–0.00 (0.00)	–0.13	.096
BPD traits 1 year later				
Step 1	BPD traits at baseline	0.65 (0.06)	0.63	< .001
Step 2	BPD traits at baseline	0.60 (0.07)	0.59	< .001
	Variability of NA at baseline	0.20 (0.12)	0.11	.089
Step 3	BPD traits at baseline	0.58 (0.07)	0.56	< .001
	Variability of NA at baseline	0.07 (0.15)	0.04	.649
	Mean NA at baseline	0.11 (0.07)	0.12	.147
Variability of NA 1 year later				
Step 1	Variability of NA at baseline	0.60 (0.07)	0.57	< .001
Step 2	Variability of NA at baseline	0.52 (0.07)	0.50	< .001
	BPD traits at baseline	0.10 (0.04)	0.17	.011
Step 3	Variability of NA at baseline	0.42 (0.09)	0.40	< .001
	BPD traits at baseline	0.09 (0.04)	0.14	.038
	Mean NA at baseline	0.08 (0.05)	0.16	.066

Note: Values in parentheses are standard errors. BPD = borderline personality disorder; NA = negative affect; PA = positive affect.

time and highlight the importance and necessity of first considering the predictive value of more parsimonious measures, such as average emotional intensity. Moreover, although our sample was not an extremely healthy sample, still our findings might not generalize to people diagnosed with a clinical major depressive disorder. A clinical sample might show more robust associations with emotional inertia because emotional inertia is likely stronger in people with a diagnosis of major depressive disorder. Further replication is needed,

ideally with clinical samples in which similar analytic approaches are adopted.

In contrast to results involving depressive features, our study showed that BPD traits were robustly associated with higher levels of variability of NA even after correction for overlap between different dynamic measures, indicators of depressive symptoms, and mean affect. This finding shows that in contrast to findings for depressive features, the presence of emotional fluctuations is a crucial component to describe the emotional functioning of persons characterized by more BPD-related traits. This finding shows that these people experience emotions that deviate strongly from their emotional baseline over time, which results in a larger emotional range. This finding is in line with models of BPD that propose that emotion dysregulation is a core feature of BPD (Carpenter & Trull, 2013; Crowell, Beauchaine, & Linehan, 2009).

However, it should be noted that the overall predictive power of dynamic measures for BPD traits was still limited given it accounted only for a small portion of the variance. In addition, no association with emotional inertia was found. Emotional instability, which reflects emotional changes that go beyond simple fluctuations around a person's average emotional state but specifically involve changes that occur abruptly from one point to the next, is typically measured with the MSSD, which has been shown to be a combination of high levels of variability and low levels of inertia (Jahng et al., 2008). Our findings might suggest that not instability but variability is the defining emotion dynamic feature that is central for persons with BPD features. This result shows that these persons experience a large emotional range or large overall deviations in their emotional repertoire that do not necessarily follow a rapid up-and-down pattern. See Supplemental Material available online for more information regarding this association. These findings again highlight the importance of first considering more simple parsimonious measures of emotional change before focusing on more complex dynamic measures. Still, our study did not include a clinical sample, and persons with a diagnosis of BPD might experience more extreme emotional changes, which could be characterized by also more abrupt emotional changes. Replication among persons with a formal diagnosis of BPD is needed to further elucidate the true relation between emotional dynamics and BPD.

In a final step, we examined the directionality of the relationship between emotion dynamics and psychopathological traits. Results indicated that depressive features and BPD traits predicted the strength of dynamic patterns 1 year later rather than the opposite. This finding is in line with the idea that emotion dynamic patterns are a consequence rather than a precedent of psychopathological features, at least in nonclinical populations. These findings are not in line with previous studies that show that emotional inertia precedes transitions into a depression (Kuppens et al., 2012; Leemput et al., 2014). However, these previous studies focused on transitions into a clinical diagnosis of depression. Still, these findings and our findings are not necessarily mutually exclusive. Speculatively, increases in depressive features could impair emotional functioning and slow down emotional processes, resulting in heightened levels of emotional inertia. This process might exacerbate over time. At one point, these emotions become so inert and stuck that escape from negative emotions becomes impossible and a transition into clinical depression might occur.

The finding that BPD traits predict more variability and not the other way around shows that the more persons are characterized by features related to instability in several domains, including interpersonal relations, identity, and affect, the higher levels of variability in their negative affect they will experience 1 year later. This finding suggests that heightened levels of emotional variability are more likely a result of other features that reflect dysregulated behaviors, cognitions, and affect rather than the other way around. As a result, these findings go against the idea that dysregulated affect underlies other features of BPD, as suggested by Linehan (1993). However, our sample is a nonclinical sample. Therefore, it is not clear whether these findings can be generalized to clinical BPD populations. Moreover, on the basis of etiological models, BPD and related personality disorders are likely the result of both biologically driven vulnerability factors combined with an invalidating developmental context occurring at early stages in life. A more complex interaction between several crucial factors could obscure the effect of emotion dynamic patterns in our study.

Several limitations should be noted. We focused on a nonclinical sample, which allowed us to examine change in the intensity of psychopathological features that have not reached the clinical diagnosis (yet). Therefore, our study could inform future studies that aim to explore and identify potential precursors of clinical diagnoses. However, our findings might not generalize to the relationship between emotion dynamic patterns and clinical diagnoses because different emotional processes could underlie clinical and nonclinical levels of psychopathology. Future studies should further explore the nature of the relationship and its prospective direction between clinical diagnoses such as depression and BPD and different emotion dynamic measures. In addition, our sample was largely a European sample, potentially limiting the generalizability of the findings. Another limitation is the limited duration of the experience sampling in each wave. At baseline and at follow-up, participants

each time participated in 1 week of experience sampling. It is not clear whether the selected week also represents a typical week for each participant because it might be biased because of atypical events or circumstances. However, exactly for this reason did we attempt to replicate findings at 1-year follow-up. Last, we focused on between-persons differences in emotion dynamics and the relation to depressive features and BPD traits. Still, results cannot be generalized to the within-person level. For example, on the basis of our findings, we cannot conclude that changes in emotional inertia within one individual over time are unrelated to the person's depressive state, even in nonclinical samples.

In sum, when overlap between different emotion dynamic measures, different types of psychopathological features, and mean affect levels is taken into account, BPD traits were uniquely and specifically linked to higher levels of variability in NA. For depressive features, indications were found for a possible specific association with inertia of NA. However, these associations were not consistent and robust, thereby not convincingly showing that depressive features are concurrently related to any dynamic measures above and beyond mean affect levels. In fact, overall, incremental predictive power of the dynamic measures above mean affect was limited, especially for depressive features. Prospective relationships were mainly found in one direction: Psychopathological features predicted stronger emotion dynamic patterns 1 year later rather than the other way around. These findings further elucidate the nature of the relationship between different emotion dynamic measures and psychopathological features related to depression and BPD in nonclinical populations and illustrate the importance of taking overlap between dynamic measures, the effect of mean affect levels, and the association between different indicators of psychopathology into account.

Action Editor

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Author Contributions

P. Kuppens developed the study design. M. Houben developed the study concept, partially collected the data, and performed the data analysis. M. Houben interpreted the results together with P. Kuppens. M. Houben drafted the manuscript, and P. Kuppens provided critical revisions. All of the authors approved the final manuscript for submission.

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Supplemental Material

Additional supporting information can be found at http://journals.sagepub.com/doi/suppl/10.1177/2167702619871962

Notes

1. We also repeated the main analyses and investigated the three main emotion dynamics patterns that are also examined in the meta-analysis by Houben et al. (2015): emotional variability, emotional instability, and emotional inertia. Because the measures of emotional variability, instability, and inertia are interrelated (Jahng et al., 2008) and one measure can be expressed as a function of the two other measures, not all three measures, but only pairs of dynamic measures, were entered simultaneously as predictors of depressive features or BPD traits in separate models. These results are reported in Supplemental Material available online.
2. Emotional indexes examined in this study did not significantly differ by gender.
3. Note that no significant differences were found between participants completing and not completing the follow-up wave regarding age, gender, intensity of depressive features and BPD traits, mean PA, mean NA, variability in PA or NA, and inertia of PA and NA in Wave 1.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Bouma, J., Ranchor, A. V., Sanderman, R., & van Sonderen, E. (2012). *Het meten van symptomen van depressie met de CES-D: en handleiding* [Measuring symptoms of depression with the CES-D: a manual] (2nd ed., Rev). Groningen, The Netherlands: UMCG / Rijksuniversiteit Groningen, Research Institute SHARE.

Bulteel, K., Mestdagh, M., Tuerlinckx, F., & Ceulemans, E. (2018). VAR(1) based models do not always outpredict AR(1) models in typical psychological applications. *Psychological Methods*, *23*, 740–756. doi:10.1037/met0000178Q

Carpenter, R. W., & Trull, T. J. (2013). Components of emotion dysregulation in borderline personality disorder: A review. *Current Psychiatry Reports*, *15*, 1–8.

Crowell, S. E., Beauchaine, T. P., & Linehan, M. M. (2009). A biosocial developmental model of borderline personality: Elaborating and extending Linehan's theory. *Psychological Bulletin*, *135*, 495–510. doi:10.1037/a0015616

Dejonckheere, E., Mestdagh, M., Houben, M., Rutten, I., Sels, L., Kuppens, P., & Tuerlinckx, F. (2019). Complex affect dynamics add limited information to the prediction of psychological well-being. *Nature Human Behaviour*, *3*, 478–491. doi:10.1038/s41562-019-0555-0

Diener, E., & Emmons, R. A. (1984). The independence of positive and negative affect. *Journal of Personality and Social Psychology*, *47*, 1105–1117. doi:10.1037/0022-3514.47.5.1105

Gotlib, I. H., Lewinsohn, P. M., & Seeley, J. R. (1995). Symptoms versus a diagnosis of depression: Differences in psychosocial functioning. *Journal of Consulting and Clinical Psychology*, *63*, 90–100.

Houben, M., Van Den Noortgate, W., & Kuppens, P. (2015). The relation between short-term emotion dynamics and psychological well-being: A meta-analysis. *Psychological Bulletin*, *141*, 901–930. doi:10.1037/a0038822

Ingram, R. E., & Siegle, G. J. (2009). Methodological issues in the study of depression. In I. H. Gotlib & C. L. Hammen (Eds.), *Handbook of depression* (pp. 69–92). New York, NY: Guilford.

Jahng, S., Wood, P. K., & Trull, T. J. (2008). Analysis of affective instability in ecological momentary assessment: Indices using successive difference and group comparison via multilevel modeling. *Psychological Methods*, *13*, 354–375. doi:10.1037/a0014173

Koole, S. L. (2009). The psychology of emotion regulation: An integrative review. *Cognition and Emotion*, *23*, 4–41. doi:10.1080/02699930802619031

Koval, P., Pe, M. L., Meers, K., & Kuppens, P. (2013). Affect dynamics in relation to depressive symptoms: Variable, unstable or inert? *Emotion*, *13*, 1132–1141. doi:10.1037/a0033579

Kuppens, P., Sheeber, L. B., Yap, M. B., Whittle, S., Simmons, J. G., & Allen, N. B. (2012). Emotional inertia prospectively predicts the onset of depressive disorder in adolescence. *Emotion*, *12*, 283–289.

Kuppens, P., & Verduyn, P. (2015). Looking at emotion regulation through the window of emotion dynamics. *Psychological Inquiry*, *26*, 72–79. doi:10.1080/1047840X.2015.960505

Kuppens, P., & Verduyn, P. (2017). Emotion dynamics. *Current Opinion in Psychology*, *17*, 22–26. doi:/10.1016/j.copsyc.2017.06.004

Leemput, I. A. van de, Wichers, M., Cramer, A. O. J., Borsboom, D., Tuerlinckx, F., Kuppens, P., . . . Scheffer, M. (2014). Critical slowing down as early warning for the onset and termination of depression. *Proceedings of the National Academy of Sciences, USA*, *111*, 87–92. doi:10.1073/pnas.1312114110

Leichsenring, F., Leibing, E., Kruse, J., New, A. S., & Leweke, F. (2011). Borderline personality disorder. *The Lancet*, *377*, 74–84.

Linehan, M. (1993). *Cognitive-behavioral treatment of borderline personality disorder*. New York, NY: Guilford Press.

Meiran, N., Diamond, G. M., Toder, D., & Nemets, B. (2011). Cognitive rigidity in unipolar depression and obsessive compulsive disorder: Examination of task switching, Stroop, working memory updating and post-conflict adaptation. *Psychiatry Research*, *185*, 149–156. doi:10.1016/j.psychres.2010.04.044

Mestdagh, M., Pe, M., Pestman, W., Verdonck, S., Kuppens, P., & Tuerlinckx, F. (2018). Sidelining the mean: The relative variability index as a generic mean-corrected variability measure for bounded variables. *Psychological Methods*, *23*, 690–707. doi:10.1037/met0000153

Nezlek, J. B. (2017). A practical guide to understanding reliability in studies of within-person variability. *Journal of Research in Personality*, *69*, 149–155. doi:10.1016/j.jrp.2016.06.020

Pe, M. L., Kircanski, K., Thompson, R. J., Bringmann, L. F., Tuerlinckx, F., Mestdagh, M., . . . Gotlib, I. H. (2015). Emotion-network density in major depressive disorder. *Clinical Psychological Science*, *3*, 292–300. doi:10.1177/2167702614540645

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement*, *1*, 385–401. doi:10.1177/014662167700100306

Schmukle, S. C., Egloff, B., & Burns, L. R. (2002). The relationship between positive and negative affect in the Positive and Negative Affect Schedule. *Journal of Research in Personality*, *36*, 463–475. doi:10.1016/S0092-6566(02)00007-7

Schotte, C., & De Doncker, D. (1996). *ADP-IV Questionnaire: Manual and norms*. Antwerp, Belgium: University Hospital Antwerp.

Schotte, C. K. W., De Doncker, D. A. M., Dmitruk, D., Van Mulders, I., D'Haenen, H., & Cosyns, P. (2004). The ADP-IV questionnaire: Differential validity and concordance with the semi-structured interview. *Journal of Personality Disorders*, *18*, 405–419.

Schotte, C. K. W., De Doncker, D., Vankerckhoven, C., Vertommen, H., & Cosyns, P. (1998). Self-report assessment of the DSM-IV personality disorders. Measurement of trait and distress characteristics: the ADP-IV. *Psychological Medicine*, *28*, 1179–1188.

Schroevers, M. J., Sanderman, R., van Sonderen, E., & Ranchor, A. V. (2000). The evaluation of the Center for Epidemiologic Studies Depression (CESD) scale: Depressed and positive affect in cancer patients and healthy reference subjects. *Quality of Life Research*, 9, 1015–1029.

World Health Organization. (1992). *The ICD-10 classification of mental and behavioural disorders. Clinical descriptions and diagnostic guidelines*. Geneva, Switzerland: World Health Organization.

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*, *54*, 1063–1070.

Wu, Q., Erbas, Y., Brose, A., Kuppens, P., & Janssen, R. (2016). The factor structure, predictors, and percentile norms of the Center for Epidemiologic Studies Depression (CES-D) Scale in the Dutch-speaking adult population of Belgium. *Psychologica Belgica*, 56, 1–12. doi:10.5334/pb.261