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Abstract: Background Emotion dysregulation is a characteristic central to borderline personality disorder (BPD). Valuably, verbal behaviour can provide a unique perspective for studying emotion dysregulation in BPD, with recent research suggesting that the varieties of emotion words one actively uses (i.e., active emotion vocabularies [EVs]) reflect habitual experience and potential dysregulation therein. Accordingly, the present research examined associations between BPD and active EVs across two studies. Methods Study 1 (N = 530) comprised a large non-clinical sample recruited from online forums, whereby BPD traits were measured via self-report. Study 2 (N = 64 couples) consisted of mixed-gender romantic couples in which the woman had a BPD diagnosis, as well as a control group of couples. In both studies, participants' verbal behaviours were analysed to calculate their active EVs. Results Results from both studies revealed BPD to be associated with larger negative EV (i.e., using a broad variation of unique negative emotion words), which remained robust when controlling for general vocabulary size and negative affect word frequency in Study 2. The association between BPD and negative EV was insensitive to context. Limitations Limitations of this research include: 1) the absence of a clinical control group; 2) typical constraints surrounding word-counting approaches; and 3) the cross-sectional design (causality cannot be inferred). Conclusions Our findings contribute to BPD theory as well as the broader language and emotion literature. Importantly, these findings provide new insight into how individuals manifesting BPD attend to and represent their emotional experiences, which could be used to inform clinical practice.

Research Paper

# Natural emotion vocabularies and borderline personality disorder

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## ARTICLE INFO

## ABSTRACT

*Background:* Emotion dysregulation is a characteristic central to borderline personality disorder (BPD). Valuably, verbal behaviour can provide a unique perspective for studying emotion dysregulation in BPD, with recent research suggesting that the varieties of emotion words one actively uses (i.e., active emotion vocabularies [EVs]) reflect habitual experience and potential dysregulation therein. Accordingly, the present research examined associations between BPD and active EVs across two studies.
*Methods:* Study 1 ($N = 530$) comprised a large non-clinical sample recruited from online forums, whereby BPD traits were measured via self-report. Study 2 ($N = 64$ couples) consisted of mixed-gender romantic couples in which the woman had a BPD diagnosis, as well as a control group of couples. In both studies, participants' verbal behaviours were analysed to calculate their active EVs.
*Results:* Results from both studies revealed BPD to be associated with larger negative EV (i.e., using a broad variation of unique negative emotion words), which remained robust when controlling for general vocabulary size and negative affect word frequency in Study 2. The association between BPD and negative EV was insensitive to context.
*Limitations:* Limitations of this research include: 1) the absence of a clinical control group; 2) typical constraints surrounding word-counting approaches; and 3) the cross-sectional design (causality cannot be inferred).
*Conclusions:* Our findings contribute to BPD theory as well as the broader language and emotion literature. Importantly, these findings provide new insight into how individuals manifesting BPD attend to and represent their emotional experiences, which could be used to inform clinical practice.

## 1. Introduction

Borderline personality disorder (BPD) is a severe mental health condition generally characterised by longstanding patterns of dysregulated emotional functioning, problematic interpersonal relationships, and disturbed identity (APA, 2013). Further, BPD is a problematically heterogeneous construct (e.g., Cavelti et al., 2021) and is highly co-morbid with various other mental health conditions (e.g., Shah and Zanarini, 2018), prompting some scholars to conceptualise BPD as reflective of "general psychopathology" (for empirical evidence, see, e. g., Gluschkoff et al., 2021; Sharp et al., 2015; Wright et al., 2016).

However BPD is conceptualised, emotion dysregulation remains a defining and critical feature (e.g., Crowell et al., 2009).

Emotion dysregulation in BPD is thought to consist of four components: 1) emotion sensitivity, 2) heightened and variable negative affect, 3) a deficit of appropriate emotion regulation strategies, and 4) a reliance on maladaptive regulation strategies (e.g., self-harm; Carpenter and Trull, 2013). Further, prominent clinical theories suggest that the way in which individuals manifesting BPD understand and attend to their negative emotions moderates the impact of these emotions, through either disrupting (positive impact) or driving (negative impact) patterns of emotional cascades or negative rumination (e.g., Beck et al.,

1979; Linehan, 1993).

Despite a large literature discussing emotion dysregulation in BPD, there remain foundational gaps in the understanding of such dysfunction, particularly surrounding the emotion processes and experiences themselves. Valuably, advances in affective theory and methods provide researchers with a unique opportunity to address these gaps in knowledge by utilising verbal behaviour to access patterns of attention to, and representation of, emotion (Vine et al., 2020). Examining the words individuals use is an unobtrusive way of quantifying how people think about and formulate their emotional experiences (e.g., Pennebaker, 2011). Moreover, the analysis of emotion words has also been used to assess the extent to which individuals refer to specific emotions, and is sometimes employed as a measure of emotion differentiation (i.e., the ability to experience distinct emotions; e.g., Williams & Uliaszek, 2022). When combined with natural language data, automated analyses of verbal behaviour can provide insight into emotion (dys)regulation in the real world and in context.

In the following sections, we briefly review the relationship between BPD and emotion differentiation, highlight the value of language in studying emotion, and present a recently developed method for quantifying emotion words. We then introduce how this method is applied in the present research to better understand emotion dysregulation in BPD.

### 1.1. BPD and low emotion differentiation

Emotion differentiation refers to one's ability to experience distinct and nuanced emotions, and is thought to reflect accrued knowledge or concepts for emotion (Barrett et al., 2001; Hoemann et al., 2023). In theory, higher emotion differentiation should be associated with better emotion regulation because experiencing specific emotions facilitates a person's ability to enact emotion-specific regulation strategies in a context-specific manner (e.g., Southward et al., 2019). Considerable research supports this assumption (e.g., Kalokerinos et al., 2019), with lower emotion differentiation likewise associated with emotion regulation difficulties (for a review, see Seah and Coifman, 2021).

The central role of emotion dysregulation in BPD suggests that low emotion differentiation would be associated with the construct. Again, previous research provides ample support for this association (e.g., Derks et al., 2017; Fitzpatrick et al., 2019; Suvak et al., 2011). Moreover, lower emotion differentiation predicts greater engagement in maladaptive behaviours in individuals with BPD (Dixon-Gordon et al., 2014), including non-suicidal self-injury (Zaki et al., 2013).

### 1.2. Emotion (dys)regulation and natural language

Despite such compelling findings, the current emotion differentiation literature may only tell part of the story. Emotion differentiation is typically assessed by asking participants to repeatedly rate their momentary experience on a set of pre-specified emotion terms (for review, see Thompson et al., 2021). This approach generates a measure of how pre-selected emotion concepts are implemented but may not reflect how people spontaneously (or typically) represent affective experiences in everyday life. The terms pre-specified by researchers may fail to capture certain types of emotions and, in any case, explicitly prompt participants to attend to their experiences in ways that they might not otherwise do (for discussion, see Li et al., 2020; Vine et al., 2020). For these reasons, researchers have explored natural language as an ecologically valid and minimally intrusive means of capturing the experience and expression of emotion *in-situ* (e.g., Williams & Uliaszek, 2022).

Research using verbal behaviour to better understand emotion dysregulation is somewhat scarce. One prominent approach has involved the examination of emotion word frequencies. In this work, researchers employ word-counting software (e.g., Linguistic Inquiry and Word Count; Pennebaker et al., 2015) to identify the proportion of affectively-laden words in a given text, reflecting general attention to

emotion (see Boyd and Schwartz, 2021). In line with the conceptualisation of emotion dysregulation in BPD, research examining emotion word frequencies has consistently demonstrated that people manifesting BPD typically use a high frequency of negative affect words, and anger words in particular (e.g., Coppersmith et al., 2015; Lyons et al., 2018), as well as relatively fewer positive affect words (e.g., Rosenbach and Renneberg, 2015). Although such research provides a useful starting point for exploring emotion processes in BPD using naturalistic language-based methods, there remains considerable room for more in-depth investigation that goes beyond simply exploring general emotion word frequencies.

### 1.3. Active emotion vocabularies

Recently, Vine et al. (2020) introduced a new method for quantifying emotion language; namely, the measurement of active emotion vocabularies (EVs). This approach captures the *variety* of emotion words used spontaneously (i.e., without prompting from researchers); a greater variety of words used to refer to a particular emotion would indicate a larger active EV for that emotion concept. Based on linguistic theory (see, e.g., Pennebaker, 2011; Zipf, 1949), the emotion words one spontaneously uses should generally correspond with one's typical or frequent, salient experiences. Smaller positive EV (reflecting less experience with positive emotion) and larger negative EV (reflecting more experience with negative emotion) should, then, be associated with poorer emotional functioning. To test this hypothesis, Vine et al. (2020) conducted two studies comprising different general population samples. Findings revealed that, in general, larger negative EVs were associated with indicators of poorer physical and psychosocial health, whereas larger positive EVs were associated with indicators of better physical and psychosocial health.

The findings from Vine et al. (2020) provide initial empirical support for linguistic theory suggesting that active EVs should correspond with individuals' typical emotional experiences. Extending the analysis of active EVs to BPD (and any other clinical group) has the potential to provide new insight into the inner emotional world of individuals with BPD and the emotion dysregulation that is central to the disorder.

### 1.4. Current research

In the current investigation, we conducted two studies – comprising different samples and types of language modality – to examine active EVs expressed in natural language and investigate how they relate to BPD. Study 1 comprised written essays from participants recruited from online forums, enabling us to investigate the relationship between emotion-relevant verbal behaviour and BPD traits in a large non-clinical sample. Study 2 consisted of spoken interactions between romantic partners in a clinical BPD sample, as well as a comparison group of control (i.e., non-clinical) couples.[1] Data from both studies enabled us to examine emotion vocabularies in BPD in the context of close relationships, where emotion dysregulation is especially consequential and likely to be more prominent (e.g., Hill et al., 2008).

The current research was driven by two main goals: 1) investigate the relationship between BPD and active EVs, and 2) explore whether associations between BPD and active EVs vary depending on the context, as an indicator of their context-sensitivity. Based on linguistic theory (e.g., Zipf, 1949) and findings from Vine et al. (2020), we hypothesised that BPD would be associated with relatively larger negative EV and smaller positive EV. Further, we hypothesised that the associations with negative EV would be stronger and more robust than the associations with positive EV due to research evidencing that emotion dysregulation in BPD is most prominently distinguished by heightened negative emotion

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[1] See https://osf.io/3j7mk/?view_only=ea2d77ad7244420bbabfbc8eec4f710e for data for both studies.

(e.g., Chu et al., 2016). Given the lack of research on the stability of active EVs across time and context, our second research aim was exploratory in nature.

## 2. Study 1

### 2.1.1. Method

Data for Study 1 were collected as part of a larger investigation on the associations between natural language and various psychological and personality processes, including BPD traits. This study was approved by the Faculty of Science and Technology Research Ethics Committee (FSTREC) at Lancaster University.

#### 2.1.1.1. Participants and procedure

Participants were recruited for the study via targeted sampling from various online forums (all approved by forum moderators). In particular, advertisement of the study involved online distribution of anonymous links to the Qualtrics study information sheet. Both general discussion forums and mental health forums were targeted for recruitment, with the aim of enhancing sample diversity in mental health status. Following consent procedures, participants were presented with several questions that measured their sociodemographic characteristics (e.g., age, gender). The remaining questions in the study assessed various psychological, social, and personality processes, with the order of all questions, questionnaire items, and writing prompts randomised between participants.

The only inclusion criteria for the study included the ability to write or speak in fluent English and being a minimum of 18 years of age. There were no exclusion criteria relating to mental health conditions; we wanted to allow the sample to be as (psychologically) diverse and inclusive as possible. No incentives were offered for participation in the study. Participants who did not provide sufficient data for key measures – that is, those who did not provide any responses to the BPD measure or whose relationship essays did not meet the minimum word count criteria (see below) – were removed from the dataset ($N = 137$), resulting in a total of 530 participants (see Table 1 for sociodemographic characteristics).

### 2.1.2. Measures

#### 2.1.2.1. Borderline pathology features

BPD features were assessed using the Personality Assessment Inventory-Borderline Scale (PAI-BOR; Morey, 1991). The PAI-BOR is a 24-item questionnaire that assesses 4 core features of BPD: affective instability (6 items; $\alpha = 0.78$), identity problems (6 items; $\alpha = 0.70$), social dysfunction (6 items; $\alpha = 0.62$), and self-harm (6 items; $\alpha = 0.80$). Responses are measured through a 4-point response scale ranging from 0 (false) to 3 (very true); total PAI-BOR scores can range from 0 to 84. The average total PAI-BOR score for our sample was 37.24 ($SD = 13.03$; $\alpha = 0.88$). A total PAI-BOR score of 38 or more is proposed to indicate the presence of "significant BPD features", whereas a score of 60 or more indicates typical borderline pathology (i.e., clinically significant levels; Morey, 1991). While our sample centres around PAI-BOR scores indicative of the presence of BPD traits in the general population (i.e., a score of 38), only a very small portion of the sample (less than 4%) reach clinically significant levels of BPD (i.e., scores of 60+).

#### 2.1.2.2. Relationship essays

Participants were asked to write in a spontaneous, 'stream of consciousness' fashion about their relationships with other people, to capture rich data on participants' psychology around the topic of interpersonal relationships. The prompt read as follows:

*When you think about your relationships with other people, what comes to mind? For the next 7 minutes (or more), we would like for you to write*

**Table 1**

Sociodemographic Characteristics of Participants in Study 1 ($N = 530$).

| Characteristic | Mean | SD |
|---|---|---|
| Age ($n = 528$) | 26.22 | 8.41 |
| | $n$ | % |
| Gender ($n = 520$) | | |
| Female | 379 | 72.88 |
| Male | 126 | 24.23 |
| Non-binary | 15 | 2.88 |
| Ethnicity ($n = 521$) | | |
| Asian | 40 | 7.68 |
| Black | 10 | 1.92 |
| Hispanic or Latino | 37 | 7.10 |
| Mixed | 34 | 6.53 |
| White | 394 | 75.62 |
| Other | 6 | 1.15 |
| Marital Status ($n = 521$) | | |
| Single | 268 | 51.44 |
| Married/partnered | 237 | 45.49 |
| Divorced/separated | 16 | 3.07 |
| Education Level ($n = 522$) | | |
| Less than high school | 17 | 3.26 |
| High school/some college | 260 | 49.81 |
| College | 74 | 14.18 |
| University/postgraduate degree | 171 | 32.76 |
| Employment Status ($n = 524$) | | |
| Unemployed | 117 | 22.33 |
| Student | 172 | 32.82 |
| Employed | 213 | 40.65 |
| Self-employed | 16 | 3.05 |
| Retired | 6 | 1.15 |

*Note.* Differences in *n*s between the various demographic measures reflect the data provided by participants, as all participants (i.e., $n = 530$) did not provide responses to all questionnaire measures, hence the differing *n*s (e.g., more participants provided data for age than for gender).

*about how you get along with people. This can include your relationships with co-workers, family, friends, and romantic partners. Try to say as much as you can about both the <u>good</u> and the <u>bad</u>. Do not worry about spelling or grammar. Simply write everything that comes to mind, giving as much detail as possible. Once you begin writing, try to write continuously until you have finished. If you run out of things to say, re-tell what you have previously said in other words.*

#### 2.1.2.3. Everyday behaviour essays

To collect natural language data as a more general comparison, participants were also prompted to write about their daily behaviours over the past seven days. The prompt presented was slightly modified from that used in a previous study relating to everyday behaviour and values (Boyd et al., 2015). Specifically, the prompt read:

*"For the next 7 minutes (or more), write about everything that you have done in the past 7 days. For example, your activities might be simple, day-to-day types of behaviors (such as eating dinner with your family, making your bed, writing an e-mail, and going to work). Your activities in the past week might also include things that you do regularly, but not necessarily every day (such as going to church, playing a sport, writing a paper, having a romantic evening) or even rare activities (such as skydiving, taking a trip to a new place). Try to recall each activity that you have engaged in, starting a week ago and moving to the present moment. Be specific. Once you begin writing, try to write continuously until you have finished."*

### 2.1.3. Pre-processing and language analysis

Participants' written essays were corrected for common misspellings and idiosyncrasies prior to analysis, and all texts containing fewer than 50 words were excluded from subsequent analysis to ensure reliability of language analysis and validity of measurement (see, e.g., Boyd, 2017;

Cutler et al., 2021). Participants wrote an average of 211.60 words (*SD* = 186.22) for the relationship essays and 185.79 words (*SD* = 107.05) for the everyday behaviour essays.

Following pre-processing procedures, participants' active EVs were computed from their language using the same methodology as in Vine et al. (2020). Specifically, we used BUTTER (Boyd, 2020) – a text analysis software for the social sciences – to calculate active EVs. For an overview of the methodology behind the automated program, active EVs are quantified by counting the frequency of unique emotion words (e.g., "sad", "depressed") to describe an emotion concept (e.g., sadness) in a given text. As an example, the sentence "I'm so *disappointed* – he made me feel very *sad* and *upset*" illustrates a larger negative EV than the sentence "I'm so *upset* – I can't believe this, it was so *upsetting*, he made me feel so *upset*", despite displaying the same negative emotion word frequency. Active EV scores generated therefore reflect the percentage of unique emotion words relative to the total word count, rather than simply reflecting general emotion word frequencies. Using pre-determined word-mappings (see Vine et al., 2020), the software calculates active EV scores for positive and negative emotion as well as for specific negative emotions nested under the overall negative emotion category, namely: sadness, anxiety/fear, anger, and undifferentiated negative emotion (reflecting stress). Additionally, individuals' general vocabulary size (i.e., the diversity of unique words used in general) is also computed and was included as a control variable in the subsequent EV analyses, as described in Vine et al. (2020).

In EV analyses, it is also informative to control for overall emotion word frequencies to determine whether the results generated directly reflect the *diversity* of one's emotion word use, as opposed to simply being a function of the overall frequency. Accordingly, to generate emotion word frequency scores to be controlled for, we used the word-counting program Linguistic Inquiry and Word Count (LIWC2015; Pennebaker et al., 2015). LIWC is an extensively validated word counting program that uses an internal dictionary to calculate the percentage of words belonging to psychologically meaningful dimensions (e.g., affective processes; social processes) in a given text. Specifically, we used LIWC to measure the frequency of overall positive and negative affect words, computed as percentages of the total word count.

## 2.2. Results

### 2.2.1. Data analysis

To test our hypotheses that BPD would be associated with larger negative EV and smaller positive EV, we first examined associations between BPD features and positive and negative EVs via two-tailed, bivariate Pearson's correlations. We also correlated BPD features with the negative EV subtypes (i.e., anxiety/fear, anger, sadness, and undifferentiated negative EV) as follow-up specificity tests. To determine the robustness of associations found between BPD and active EVs, we then conducted linear regressions, where we included key control variables as covariates. Specifically, in all regression models, total BPD feature scores were entered as the outcome variable and active EVs, general vocabulary size, and the corresponding emotion word frequency (derived from LIWC) were added as predictors. Although another potential confound, education level was not included as a control variable as it was not significantly associated with positive or negative EV (or any of the negative EV subtypes). Separate regression models were conducted for positive and negative EV. Analyses were performed in the same way on data from both the relationship and everyday behaviour essays.

### 2.2.2. Descriptive analyses

In terms of the overall emotion word frequencies in participants' relationship essays, using LIWC2015, it was found that an average of 7.84% (*SD* = 2.84) of the words used were of emotional content,

including both negative (*M* = 3.11, *SD* = 1.90) and positive emotion (*M* = 4.55, *SD* = 2.30). With regard to unique emotion words used, or active emotion vocabulary scores, the average positive EV was 0.59 (*SD* = 0.56) and average negative EV was 0.80 (*SD* = 0.80). Each EV was significantly associated with the corresponding emotion word frequency (all *p*'s < 0.001). General vocabulary size positively correlated with negative EV (*r* = 0.10, *p* = .020), but was not significantly associated with positive EV.

As for the everyday behaviour essays, an average of 3.44% (*SD* = 2.27) of the words used were of emotional content, composed of negative (*M* = 1.47, *SD* = 1.60) and positive emotion (*M* = 1.92, *SD* = 1.37). With regard to active EVs, the average positive EV was 0.17 (*SD* = 0.35) and average negative EV was 0.32 (*SD* = 0.52). Each EV was again significantly associated with the corresponding emotion word frequency (all *p*'s < 0.001). General vocabulary size was not found to correlate significantly with negative or positive EVs in the behaviour essays.

### 2.2.3. Research aim 1: examining the relationship between BPD and active EVs

Table 2 illustrates the correlation coefficients between BPD features and active EVs derived from the relationship essays. In general, results showed that BPD features were positively associated with negative EV and negatively associated with positive EV. Follow-up analyses revealed that the association with overall negative EV was primarily driven by anxiety/fear and anger EV. That is, anxiety/fear EV was marginally associated with total BPD feature scores (*r* = 0.09, *p* = .055) and significantly associated with BPD social feature scores (*r* = 0.12, *p* = .009); Anger EV was significantly associated with total BPD feature scores (*r* = 0.09, *p* = .048), and BPD affect (*r* = 0.12, *p* = .008) and identity (*r* = 0.10, *p* = .030) feature scores.

Follow-up linear regression analyses revealed that, when controlling for general vocabulary size and corresponding emotion word frequencies, active EVs were not found to significantly predict BPD features. Regression coefficients for each of the covariates, in each of the models, are presented in Supplemental Materials A (Table S1).

### 2.2.4. Research aim 2: exploring the context-dependency of associations between BPD and active EVs

Table 3 shows the correlation coefficients between BPD features and active EVs derived from the everyday behaviour essays. Correlation analyses uncovered that BPD features were positively associated with negative EV, but were not significantly associated with positive EV. Follow-up analyses showed that the association with negative EV was primarily driven by anger EV, as anger EV was significantly correlated with total BPD feature scores (*r* = 0.12, *p* = .023) as well as BPD affect (*r*

**Table 2**

Pearson Correlations between BPD Features and Emotion Vocabularies in Relationship Essays.

| | Positive EV | Negative EV |
|---|---|---|
| BPD Total (*n* = 498) | −0.10* | .12* |
| Affect (*n* = 515) | −0.10* | .11* |
| Identity (*n* = 510) | −0.08† | .13** |
| Social (*n* = 513) | −0.07 | .13** |
| Self-harm (*n* = 516) | −0.06 | −0.01 |

** *p* < .01.
* *p* < .05.
† *p* < .10

*Note.* All tests are two-tailed. The *n*s reflect the PAI-BOR data provided by participants (from a total of *n* = 530). *N*s vary by subscale due to some participants responding to all items in some subscales but not in others; participant data were only included in the analysis if they provided responses for every item in the subscale, hence the differing *n*s. The *n* for the total score reflects the number of participants that provided responses for all 24 items.

**Table 3**

Pearson Correlations between BPD Features and Emotion Vocabularies in Behaviour Essays.

|  | Positive EV | Negative EV |
|---|---|---|
| BPD Total ($n = 387$) | −0.05 | .13* |
| Affect ($n = 400$) | −0.08 | .12* |
| Identity ($n = 397$) | −0.06 | .15** |
| Social ($n = 398$) | −0.04 | .09† |
| Self-harm ($n = 400$) | −0.04 | .04 |

** $p < .01$.
* $p < .05$.
† $p < .10$.

*Note.* All tests are two-tailed. The *n*s reflect the PAI-BOR data provided by participants (from a total of $n = 530$). *N*s vary by subscale due to some participants responding to all items in some subscales but not in others; participant data were only included in the analysis if they provided responses for every item in the subscale, hence the differing *n*s. The *n* for the total score reflects the number of participants that provided responses for all 24 items. The *n*s reported in this table (i.e., behaviour essays) are considerably smaller than in Table 2 (i.e., relationship essays) due to more participants completing and providing sufficient language data (i.e., $\geq 50$ words) for the relationship essays than the behaviour essays.

$= 0.11$, $p = .035$) and identity ($r = 0.18$, $p < .001$) feature scores.

As in the relationship essays, when controlling for general vocabulary size and corresponding emotion word frequencies in the follow-up linear regressions, active EVs did not significantly predict BPD features. The lack of significant associations between negative EV and BPD in these models can be explained as an effect of accounting for overall negative affect word frequencies, as the use of negative affect words in general significantly positively predicted BPD features in all regression models. Detailed regression results for the everyday behaviour essays are presented Supplemental Material A (Table S2).

**2.3. Discussion**

Analyses of participant writing provided general support for our hypotheses that people with higher levels of BPD traits would exhibit larger negative EV and smaller positive EV – although the latter relationship was not evidenced in the everyday behaviour essays. The associations between BPD features and active EVs were not robust when controlling for general vocabulary size and the overall frequency of positive and negative affect words, which, for negative EV, appeared to be a direct result of accounting for negative affect word frequencies across both essay topics. The overlap of patterns found across the different topics provides an initial indication that the relationship between BPD features and active EVs may be insensitive to context, although more evidence is needed to confirm this. In Study 2, we sought to extend this investigation to a clinical population, while providing further clarity on the context-dependency of the associations between BPD and active EVs.

**3. Study 2**

**3.1.1. Method**

Study 2 was a secondary analysis of data previously collected for purposes unrelated to the present study's aims (i.e., the 'couple communication study'; see, e.g., Miano et al., 2017a, 2017b). For a brief overview, the couple communication study investigated various domains of social cognition, interpersonal functioning, affect, and behaviour in BPD, with the broad aim of providing greater understanding of interpersonal dysfunction in BPD. In this article, we only describe the study methods that are directly relevant to the present investigation (for a detailed description, including information relating to consent and ethics, see, e.g., Miano et al., 2017a, 2017b).

**3.1.2. Participants**

Participants (recruited in Germany) were mixed-gender romantic couples in which female partners were either diagnosed with BPD or did not have a clinical diagnosis (i.e., control couples). Participating couples were eligible for the study if they had been in their current relationship for at least three months and were not married or engaged. The final sample of participants comprised 64 couples in total – 30 couples in the BPD group and 34 control couples. Full inclusion/exclusion criteria and participant characteristics are described in detail in the above-referenced studies.

**3.1.3. Measures**

**3.1.3.1. Borderline pathology symptoms**

The short version of the Borderline Symptom List (BSL-23; Bohus et al., 2009) was used to assess borderline symptom severity. The BSL short-version is a 23-item self-report measure that assesses BPD symptomology severity using a 5-point Likert scale, with responses ranging from 0 to 4. Higher scores indicate greater borderline symptom severity within the last week. In the present sample, the average BSL score was 1.69 ($SD = 0.67$; $\alpha = 0.98$).

**3.1.3.2. Depressive symptoms**

The German version of the Beck Depression Inventory (BDI-II; Hautzinger et al., 2006) was used to measure the presence and severity of depressive symptoms. The BDI-II is a self-report measure composed of 21 items in total, with items rated on a 4-point Likert scale ranging from 0 to 3. Higher scores indicate greater severity of depressive symptoms within the last 2 weeks. The German version of the BDI-II has been well-validated (e.g., Kühner et al., 2007). The average total BDI-II score in the present sample was 13.55 ($SD = 15.17$; $\alpha = 0.96$).

**3.1.4. Procedure**

Following the verification of inclusion criteria, participants completed an online questionnaire in which a range of socio-psychological variables were assessed. Couples were then invited into the laboratory where they engaged in three different conversations with one another for six minutes each while being video recorded. In the first condition *(neutral condition)*, participants were asked to discuss their favourite film genre, which was designed as a non-emotive discussion topic. In the other two conditions, participants were asked to discuss topics of a more negative emotive nature, designed to induce feelings of threat and stress. Specifically, participants were asked to discuss a fear that was most relevant to them during the past year *(personally-threatening condition)* and plausible factors that could result in the couple ending their current relationship *(relationship-threatening condition)* – a situation that is likely to be particularly emotionally difficult for individuals with BPD. Following each conversation, couples separately completed a questionnaire – including a threat manipulation check – and prepared for the next conversation topic.

**3.1.5. Pre-processing and language analysis**

Couples' conversations were transcribed from the video recordings by trained research assistants in their original German language and translated to English for subsequent language analysis (for comparability with Study 1). Texts were translated to English using machine translation followed by manual inspection (see, e.g., Li et al., 2014; Windsor et al., 2019). Language data in the form of transcribed conversations were then separated by speaker (i.e., female and male partners) and pre-processed and analysed in exactly the same way as in Study 1. In total, language data were obtained from 128 individuals (64 couples) who each had three separate conversations with their partner, resulting in 384 individual texts to be analysed.

## 3.2. Results

### 3.2.1. Data analysis

We primarily report the analyses conducted on the texts from the female partners in the main manuscript, as only the women had BPD diagnoses in the present sample, and we wanted to ensure a conceptually accurate analysis (and results). To address our first aim of examining the relationship between BPD and active EVs, we compared the active EVs of women with BPD and women without BPD ($N = 64$) via independent, two-tailed $t$-tests, with group (BPD vs. non-BPD) as the independent variable and the EVs as dependant variables. To test the robustness of any differences in EVs found between groups, we also conducted univariate ANCOVAs, controlling for (as in Study 1) general vocabulary size and the corresponding emotion word frequency (derived from LIWC). We also provide a statistical comparison of EVs between male partners (i.e., partners of women with BPD versus women without BPD) in Supplemental Material D, to corroborate that the differences found between women with BPD and women without BPD are predominantly a result of personality pathology.

In addition to the group comparison (i.e., categorical) analytic approach, we adopted a dimensional approach, given that this is more in alignment with now widely supported contemporary models of dimensional psychopathology (Dalgleish et al., 2020), and borderline pathology in particular (e.g., Wright et al., 2016). Accordingly, we conducted the exact same analyses as in Study 1 (i.e., Pearson's correlations and linear regression analyses), using the total BPD symptom scores for all women in the sample. Note that we only conducted these dimensional analyses on the women in the sample to control for non-independence of data between partners.

To address our second aim of exploring the context-dependency of active EVs, we conducted 2 (group: BPD vs. non-BPD) x 3 (condition: neutral vs. personally-threatening vs. relationship-threatening) mixed ANCOVAs to examine differences in EVs between (across groups) and within (across conditions) participants. In all $2 \times 3$ ANCOVAs, "Group" represented the between-participants fixed factor and "Condition" the repeated measures variable, controlling for general vocabulary size and the corresponding emotion word frequency.

To test the robustness of findings, we conducted post-hoc analyses whereby we adopted a dyadic analytic perspective, following a well-established approach for analysing dyadic interactions that takes the dyadic interdependence of data into account (see Iida et al., 2018; Kenny et al., 2020). Specifically, we examined whether and how dyadic

patterns in EVs differ between BPD and non-BPD groups. Refer to Supplemental Material E for all post-hoc dyadic analysis results.

### 3.2.2. Descriptive analyses

Calculated using LIWC, an average of 1.33% ($SD = 0.48$) of the women's language in the conversations were of emotive nature, including both negative ($M = 0.80$, $SD = 0.40$) and positive emotion ($M = 0.53$, $SD = 0.28$). In terms of the number of unique emotion words used, the mean positive EV was 0.27 ($SD = 0.19$) and mean negative EV was 0.41 ($SD = 0.22$). In the present sample, active EVs did not significantly correlate with corresponding emotion word frequencies. General vocabulary size correlated positively with both negative EV ($r = 0.35$, $p = .005$) and positive EV ($r = 0.36$, $p = .004$). Interestingly, paired $t$-tests revealed no significant differences in emotion word frequencies, active EVs, or general vocabulary size between female and male partners within each couple, generalised across the three conditions (see Supplemental Material D for more detailed results).

### 3.2.3. Research aim 1: examining the relationship between BPD and active EVs

Fig. 1 presents a comparison of average active EVs across all conditions between women with BPD and women without BPD. Independent $t$-tests revealed that women with BPD had considerably larger negative EVs ($t(45) = -2.97$, $p = .005$, $d = -0.77$) than women without BPD, but there was no difference in positive EV between these groups. Follow-up analyses revealed that group differences in negative EV were predominately a result of significantly larger anxiety/fear EVs amongst women with BPD ($t(62) = -3.44$, $p = .001$, $d = -0.86$).

Results from the univariate ANCOVAs controlling for general vocabulary size and corresponding emotion word frequencies confirmed, and thus established the robustness of, the group differences in EVs. The difference between women with BPD and women without BPD in negative EV remained significant when accounting for the control variables (results presented in Table 4), which was again driven by anxiety/fear EV ($F(1,60 = 10.12$, $p = .002$, $np^2 = 0.14$). The post-hoc analyses that take into account the non-independence of data also corroborate the results presented here (see Supplemental Material D and E).

When adopting the dimensional analytic approach described above (in the Data Analysis section), the results show the exact same patterns as in the categorical analysis. Specifically, Pearson's correlations between women's total BPD symptoms and active EVs revealed that BPD
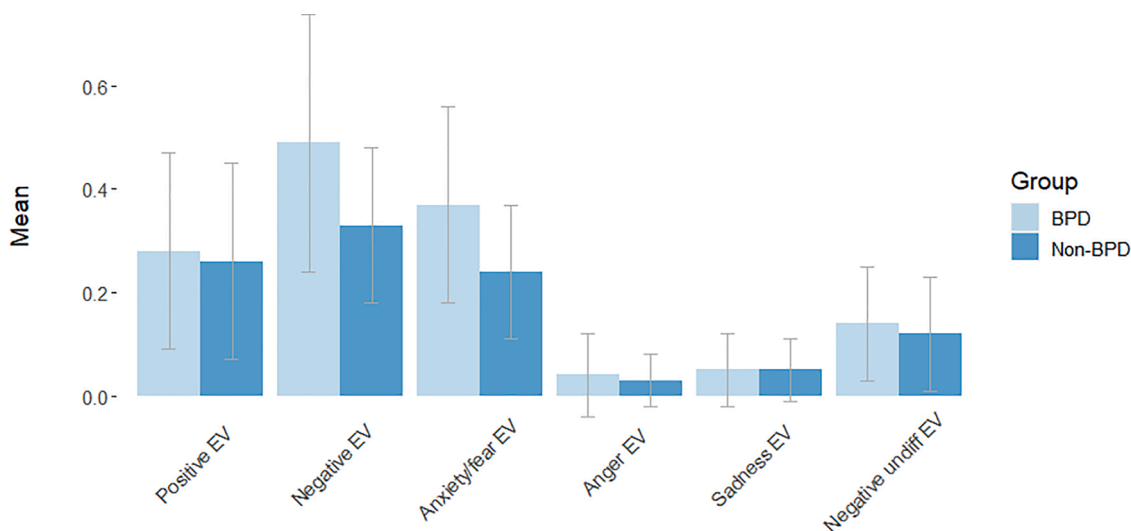


**Fig. 1.** Mean Emotion Vocabularies of Women with BPD Versus Women without BPD ($N = 64$).
*Note.* Error bars represent standard deviations.

**Table 4**
Differences in Emotion Vocabularies (EVs) Between Women with BPD and Women without BPD, Controlling for General Vocabulary and Emotion Word Frequencies (*N* = 64).

| EV | Mean (*SD*) BPD (*N* = 30) | Non-BPD (*N* = 34) | *F* | *p* | $np^2$ | 95% CI |
|---|---|---|---|---|---|---|
| Positive EV | 0.28 (0.19) | 0.26 (0.19) | 0.59 | .446 | .01 | −0.06 – 0.13 |
| Negative EV | 0.49 (0.25) | 0.33 (0.15) | 7.32 | .009 | .11 | .04 – 0.23 |

*Note.* CI = confidence interval.

symptoms were positively correlated with negative EV (*r* = 0.32, *p* = .009), with no significant association with positive EV. The association with negative EV was again driven by anxiety/fear EV (*r* = 0.32, *p* = .009). Further, these associations remained significant when controlling for general vocabulary size and overall negative affect word frequencies in the linear regression analyses. That is, negative EV – driven by anxiety/fear EV (β = 0.27, *t* = 2.03, *p* = .047) – significantly predicted BPD symptoms when accounting for the control variables (β = 0.28, *t* = 2.16, *p* = .034; see Supplemental Materials B, Table S3 for full regression results).

*3.2.4. Research aim 2: exploring the context-dependency of associations between BPD and active EVs*

Mixed ANCOVAs revealed significant group-by-condition interaction effects for negative EV but not for positive EV (see Table 5 for full group-by-condition interaction effects). Specifically, pairwise comparisons revealed that women with BPD had significantly larger negative EVs than women without BPD in the neutral film condition and the relationship-threatening condition, but not in the personally-threatening condition (see Table 5 for statistics). Moreover, women without BPD had significantly larger negative EVs in the personally-threatening condition compared to the neutral (*M* difference = 0.48, *SE* = 0.13, *p* < .001) and relationship-threatening conditions (*M* difference = 0.56, *SE* = 0.14, *p* < .001), whereas there were no significant

**Table 5**
Group by Condition Interaction Effects on Emotion Vocabularies (EVs), Controlling for General Vocabulary and Emotion Word Frequencies (*N* = 64).

| EV | Condition | Mean (*SD*) BPD (*N* = 30) | Non-BPD (*N* = 34) | *F* | *p* | $np^2$ | 95% CI |
|---|---|---|---|---|---|---|---|
| Positive EV | Film | 0.55 (0.49) | 0.39 (0.26) | 5.09 | .028 | .08 | .03 – 0.41 |
| | Fear | 0.10 (0.20) | 0.15 (0.26) | 0.43 | .513 | .01 | −0.17 – 0.08 |
| | Separation | 0.19 (0.32) | 0.16 (0.28) | 0.06 | .803 | .00 | −0.14 – 0.18 |
| | Overall interaction | | | 3.30 | .074 | .05 | |
| Negative EV | Film | 0.36 (0.28) | 0.22 (0.25) | 5.20 | .026 | .08 | .02 – 0.29 |
| | Fear | 0.54 (0.42) | 0.67 (0.84) | 1.03 | .314 | .02 | −0.52 – 0.17 |
| | Separation | 0.39 (0.54) | 0.13 (0.17) | 6.38 | .014 | .10 | .05 – 0.45 |
| | Overall interaction | | | 3.45 | .048 | .05 | |

*Note.* "Group" refers to the between-participants factor comparing EVs between women with BPD versus women without BPD. "Condition" refers to the within-participants factor comparing EVs across the three conditions (neutral, personally-threatening, relationship-threatening). Results presented show the overall group by condition interaction effects on the EVs (i.e., the "overall interaction" rows) as well as differences in EVs between women with BPD and women without BPD in each of the conditions. CI = confidence interval.

differences in negative EV across the conditions in women with BPD. Non-significant interaction effects for positive EV are described in detail in Supplemental Material C, along with a visual presentation of the results (see Figure S1).

*3.2.5. Post-hoc exploratory analyses: examining the relationship between active EVs and depression*

Given that BPD is arguably reflective of general psychopathology (e. g., Gluschkoff et al., 2021; Wright et al., 2016), it could be presumed that the associations evidenced between BPD and active EVs could in fact be transdiagnostic (i.e., extend to various other mental health conditions), rather than necessarily being specific to BPD. Accordingly, to explore this, we ran additional exploratory analyses investigating the relationship between active EVs and depression – using the depression scores (derived from the BDI measure) of the women in the sample – to examine whether the associations found between active EVs and BPD also extend to depression, as a potential indicator that they may be transdiagnostic. To do this, we conducted the same analyses as in the dimensional analytic approach with BPD symptoms (i.e., Pearson's correlations and linear regressions), but instead using the BDI scores. As with the BPD analysis, we only conducted these analyses on the women in the sample to control for the non-independence of data between partners.

Bivariate Pearson's correlation analyses revealed that depression scores were significantly associated with larger negative EV (*r* = 0.35, *p* = .005), but there were no significant associations with positive EV. Follow-up analyses revealed that the association with negative EV was predominantly driven by anxiety/fear EV (*r* = 0.34, *p* = .006) and undifferentiated negative EV (*r* = 0.27, *p* = .032). Linear regression analyses – in which active EVs, general vocabulary, and corresponding emotion word frequencies were entered as predictors of depression scores – revealed that the association between depression and negative EV remained statistically significant when accounting for the control variables, but this was now primarily driven by only anxiety/fear EV. Specifically, larger negative EV (driven by larger anxiety/fear EV; β = 0.33, *t* = 2.44, *p* = .018) significantly predicted depression scores while accounting for the control variables (β = 0.33, *t* = 2.57, *p* = .013), thereby displaying the same pattern of results as with BPD. See Table S7 in Supplemental Materials F for full regression results.

**4. Discussion**

In Study 2, we extended the findings from the previous study to a clinical sample by analysing the emotion language of women with a BPD diagnosis in spoken conversations with their romantic partners, compared to non-clinical couples. The results from Study 2 largely replicated those found in Study 1; BPD was associated with larger negative EV (primarily driven by larger anxiety/fear EV), although this was true even after accounting for general vocabulary size and overall negative affect word frequencies in this sample, thereby providing further support to our hypotheses. However, BPD was not found to be associated with smaller positive EV, running counter to our hypothesis. Results from Study 2 confirm the initial suggestion from Study 1's findings that the relationship between BPD and active EVs is predominantly context-insensitive, as the associations found in Study 2 largely generalised across three types of conversation.

**5. General discussion**

In the present research, we conducted two studies comprising different types of samples and language data modalities to examine the diversity of emotion word use (i.e., active emotion vocabularies [EVs]) associated with BPD. As expected, findings from both studies revealed BPD to be associated with larger negative EV (i.e., greater diversity in negative emotion word use), which was found to be true even when

controlling for general vocabulary size and negative affect word frequencies in Study 2. However, contrary to our hypotheses, BPD was not found to be reliably associated with positive EV. The associations between BPD and active EVs were also context-insensitive, with findings generalising across a variety of topics in both studies. Our findings provide insight into how emotion is attended to, represented, and may be(come) dysregulated in BPD. Moreover, the present findings add to the broader language and emotion literature by extending the findings of Vine et al. (2020) to the context of psychopathology, while also generating insight into the context-dependency of active EVs.

Most importantly, the robust finding that BPD was associated with larger negative EV after controlling for the use of negative affect words in Study 2 means that this association cannot simply be explained by people with BPD being more likely to use greater negative language overall, despite this also being true (e.g., Lyons et al., 2018). Rather, the finding is specific to the *variety* of negative emotion words used by individuals manifesting BPD. This finding is consistent with linguistic theory (e.g., Zipf, 1949), according to which profoundly frequent, prolonged, and varied experience with (often intense) negative emotion, possibly combined with a preoccupation with negative emotion (e.g., Peters et al., 2017), is indexed by the negative emotion words that individuals with BPD spontaneously and habitually use (see Vine et al., 2020). Moreover, such broad negative EVs may contribute to the emotion dysregulation observed in BPD by driving emotional cascades and negative rumination cycles, subsequently exacerbating negative affect. For example, frequently using a wide range of negative emotion words in everyday life may result in greater attention to, and rumination around, these negative emotions.

The fact that we did not find BPD to be associated with larger negative EV when controlling for overall negative affect word frequencies in Study 1 suggests that, in non-clinical populations, BPD traits are more strongly associated with greater use of negative affect words in general. In contrast, in individuals with high severity of borderline pathology (i.e., clinically significant levels), negative EVs explain variance in BPD severity over and above general negative affect word frequencies (as demonstrated in Study 2). Following the logic outlined above, one potential explanation for such difference is that individuals with lower levels of BPD traits (i.e., those in the general population) may not have reached the level of experience with negative emotion that is frequent, intense, and overpowering enough to be reflected in their natural emotion vocabularies over and above the strong positive relationship with negative emotion word frequency (reflecting greater attention to negative emotion) in general. It is also worth emphasising that the same pattern of effects (i.e., BPD = larger negative EV) were still evident across both studies; these effects were simply stronger/more robust in Study 2, where participants suffer more severe borderline pathology (note that less than 4% of the Study 1 sample reached clinically significant levels of borderline pathology, according to the PAI-BOR manual; Morey, 1991).

Contrary to our hypotheses and findings from the Vine et al. (2020) study illustrating positive associations between positive EV and psychosocial health, BPD was not found to be associated with smaller positive EV after controlling for general vocabulary size and positive affect word frequencies. The fact that we did not find BPD to be reliably associated with smaller positive EV could be explained by the nature of emotional dysregulation in BPD. In particular, emotional problems in BPD will typically take the form of extreme and rapid fluctuations in mood (e.g., Carpenter and Trull, 2013). By definition, such extreme fluctuations in mood mean that individuals with BPD also frequently experience fluctuating periods of positive emotion (e.g., Russell et al., 2007). Thus, individuals manifesting BPD may have had sufficient encounters with positive emotion for them to not show differences in positive EVs compared to the general population, which is in alignment with research showing emotion dysregulation in BPD to be most prominently distinguished by heightened negative emotion (e.g., Chu et al., 2016). Future research is needed to confirm this hypothesis.

Interestingly, our findings indicate that the associations between BPD and active EVs were not sensitive to context. Findings from Study 2 provided the most support for this interpretation – the negative EVs of women with BPD did not differ when discussing a non-emotive film topic compared to topics of a more negative emotive nature (i.e., personal fears and relationship threats). In comparison, women without BPD typically had larger negative EVs when discussing personal fears compared to film and relationship threat topics, presumably because the topic of personal fears was the most emotive and psychologically threatening for this group. These results seem to indicate that in the general population, highly emotive contexts may draw out people's natural emotion vocabularies. In contrast, individuals manifesting BPD appear to frequently access and use a broad range of negative emotion words irrespective of context.

One possible explanation for the overall findings is that individuals with BPD, through frequent experience with and interest in negative emotion, have become 'experts' in this domain (see Vine et al., 2020). That is, they verbally represent their emotional experience using a greater diversity of (and, in this sense, more specific) labels (Hoemann et al., 2021). In adaptive forms of expertise, this type of verbal representation is often linked to the possession of broad and efficiently-structured domain knowledge (e.g., Bukach et al., 2006); here, diverse and specific concepts for emotion. Yet, accounts of expertise also stipulate context-specificity as a critical ingredient (Hoemann et al., 2021). Our finding that associations between BPD and negative EV did not differ based on the elicitation context suggests that individuals with BPD may have a maladaptive form of expertise in (negative) emotion, including over-attention to emotion-relevant information and inflexible implementation of emotion concepts.

In speaking to how emotion concepts are implemented, the present findings also have some bearing on emotion differentiation and emotion labelling research. Namely, we do not consider an association between BPD and large negative EV to be contrary to the established link between BPD and lower emotion differentiation (e.g., Fitzpatrick et al., 2019). It is certainly plausible that individuals with BPD are less able to differentiate between specific emotions when the options are made explicit, and at the same time use a wide range of words to spontaneously refer to negative emotion. Indeed, studies that have operationalised emotion differentiation using verbal behaviour have found labelling- and rating-based measures to be unrelated (Ottenstein and Lischetzke, 2019; Williams & Uliaszek, 2022). More broadly, there is a lack of consensus as to the role of emotion labelling in emotion regulation. While many theories and studies support the utility of emotion labels for reducing distress (e. g., Gross, 2015) – although sometimes only after a delay in follow-up, and not when observing the immediate effects (see Torre and Lieberman, 2018) – including in BPD (e.g., Linehan, 2014), other work has found emotion labelling to interfere with effective emotion regulation (e.g., Meier et al., press; Nook et al., 2021; Vine et al., 2019). Indeed, the utility of emotion labels may vary based on the specific context of emotion regulation, such as the intensity of experienced distress (Levy-Gigi and Shamay-Tsoory, 2022). Further research is necessary to disentangle when, how, and for whom the use of more precise words may be beneficial for emotional functioning.

Taken together, the present findings show that BPD is associated with the spontaneous use of more varied negative emotive language – likely reflecting extensive experience with negative emotion and, potentially, a (maladaptive) type of expertise in which emotion concepts are not implemented in a context-sensitive way. These large, context-insensitive negative EVs emphasise the need for more regulation of the referenced negative emotions. Thus, it may be beneficial for therapeutic interventions to work with individuals manifesting BPD to encourage them to explicitly attend to the way in which they spontaneously refer to their emotions in everyday life, while simultaneously encouraging reference to negative emotion in a more context sensitive manner and attempting to incorporate a broader range of positive emotion words in their natural emotion vocabularies.

However, it should be acknowledged that the associations found between active EVs (i.e., larger negative EVs) and BPD also extended to depression when explored as a post-hoc question in Study 2, providing an initial indication that these patterns may in fact be shared across numerous mental health conditions, consistent with transdiagnostic approaches to mental health (e.g., Dalgleish et al., 2020). Moreover, this finding is also consistent with that of the Vine et al. (2020) study in which depression symptoms were found to be positively correlated with negative EV. Nevertheless, given that there are very high rates of co-morbidity between BPD and depression (e.g., Beatson and Rao, 2013), and BPD and depression symptom levels were highly correlated in the present sample, future research is needed to probe associations with EVs for specificity across a broader range of psychopathologies, in distinct samples.

## 6. Limitations and future directions

Despite the strengths of the present research – including the consistency in findings across two studies comprising diverse samples and types of language data – it is not without limitations. First, Study 1 comprised a self-selected sample, with the assessment of BPD features done via self-report methods, of which are accompanied by various biases (e.g., sampling bias, demand characteristics). Moreover, since we adopted a dimensional approach to psychopathology, the sample largely represented BPD traits prevalent in the general population, rather than clinically significant levels of BPD.

Second, Study 2 is limited by the absence of a clinical control sample (i.e., a group of people diagnosed with a mental health condition other than BPD) to confirm the initial indication explored with depression that the associations found with active EVs may be transdiagnostic. Thus, it would be most informative for future research to investigate active EVs in other clinical groups, in distinct samples, to examine the potential transdiagnostic nature of associations with active EVs.

Third, another potential limitation of Study 2 surrounds the fact that language data were translated from German to the English language for analysis. It is a possibility that this translation process could have influenced the emotion vocabulary scores to some extent. Yet, even if this did occur, any translation effects should have influenced data from all individuals, and both groups (i.e., BPD versus non-BPD), to equal extents, and so should not have had any impact on the overall results.

Fourth, there are some constraints surrounding the method of calculating active EVs (see Vine et al., 2020). Given that the calculation of active EVs relies on a word-counting approach, this means that words counted as part of the EV program will not always be exclusive to the realm of emotions; such words will often have numerous meanings (e.g., "mad" can mean angry, irrational, or even enthusiastic). More generally, these types of automated emotion word-counting approaches do not account for the context in which emotion words are used. For example, the statements "this makes me so happy" and "this does not make me happy" would generate the same positive emotion word count (and positive EV score), despite conveying different meanings. Yet, in the context of this particular research, the semantic context of emotion labels is largely irrelevant. Regardless of the degree to which a person is experiencing a given emotion (e.g., "happy" versus "not happy"), the fact that individuals were *attending to* a particular affective state – through the lens of a particular affective concept (e.g., "happiness") rendered through natural language – was the central focus of the current work (see, e.g., Boyd and Schwartz, 2021; Pennebaker et al., 1997). Moreover, such constraints apply to all "bag-of-words" approaches, which have been widely well-established as meaningful indicators of a broad range of psychological constructs (e.g., Kennedy et al., 2022).

Finally, given the nature of the data, causal relationships cannot be inferred from the present findings. Further research comprising longitudinal data is needed to determine cause-and-effect relationships between emotion functioning and experience and active EVs.

## 7. Conclusion

In the present research, we conducted two studies to examine the relationship between BPD and active emotion vocabularies (EVs). Results from both studies revealed that BPD was associated with relatively large negative EV (i.e., using a broad variety of negative emotion words), even after controlling for general vocabulary size and negative affect word frequencies in Study 2, likely reflecting extensive experience and preoccupation with negative emotion. Moreover, the relationship between BPD and negative EV was largely insensitive to context. Taken together, these findings indicate that BPD is associated with extensive but inflexible attention to and knowledge of negative emotion, potentially contributing to emotion dysregulation. Our findings contribute to BPD theory as well as the broader language and emotion literature, and also have implications for clinical practice.

## Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jadr.2023.100647.

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