

Emotion Differentiation, Borderline Personality Features, and Self-Destructive Behaviour

by

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Abstract

I examined the association of negative emotion differentiation with borderline personality (BP) features, and whether negative emotion differentiation moderates the association of BP features with self-destructive behaviour. Undergraduate and community participants first completed questionnaires assessing BP features and psychopathology. Subsequently, ecological momentary assessment and daily diary methods were used to assess emotion, urges to engage in self-destructive behaviour, and self-destructive behaviour engaged in over a 14-day period. As a measure of negative emotion differentiation, intraclass correlation coefficients were calculated from the repeated administration of the emotion questionnaire. As predicted, BP features were negatively associated with negative emotion differentiation. As well, multilevel modelling revealed that negative emotion differentiation moderated the relationship between BP features and urge intensity, but not actual engagement in self-destructive behaviour. These results suggest that teaching individuals high in BP features how to better differentiate negative emotions may lessen the intensity of urges to engage in self-destructive behaviour.

Keywords: emotion differentiation; borderline personality disorder; self-destructive behaviour; ecological momentary assessment

Dedication

This thesis is dedicated to my family, especially my parents. Thank you for all you have given me. I am truly blessed.

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This thesis would not exist if not for the help and support of a great number of people, to whom I am eternally grateful.

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List of Acronyms

| | |
|---------|--|
| APA | American Psychiatric Association |
| BP | Borderline Personality |
| BPD | Borderline Personality Disorder |
| EMA | Ecological Momentary Assessment |
| GSI | Brief Symptom Inventory – Global Severity Index |
| ICC | Intraclass Correlation Coefficient |
| NA | Negative Affect |
| PAI-BOR | Personality Assessment Inventory – Borderline Features Scale |
| PANAS | The Positive and Negative Affect Schedule |
| PDA | Personal Digital Assistant |
| SFU | Simon Fraser University |
| SH | Self-Harm |

Chapter 1.

Introduction

A growing body of research suggests that *emotion differentiation* (the ability to identify discrete but similarly valenced emotions; Barrett, Gross, Christensen, & Benvenuto, 2001) aids in emotion regulation (e.g., Barrett et al., 2001, Pond et al, 2012, Kashdan, Ferssizdis, Collins, & Muraven, 2010). Difficulty regulating emotions is central to borderline personality disorder (BPD), and individuals with BPD often turn to self-destructive behaviours (e.g., substance abuse, self-injury) to alleviate emotional pain (Linehan, 1993; Chapman et al., 2008). Research on whether emotion differentiation serves as a protective factor against self-destructive behaviour for persons with elevated borderline personality (BP) features, however, has been inconclusive. I sought to address the disparities in the existing research and to contribute to the literature on BP features and emotion differentiation.

1.1. Borderline Personality Disorder

BPD is characterized by emotional instability, interpersonal discord, an unstable sense of self, and impulsive and self-destructive behaviours (American Psychiatric Association [APA], 2013). With a prevalence in the general population of approximately 2-6% (Grant et al., 2008; Widiger & Weissman, 1991), BPD carries a high cost in terms of public health and the personal suffering of those afflicted with this disorder. Those with BPD have a high prevalence of self-injury (63-75%; Gunderson & Links, 2009; Soloff, Lis, Kelly, Cornelius, & Ulrich, 1994), mortality by suicide (9%; Paris, Brown, & Nowlis, 1987), and persistent functional impairment even following intensive treatment (Bateman & Fonagy, 2008; Gunderson et al., 2011; Zanarini, Frankenburg, Hennen, Reich, & Silk, 2006; Zanarini, Frankenburg, Reich, Fitzmaurice, 2010a; Zanarini, Frankenburg, Reich, Fitzmaurice, 2010b). In addition, persons with BPD heavily utilize mental health services (the prevalence of BPD among psychiatric inpatients is approximately 15%; Tomko, Trull, Wood, & Sheer, 2014; Widiger & Francis, 1989).

1.2. BPD and Self-Destructive Behaviour

Particularly troubling is the high prevalence of self-destructive behaviours (such as gambling, problematic alcohol or drug use, disordered eating, risky sexual behaviour, or self-injury; APA, 2013; Gunderson & Links, 2009) among those with BPD. A recent review suggests that the current point prevalence rates of substance use disorders among those with BPD are between 14-23%, while lifetime prevalence rates are between 52-72% (Sansone & Sansone, 2011). In addition, BPD over and above substance abuse has a significant association with risky sexual behaviour in the past year (Tull, Gratz, & Weiss, 2011), has been identified as the most prevalent personality disorder among pathological gamblers (Fernández-Montalvo & Echeburúa, 2004), and is one of the personality disorders most often associated with bulimia and binge eating (Cassin & von Ranson, 2005). Further, recurrent suicidal behaviour or nonsuicidal self-injury is one of the diagnostic criteria for BPD (APA, 2013), and this association has been consistently demonstrated (Linehan, Rizvi, & Welch, 2000; Muehlenkamp, Ertelt, Miller, & Claes, 2011; Skodol et al., 2002). The lifetime prevalence of suicide attempts among individuals with BPD is 84% (Soloff, Lynch, Kelly, Malone, & Mann, 2000) and 63% of individuals with BPD engage in nonsuicidal self-injury (Soloff, Lis, Kelly, Cornelius, & Ulrich, 1994).

According to the biosocial theory (Crowell, Beauchaine, & Linehan, 2009; Linehan, 1993), individuals with BPD have a temperamental predisposition to heightened emotionality (and other precursors to mental health problems, such as impulsivity and neuroticism) and have been raised in invalidating, abusive, or traumatic environments; thus, these individuals fail to learn to adaptively regulate their emotions (Crowell et al., 2009; Linehan, 1993). Emotions are experienced as threatening, confusing, and intolerable, and self-destructive behaviour (e.g., self-injury, suicide attempts) often occurs in an effort to alleviate emotional pain. Therefore, difficulties in the regulation of emotions are considered central to the suffering and health impact associated with BPD (Bijttebier & Vertommen, 1997; Chapman, Leung, & Lynch, 2008; Chapman, Specht, & Cellucci, 2005; Crowell et al., 2009; Leible & Snell, 2004; Linehan, 1993; Yen, Zlotnick, & Costello, 2002).

1.3. BPD and Emotion Differentiation

One aspect of emotion regulation difficulties, deficits in negative emotion differentiation, might be particularly important in BPD. Theory suggests that young children differentiate emotion in an unsophisticated manner (e.g., pleasant versus unpleasant; Lindquist & Barrett, 2008). Ability to differentiate emotion develops as children expand their conceptual base for emotion through formal-instruction from parents and via associative learning (Lindquist & Barrett, 2008). Thus, deficits in emotion differentiation would arise, in part, from deficiencies in parental-instruction and lack of opportunity for associative learning. Childhood environments such as those associated with the development of BPD, wherein emotion is minimized and dismissed (Crowell et al., 2009; Linehan, 1993), could therefore lead to deficits in emotion differentiation. Indeed, BPD symptoms are associated with deficits in emotional awareness and clarity (Leible & Snell, 2004), and individuals with BPD have difficulties with emotional identification (Wolff, Stiglmayr, Bretz, Lammers, & Auckenthaler, 2007). Further, individuals with BPD have demonstrated lower emotional granularity (i.e., they represent emotions without specificity – e.g., “feeling bad” versus “angry” or “sad”) relative to non-BPD controls (Suvak et al., 2011).

Deficits in emotion differentiation may contribute to the emotional lability seen in individuals with BPD. With few gradients of emotion, individuals with BPD may lump slight negative emotional states (e.g., slight annoyance or frustration) into general distress, causing minor shifts between positive and negative emotion to become major swings. Indeed, individuals with BPD have demonstrated more polarized emotion (i.e., “all good or all bad”) than healthy controls (Coifman, Berenson, Rafaeli, & Downey, 2012) and larger changes in emotion when switching between positive and negative emotions, relative to controls (Houben et al., 2016). Additionally, for those high in BP features, an inability to label emotion is associated with distress (Ebner-Priemer et al., 2008). Different emotions might also require different coping skills; thus, deficits in emotion differentiation likely make it difficult to select optimal coping strategies. Some research has shown that emotion differentiation aids in the development and selection of adaptive emotion regulation strategies (Bernstein, Vine, & Nolen-Hoeksema, 2012) and is positively associated with emotion regulation, especially for intense emotion (Barrett et al., 2001). In addition, those with greater ability to differentiate emotion are less easily

provoked to aggression when feeling intense anger than those low in emotion differentiation (Pond et al., 2012). Furthermore, labelling emotions is associated with decreased activity in brain regions associated with emotional reactivity (i.e., the amygdala and limbic regions) during exposure to negative emotional images (Lieberman et al., 2007). Further, in a 21-day ecological momentary assessment study of underage social drinkers findings indicated that, when individuals were faced with intense negative emotion, those who were better able to differentiate emotion used less alcohol (Kashdan et al., 2010).

Based on this theory and research, deficits in emotion differentiation may contribute to the self-destructive behaviours often observed among those with BPD or elevated BP features in two ways: a) by increasing negative emotion, which for them can be confusing and overwhelming and amplifies their need for emotion regulation, and b) by interfering with the selection of appropriately targeted emotion regulation strategies, thereby compounding the risk of turning to maladaptive coping (i.e., self-destructive behaviour). For individuals higher in BP features, negative emotions may be experienced as even more intense and intolerable. For these individuals, the increased negative emotion and impaired ability to select appropriate emotion regulation strategies associated with deficits in emotion differentiation likely leads to more intense urges for, as well as more frequent engagement in, self-destructive behaviours, than for those lower in BP features; thus, the effect of emotion differentiation may be particularly salient among these individuals. For them, deficits in negative emotion differentiation may strengthen the positive association of BP features with the intensity of urges for, and actual engagement in, self-destructive behaviour.

To date, however, research on whether emotion differentiation may serve as a protective factor against urges for, or engagement in, self-destructive behaviours for persons with elevated BP features, has been inconclusive. In one study, negative emotion differentiation moderated the association between rumination and nonsuicidal self-injury (NSSI) urges and behaviour, for individuals with BPD, such that the positive association between rumination and NSSI urges and behaviour was stronger when negative emotion differentiation was low, and weaker when negative emotion differentiation was high (Zaki, Coifman, Rafaeli, Berenson, & Downey, 2013). In a preliminary investigation of a wider range of behaviours, however, negative emotion differentiation did not moderate the relation between BPD and impulsive, self-destructive

behaviour or urges (Dixon-Gordon, Chapman, Weiss, & Rosenthal, 2014). Findings from my honours thesis indicated that poor negative emotion differentiation predicted self-destructive urges (but not behaviours) for undergraduate participants with BP features, but did not moderate the relation between BP features and self-destructive urges or behaviour (Wakefield, Dixon-Gordon, & Chapman, 2015).

These discrepant findings may stem from limitations in the methods used in two of these studies. Although all three studies employed experience sampling methods, there were noteworthy differences in the methods used. Zaki et al. (2013), wherein a negative association between emotion differentiation and NSSI in the context of rumination was demonstrated, employed personal digital assistants (PDAs), which prompted participants to answer questions regarding their current emotional state and NSSI urges and behaviours at random intervals five times a day¹ for 21 days (Zaki et al., 2013). Dixon-Gordon et al. (2014) also used PDAs; however, all eight prompts occurred “pseudorandomly” (i.e., constrained by inter-beep intervals of 60-90 minutes) during one 12-hour period. This short period of data collection (i.e., 12 hours) may not have been adequate to capture variability in emotional experiences, self-destructive urges, or behaviours. Finally, my honours research finding that poor negative emotion differentiation predicted self-destructive urges (but not behaviours) involved participants completing an online daily diary once per day at the end of the day for 4 days (Wakefield et al., 2015). As with the Dixon-Gordon et al. (2014) study, the relatively short period of data sampling (once per day for 4 days) may not have captured needed variability in urges or behaviours. Further, EMA was not used, participants in the Wakefield et al. (2015) study logged into the daily diary when they chose to, as close to bedtime as possible. Participants may have waited until they were in a similar emotional state (or a calm state) each evening before completing the diary, and thereby limited emotional variability. In addition, participants’ retrospective reports of self-destructive behaviour likely were vulnerable to recall or possibly impression management biases.

¹ The authors did not specify if there was a restricted period (e.g., waking hours) during which participants received prompts.

1.4. Primary Aims and Hypotheses

The primary aims of this research were to (1) examine the association between negative emotion differentiation and BP features, and (2) investigate whether negative emotion differentiation moderated the association of BP features with self-destructive urges and behaviour. I sought to address some of the discrepancies in the existing studies to contribute to the body of knowledge on the association between BP features and deficits in emotion differentiation. To better understand how people with elevated BP features differentiate negative emotion and the association between negative emotion differentiation and self-destructive behaviours and urges, it is important to investigate both factors in day-to-day life. Thus, I assessed negative emotion differentiation and self-destructive urges via an ecological momentary assessment (EMA) method similar to that used in previous investigations (Dixon-Gordon et al., 2014; Zaki et al., 2013). Unlike previous studies, however, I used smartphones (e.g., iPhone, or Android phones) instead of PDAs, and an online daily diary component to assess self-destructive behaviours. The EMA method provided a snapshot of negative emotion differentiation and self-destructive urge intensity in the moment in daily life, allowing the generalization of findings to real world situations and reducing reliance on retrospective reporting of urges. Daily diary assessment of self-destructive behaviours circumvented some of the limitations associated with more traditional retrospective self-report, such as poor recall. EMA has often been used in emotion differentiation studies, though the length of the data collection period has varied (e.g., one week [Demiralp, 2012] to three weeks [Zaki et al., 2013]). Nevertheless, 14 days often has been used as a data collection period (Barrett et al., 2001; Kashdan & Farmer, 2014); thus, I collected data for 14 days. In other research, a 14-day period has been adequate to capture sufficient variability in self-destructive urges and behaviours (e.g., self-injury; Nock, Prinstein, & Sterba, 2009; Turner, Gratz, Cobb, & Chapman, 2015; Turner, Wakefield, Gratz, & Chapman, 2017).

A number of demographic variables were included for investigation as potential covariates. Further, as the use of medications or drugs or conditions such as major depression or psychosis may have influenced participants' responses to the questionnaires or their emotional experiences, a general measure of psychopathology was included for investigation as a potential covariate. As well, as affect intensity has been associated with impulsivity and urges for maladaptive behaviour (Dixon-Gordon et

al., 2014), negative affect intensity was also included for investigation as a potential covariate.

Hypothesis 1 was that BP features would be negatively associated with negative emotion differentiation during daily, momentary experience of emotion. Hypothesis 2 was that negative emotion differentiation would moderate the association of BP features with the intensity of urges for, and engagement in, self-destructive behaviour. Specifically, I hypothesized that BP features would be positively associated with the intensity of urges for, and engagement in, self-destructive behaviour, and that the positive association of BP features with urge intensity and self-destructive behaviour would be stronger among those lower versus higher in negative emotion differentiation.

Chapter 2.

Method

2.1. Participants

Individuals ($N=155$) were recruited from Simon Fraser University (SFU) and the broader community, though the majority were SFU students ($N=152$). Individuals aged 17 or older were eligible to participate, though 17- and 18-year-old participants were only allowed if they were university students, as they are considered emancipated for the purposes of research. University students were recruited through SFU's Research Participation System, drawing from students enrolled in Psychology courses, and were offered course credit for study participation. Individuals who had participated in previous studies in our lab who had consented to being recontacted were recruited via email. Participants who did not complete the study for course credit received \$20 for their participation. All participants received an additional bonus of \$10 for completing at least five days of EMA and daily diary questionnaires during the first seven days of the study (i.e., all three sets, morning, afternoon, and evening, of EMA questionnaires and the daily diary questionnaires each evening – see section 2.2 – for the same five or more days in the first week of the study). Participants also received an additional bonus of \$10 for completing at least five days of EMA and daily diary questionnaires during the second seven days of the study. Thus, all participants could potentially earn \$20 in bonuses, in addition to their initial compensation. Participants were required to have smartphones with data plans on which they could complete the EMA questionnaires.

Five participants withdrew without completing all parts of the study. As the calculation of the negative emotion differentiation index (see section 2.4.4) requires multiple administrations of the emotion measure to be calculated accurately, data from participants who failed to complete at least 14 (33.3%) of the EMA questionnaires were eliminated from analyses. Fourteen EMA questionnaires completed was chosen as the cutoff because it is the equivalent of one questionnaire completed a day for the 14 days of the study and to balance the need for multiple administrations of the emotion measure with maintaining a sample size with adequate power to detect the expected effects. As well, the EMA questionnaires had to have been completed within one hour of text

message prompts to be included in analyses. To be consistent with the completion requirements for the EMA, data from participants who did not complete at least 33.3% of the daily diary questionnaires were also excluded from analyses. These eliminations reduced the sample to 120 participants. Data from a further six participants were eliminated due to listwise deletions, which resulted in a final sample of 114. No differences in BP features ($t=-0.41$, $p=0.69$), general psychopathology (measured via the Brief Symptom Inventory's Global Severity Index – see section 2.4.2; $t=-0.16$, $p=0.87$), age ($t=-0.53$, $p=0.60$), or gender ($\chi^2=0.49$, $p=0.48$) were found between the full sample and the final sample.

Sample demographics appear in Tables 2.1, 2.2, and 2.3. The final sample was predominantly female (74.6%). Participants' ages ranged from 17 to 37 ($M=19.91$, $SD=2.84$). The majority of participants identified as White (25.4%), South Asian (e.g., East Indian, Pakistani, Sri Lankan, et cetera; 27.2%), or Chinese (16.7%). Most participants were born in Canada (71.1%) and the majority reported English as their first language (64.0%). Most participants identified as heterosexual (88.6%) and most were single, never married (73.7%). The majority of participants reported high school (53.5%) or some college or university (42.1%) as their highest educational attainment. Most participants reported that they were either employed part time (49.0%) or were full-time students (46.0%).

Table 2.1. Ethnicity, Birth, & Language

| Variable | <i>N</i> | % |
|--|----------|-------|
| Ethnicity | | |
| White | 29 | 25.4% |
| South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.) | 31 | 27.2% |
| Chinese | 19 | 16.7% |
| Filipino | 10 | 8.8% |
| Korean | 7 | 6.1% |
| Arab | 2 | 1.8% |
| Aboriginal (e.g., First Nations, Métis, Inuk, etc.) | 1 | 0.9% |
| Southeast Asian (e.g., Vietnamese, Cambodian, Laotian, Thai, etc.) | 1 | 0.9% |
| West Asian (e.g., Iranian, Afghan, etc.) | 1 | 0.9% |
| Other | 7 | 6.1% |
| More than one ethnicity | 6 | 5.3% |
| Born in Canada? | | |
| Yes | 81 | 71.1% |
| No | 33 | 28.9% |
| Is English a second language? | | |
| Yes | 41 | 36.0% |
| No | 73 | 64.0% |

N=114

Table 2.2. Sex, Gender Identity, Sexual Orientation, & Relationship Status

| Variable | <i>N</i> | % |
|---|----------|-------|
| Sex | | |
| Female | 85 | 74.6% |
| Male | 29 | 25.4% |
| Gender Identity | | |
| Female/Woman | 84 | 73.7% |
| Male/Man | 29 | 25.4% |
| Other Genders | 1 | 0.9% |
| Sexual Orientation | | |
| Gay | 2 | 1.8% |
| Bisexual | 6 | 5.3% |
| Queer | 1 | 0.9% |
| Questioning | 1 | 0.9% |
| Heterosexual/Straight | 101 | 88.6% |
| Asexual | 1 | 0.9% |
| Other | 1 | 0.9% |
| Relationship Status | | |
| Single, never married | 84 | 73.7% |
| Married | 3 | 2.6% |
| Living with partner (but not legally married) | 4 | 3.5% |
| Long-term committed relationship | 23 | 20.2% |

N=114

Table 2.3. Education & Employment

| Variable | <i>N</i> | % |
|--|----------|-------|
| Highest Level of Education Completed | | |
| High school graduate | 61 | 53.5% |
| Business or technical training beyond high school | 1 | 0.9% |
| Some college/university | 48 | 42.1% |
| University graduate | 2 | 1.8% |
| Master's degree | 2 | 1.8% |
| Employment Status | | |
| Unemployed | 10 | 8.8% |
| Employed part-time (under 30 hours a week) | 49 | 43.0% |
| Employed full-time (working 30 hours or more a week) | 3 | 2.6% |
| Full-time student | 46 | 40.4% |
| Part-time student | 6 | 5.3% |

N=114

2.2. Procedure

Participants were first contacted via email and asked to provide their age, cellular phone number, and a unique, non-identifying participant identification code made up of a word combined with a number (e.g., Pickle22). Once participants responded with the required information, they were sent a second email with a link to the informed consent and the initial study questionnaires, and instructions. Upon logging in to the questionnaires, participants were presented with the informed consent information, and had the option of consenting or not. Those who consented were then asked to answer demographic questions followed by initial study questionnaires. Following the initial session, participants received a message reminding them to complete their daily diary questionnaire near bedtime each day for the next 14 days. Participants also received a link to the daily diary questionnaires each evening at 8:00 pm via email with a reminder to complete them as close to bedtime as possible. In addition, participants received a text message request and link to complete a brief questionnaire assessing current emotion and self-destructive urges at semi-random times, three times a day (i.e., morning – 8:00 am to 12:00 pm, afternoon – 12:00 pm to 4:00 pm, and evening – 4:00 pm to 8:00 pm), for each of the 14 days of the study (the EMA component). At the end of each EMA questionnaire set, there was also a message reminding participants to complete the daily diary for that day. Participants were also reminded via text message each day at 10:00 am that if they had not completed their previous day's daily diary, they could still complete it before 11:00 am. Diary entries completed after 11:00 am were considered missed. The initial session and daily diary questionnaires could be completed either on a computer or a smartphone; however, to increase the chances that participants would complete questionnaires soon after the prompts (text messages), participants in this study were required to have a smartphone with a data plan for internet access.

2.3. Materials

Online versions of all study measures were created using Qualtrics online survey authoring software (Qualtrics, 2005), using a macOS Sierra computer. A dedicated cellular phone (iOS 10 Apple iPhone) was used to send out the EMA text messages.

2.4. Measures

2.4.1. Personality Assessment Inventory – Borderline Features Scale

The *Personality Assessment Inventory – Borderline Features Scale* (PAI-BOR) is a 24-item self-report subscale of the Personality Assessment Inventory that yields a single score corresponding to level of BP features, and scores for four subscales (Morey, 1991). Participants rate on a 4-point Likert scale how true statements tapping BPD pathology are in relation to themselves. The score is calculated by recoding reversed items, and then summing the responses. Scores can range from 0 to 72, with higher scores being indicative of more BP features. The PAI-BOR was completed as part of the initial questionnaire session. The PAI-BOR subscale has demonstrated reliability ($\alpha \geq 0.86$, test-retest $r \geq 0.86$), and adequate convergent validity ($r = 0.56$ with *the Structured Clinical Interview for DSM-IV Axis II Disorders* [First, Gibbon, Spitzer, Williams, & Benjamin, 1997] BPD diagnosis; Morey, 2003), and has demonstrated validity for the measurement of BP features in non-clinical populations (Trull, 1995; Trull, 2001). In the current study the PAI-BOR's internal consistency was $\alpha = 0.89$.

2.4.2. The Brief Symptom Inventory

The *Brief Symptom Inventory* (BSI) is a 53-item self-report measure that assesses a range of psychological symptoms, including obsessive-compulsiveness, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism (Derogatis, 1975). Participants rate on a 5-point Likert scale how much discomfort each of 53 listed problems or complaints has caused them in the past four weeks. Of relevance to this study is the Global Severity Index (GSI), which is the mean of all items on the BSI to which a response was given. Scores can range from 0 to 5, with higher scores being indicative of current level of psychopathology (Derogatis, 1975). The GSI was completed as part of the initial questionnaire session, and was included as a potential covariate. The GSI has demonstrated reliability (test-retest $r = 0.90$; Derogatis, 1975). In the current study the GSI's internal consistency was: $\alpha = 0.97$.

2.4.3. Urges to engage in self-destructive behaviours

The *Urges to engage in self-destructive behaviours* (URGES) is a 26-item self-report measure that assesses the intensity of urges to engage in, and engagement in, a range of maladaptive behaviours (hereafter, urge intensity), including binge eating and purging, drug and alcohol use, NSSI, yelling and screaming, hitting someone or throwing things, reckless driving, reckless spending and gambling, risky sexual activity, escaping emotions by going to sleep, and escaping emotions (Chapman, Rosenthal, & Leung, 2009). Most items included on the URGES were chosen to reflect the behaviours captured by the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV-TR; APA, 2000) impulsive, self-damaging behaviour criteria for BPD (Chapman et al., 2009), and the criteria are consistent with DSM-5 (APA, 2013). Participants are asked how strong their urges to engage in the listed behaviours are (from 1 – “not at all/very slightly,” to 5 – “extremely”) in the moment, and whether they engaged in any of the listed behaviours that day. The score for urge intensity is calculated by summing the urges items. Similarly, the score for self-destructive behaviours is calculated by summing the behaviour items. The urges questions were completed as part of the EMA questionnaires, and the behaviours completed nightly during the daily diary questionnaire session. In prior research, the urge intensity scale’s internal consistency was: $\alpha=0.77$ – $\alpha=0.96$ (Chapman, Rosenthal, & Leung, 2009; Dixon-Gordon et al., 2014), and the behaviours scale’s internal consistency was: $\alpha=0.70$ (Chapman et al., 2009). In this study, the urge intensity scale’s internal consistency was: $\alpha=0.73$, and the behaviour scale’s internal consistency was: $\alpha=0.60$.

2.4.4. The Positive and Negative Affect Schedule

The *Positive and Negative Affect Schedule* (PANAS) is a 20-item self-report measure that yields scores for positive and negative affect (Watson, Clark, & Tellegen, 1988). Participants rate a list of emotions on a 5-point Likert scale as to how much they feel each at that moment. Positive and negative affect scores are calculated from the sums of the responses to the relevant items, and higher scores are indicative of greater affect intensity. In addition to rating the 20 emotions on the PANAS, participants were asked to rate the intensity of “sad” (as per Dixon-Gordon et al., 2014). The scores for negative affect (NA) intensity are of relevance to this study, and they can range from 10 to 53. For the NA scale Watson, Clark, and Tellegen (1988) reported reliability ($\alpha > .83$,

test-retest $r_s > .38$), and convergent validity ($r_s > .89$ with other emotion scales). In the current study the NA scale's internal consistency was $\alpha=0.87$.

Absolute intraclass correlation coefficients (ICC; Shrout & Fleiss, 1979) were calculated for each individual from the repeated administration of the NA scale (including "sad"), as a measure of negative emotion differentiation. This ICC method is a common measure of negative emotion differentiation (Dixon-Gordon et al., 2014; Erbas, Ceulemans, Boonen, Noens, & Kuppens, 2013; Kashdan et al., 2010; Kashdan & Farmer, 2014; Pond et al., 2012; Selby et al., 2013; Tugade, Fredrickson, & Barrett, 2004; Zaki et al., 2013), which captures consistency in patterns of responding by calculating correlations between emotion terms across time. Lower ICC suggest weaker correlations, and thus more differentiated negative emotion. Higher ICC suggest stronger correlations, and thus less differentiated negative emotion (i.e., a limited number of emotions were endorsed across time). ICC were Fisher's z' transformed. Though the NA scale and the ICC are both calculated from the same items on the PANAS, it has been demonstrated in prior research that there is only a small correlation between them ($r=0.22$, $p=.03$; Kasdan et al., 2010). In the current study, the correlation between the NA scale and ICC was: $r=0.44$, $p<0.001$.

Chapter 3.

Data Analysis

3.1. Preliminary Analyses

Prior to analyses, scores for the PAI-BOR, GSI, NA intensity on the PANAS, and for urge intensity and self-destructive behaviour were calculated. Additionally, the ICC were calculated and for each participant. All variables of interest were inspected for non-normality (*skew*>2.0, *kurtosis*>7.0; Curran, West, & Finch, 1996), and predictor variables were checked for multicollinearity by inspection of the variance inflation factors (VIF). Predictor variables were grand-mean centred prior to analyses to ease interpretation of coefficients, and the interaction between the grand-mean centred variables PAI-BOR and ICC was calculated (PAI-BOR X ICC).

3.1.1. Descriptive Statistics

The minimum, maximum, mean, standard deviation, skew, and kurtosis were calculated for each of the continuous variables (PAI-BOR, GSI, NA intensity, urge intensity, self-destructive behaviour, and ICC), and percentages were calculated for the demographic variables. As well, the mean number and percent of EMA prompts to which participants responded and the mean number and average percent of daily diary questionnaires completed were calculated. Further, intercorrelations were calculated among BP features, negative emotion differentiation, NA intensity, urge intensity, and self-destructive behaviour.

3.1.2. Missing Data

Analyses were run with cases excluded by listwise methods. To investigate the possibility of non-randomly missing data, Pearson product moment correlations were calculated between the number of missed EMA and diary questionnaires, and the variables included in analyses (PAI-BOR, urge intensity, self-destructive behaviour, ICC, and identified covariates – see section 3.1.3). Data was checked via Little's Missing Completely at Random (MCAR) test (Little, 1988).

3.1.3. Covariates

A number of potential covariates were investigated for possible inclusion in analyses. These included demographic variables (age, sex, ethnicity, and sexual orientation), and variables with theoretical connections to self-destructive behaviour (current level of general psychopathology [GSI] and NA intensity). Prior to covariate investigation, identified ethnicities were combined into four categories: (1) Aboriginal, (2) White, (3) Asian, and (4) Other/Mixed. Sexual orientation was combined into heterosexual and LGBTQ+.

3.2. Primary Analyses

To investigate Hypothesis 1 that BP features would be negatively associated with negative emotion differentiation during daily, momentary experience of emotion, the Pearson product moment correlation was calculated between BP features (PAI-BOR) and the negative emotion differentiation index (ICC).

Given the nested structure of the data, to test Hypothesis 2 that BP features would be positively associated with self-destructive urges and behaviours, and that the positive association of BP features with self-destructive behaviours would be stronger among those lower versus higher in negative emotion differentiation, multilevel modelling (MLM) was employed. MLM accounts for correlated variance within nested levels of data. Separate MLM analyses were conducted for urge intensity and self-destructive behaviour. Random effects models were used for both analyses. Analyses were conducted using *Stata Statistical Software: Release 13* (StataCorp, 2013).

For urge intensity, observations were nested within days within individuals, and thus a three-level model was used. Level 1 was the repeated measure of urge intensity, Level 2 was day, and Level 3 was participant. NA intensity was entered in the model as a level 1 predictor. Level 3 predictors were the time invariant variables: Scores on the GSI, scores on the PAI-BOR, the ICC, and the interaction between BP features and negative emotion differentiation (PAI X ICC). The effect of each predictor variable on urge intensity, controlling for the effects of the others, was investigated via z-tests of the regression coefficients (*b*).

$$\begin{aligned}
\text{Level 1:} & \quad (\text{URGES})_{ijk} = \pi_{0jk} + \pi_{1jk}(\text{NA})_{ijk} + e_{ijk} \\
\text{Level 2:} & \quad \pi_{0jk} = \beta_{00k} + r_{0jk} \\
& \quad \pi_{1jk} = \beta_{10k} + r_{1jk} \\
\text{Level 3:} & \quad \beta_{00k} = \gamma_{000} + \gamma_{001}(\text{GSI})_k + \gamma_{002}(\text{PAI})_k + \gamma_{003}(\text{ICC})_k + \gamma_{004}(\text{PAI} \times \text{ICC})_k + U_{00k} \\
& \quad \beta_{10k} = \gamma_{100} + U_{10k}
\end{aligned}$$

For self-destructive behaviour, observations were nested within participants, and thus a two-level model was used. NA intensity was averaged across within day time points and entered in the model as a level 1 predictor. Thus, level 1 included the repeated measure of self-destructive behaviour and the mean NA intensity, and level 2 was participant. Level 2 predictors were the time invariant variables: Age, scores on the GSI, scores on the PAI-BOR, the ICC, and the interaction between BP features and negative emotion differentiation (PAI X ICC). The effect of each predictor variable on urge intensity, controlling for the effects of the others, was investigated via z-tests of the regression coefficients (*b*).

$$\begin{aligned}
\text{Level 1:} & \quad (\text{BEHAVIOUR})_{ij} = \beta_{0j} + \beta_{1j}(\text{NA})_{ij} + r_{ij} \\
\text{Level 2:} & \quad \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{AGE})_j + \gamma_{02}(\text{GSI})_j + \gamma_{03}(\text{PAI})_j + \gamma_{04}(\text{ICC})_j + \gamma_{05}(\text{PAI} \times \text{ICC})_j + U_{0j} \\
& \quad \beta_{1j} = \gamma_{10} + U_{1j}
\end{aligned}$$

Given that one of the subscales of the PAI-BOR is Self-Harm, a measure of self-destructive urges and behaviours, there was the possibility of construct contamination with the URGES. Therefore, scores for the PAI-BOR without the Self-Harm subscale items was calculated, and separate analyses were conducted using the PAI-BOR scores with and without Self-Harm included.

3.2.1. Post-Hoc Analyses

Post-hoc analyses were conducted using Stata Statistical Software: Release 13 (StataCorp, 2013). The interaction effects were further investigated via post-hoc analysis of marginal effects (*ME*). Here, the *ME* reflect the change in urge intensity or self-destructive behaviour associated with one unit change in BP features when negative emotion differentiation is high (1 *SD* above the mean) or low (1 *SD* below the mean) and the control variables are at their mean levels. The statistical significance of the marginal effects was checked via *t*-tests.

Individual Urges and Behaviours Analyses

To further clarify the relationship between negative emotion differentiation, BP features, and self-destructive behaviour, I conducted post-hoc analyses investigating whether negative emotion differentiation serves as a protective factor against the intensity of urges for, and engagement in, specific self-destructive behaviours among persons with elevated BP features. The behaviours investigated were the individual items measured by the URGES (binge eating and purging, drug and alcohol use, NSSI, yelling and screaming, hitting someone or throwing things, reckless driving, reckless spending and gambling, risky sexual activity, escaping emotions by going to sleep, and escaping emotions).

To investigate whether negative emotion differentiation moderates the relationship between BP features and the intensity of urges for specific self-destructive behaviours, MLM was employed. The same covariates included in the primary urge intensity analysis were included (GSI and NA intensity).

$$\begin{aligned} \text{Level 1:} & \quad (\text{SPECIFIC URGE})_{ijk} = \pi_{0jk} + \pi_{1jk}(\text{NA})_{ijk} + e_{ijk} \\ \text{Level 2:} & \quad \pi_{0jk} = \beta_{00k} + r_{0jk} \\ & \quad \pi_{1jk} = \beta_{10k} + r_{1jk} \\ \text{Level 3:} & \quad \beta_{00k} = \gamma_{000} + \gamma_{001}(\text{GSI})_k + \gamma_{002}(\text{PAI})_k + \gamma_{003}(\text{ICC})_k + \gamma_{004}(\text{PAI} \times \text{ICC})_k + u_{00k} \\ & \quad \beta_{10k} = \gamma_{100} + u_{10k} \end{aligned}$$

As individual behaviours on the URGES were assessed each day by a “yes” or “no” question, mixed effects logistic regression (MELR) was employed to investigate whether negative emotion differentiation moderated the association of BP features with individual self-destructive behaviours. The same covariates included in the primary self-destructive behaviour analysis were included (Age, GSI, and NA intensity).

$$\begin{aligned} \text{Level 1:} & \quad (\text{SPECIFIC BEHAVIOUR})_{ij} = \beta_{0j} + \beta_{1j}(\text{NA})_{ij} + r_{ij} \\ \text{Level 2:} & \quad \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{AGE})_j + \gamma_{02}(\text{GSI})_j + \gamma_{03}(\text{PAI})_j + \gamma_{04}(\text{ICC})_j + \gamma_{05}(\text{PAI} \times \text{ICC})_j + u_{0j} \\ & \quad \beta_{1j} = \gamma_{10} + u_{1j} \end{aligned}$$

3.3. Power Analysis

As power for MLM is a function of units at each level, its calculation quickly becomes unwieldy (Hayes, 2006). Thus, an a priori power analysis for hierarchical

regression was used as a proxy. This analysis suggested that a sample size of 90 would be sufficient to detect a moderate effect size ($R^2 \approx 0.13$; Cohen et al., 2003) with a power of 0.95. Larger sample sizes are recommended for MLM (Hayes, 2006), and thus I aimed for 150 participants. Power analysis was conducted using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007).

3.4. Type I Error Control

For the primary analyses, urge intensity and self-destructive behaviour were conceptualized as distinct from one another, and the correlation of these variables was: $r=0.78$, $p<0.001$. Thus, alpha (α) was fixed at 0.05 for each to control for Type I error. For the post-hoc analyses, the intensity of urges for individual self-destructive behaviours could be conceptualized as all belonging to one family, as could the individual self-destructive behaviours. Family-wise error control was not employed; however, as with twelve analyses in each family, using a step-down family-wise error control method (e.g., Holm-Bonferroni; Holm, 1979) alpha starts at 0.004, which appeared overly conservative and associated with an unacceptably high risk of Type II error.

Chapter 4.

Results

4.1. Preliminary Analyses

4.1.1. Descriptive Statistics

Inspection revealed that all predictor variables were normally distributed (*skew*=-1.35–1.76, *kurtosis*=-0.25–2.76). *VIF* values (*VIFs*=1.01–2.74) were all less than 10, and thus there was no indication of multicollinearity (Cohen, West, & Aiken, 2003). On average, participants responded to 62.2% of the text message EMA prompts ($M=26.11$, $SD=6.74$) and completed 89.2% of the diary questionnaires ($M=12.49$, $SD=1.96$). See Table 4.1 for descriptive statistics. See table 4.2 for intercorrelations among BP features, negative emotion differentiation, NA intensity, urge intensity, and self-destructive behaviour.

Table 4.1. Descriptive statistics

| Variable | Min | Max | Mean (SD) | Skew (SE) | Kurtosis (SE) | N |
|-----------------------------|-------|-------|---------------|--------------|---------------|-----|
| PAI-BOR | 9.00 | 57.00 | 27.40 (11.52) | 0.54 (0.23) | -0.25 (0.45) | 114 |
| GSI | 0.02 | 2.94 | 1.02 (0.68) | 0.96 (0.23) | 0.20 (0.45) | 114 |
| ICC | -0.19 | 0.95 | 0.64 (0.21) | -1.35 (0.23) | 2.76 (0.45) | 114 |
| NA intensity per time point | 11.00 | 49.00 | 15.70 (5.74) | 1.76 (0.05) | 3.42 (0.09) | 114 |
| Urges per time point | 12.00 | 50.00 | 14.19 (3.74) | 2.84 (0.05) | 12.62 (0.09) | 114 |
| Behaviour per day | 0.00 | 12.00 | 0.76 (0.03) | 2.59 (0.07) | 12.08 (0.13) | 114 |

Note: PAI-BOR = BP features. GSI = Psychopathology. ICC = Negative emotion differentiation. NA = Negative affect. Urges=Urges intensity. Behaviour=Self-destructive behaviour.

Table 4.2. Intercorrelations

| | ICC | PAI-BOR | NA intensity [†] | Urge intensity [†] |
|---|---------------------|---------------------|---------------------------|-----------------------------|
| PAI-BOR | 0.36 ^{***} | – | | |
| NA intensity [†] | 0.44 ^{***} | 0.48 ^{***} | – | |
| Urge intensity [†] | 0.40 ^{***} | 0.59 ^{***} | 0.62 ^{***} | – |
| Self-destructive behaviour [†] | 0.27 ^{**} | 0.52 ^{***} | 0.48 ^{***} | 0.78 ^{***} |

Note: PAI-BOR = Borderline personality features. ICC = Negative emotion differentiation. NA = Negative affect. N=114. * $p < 0.05$, ** $p < .01$, *** $p < 0.001$

4.1.2. Missing Data

After listwise exclusion, 114 participants were included in the analyses. There was a weak, positive correlation between NA intensity and the number of missed diary entries ($r=0.24$, $p<0.01$), and a weak, positive correlation between the negative emotion differentiation index (ICC) and the number of missed diary entries ($r=0.29$, $p<0.01$). Higher ICC indicates poorer negative emotion differentiation, and thus missed diary entries were negatively associated with negative emotion differentiation. MCAR indicated data were not missing completely at random ($ps<.001$).

4.1.3. Covariates

MLM revealed that neither age, sex, ethnicity, nor sexual orientation were associated with urge intensity ($ps=0.11-0.79$), while general psychopathology (GSI) and NA intensity were associated with urge intensity ($ps<0.001$). Thus, only GSI and NA intensity were included in the urge intensity analysis as covariates.

MLM revealed that neither sex, ethnicity, nor sexual orientation were associated with self-destructive behaviour ($ps=0.08-0.98$), while age, general psychopathology (GSI) and NA intensity were associated with self-destructive behaviour ($ps<0.001$). Thus, age, GSI, and NA intensity were included in the behaviour analysis as covariates.

4.2. Primary Analyses

BP features were positively associated with the negative emotion differentiation index (ICC; $r =0.36$, $p<0.001$). Higher ICC indicates poorer negative emotion differentiation, and thus BP features were negatively associated with negative emotion differentiation.

MLM revealed (see Tables 4.2 and 4.3) that BP features predicted urge intensity ($b=0.08$, $SE=0.02$, $p<0.001$) and self-destructive behaviour ($b=0.03$, $SE=0.01$, $p<0.001$). Poorer negative emotion differentiation predicted urge intensity ($b=1.01$, $SE=0.43$, $p<0.05$), but not self-destructive behaviour ($b=0.09$, $SE=0.18$, $p=0.63$). Further, negative emotion differentiation moderated the relationship between BP features and urge

intensity (PAI-BOR x ICC, $b=0.09$, $SE=0.03$, $p<0.01$), but not between BP features and self-destructive behaviour (PAI-BOR x ICC, $b=0.02$, $SE=0.01$, $p=0.24$).

As shown in Tables 4.4 and 4.5, the same pattern of results was found when the PAI-BOR was scored without the Self-Harm subscale items included.

4.2.1. Post-Hoc Analyses

BP features and urge intensity were significantly positively associated when negative emotion differentiation was low (<1 SD , $ME=0.11$, $SE=0.02$, $p<0.001$) but not when negative emotion differentiation was high (>1 SD , $ME=0.04$, $SE=0.03$, $p=0.08$; see Figure 4.1). Post-hoc analysis found that BP features and self-destructive behaviour were positively associated when negative emotion differentiation was low (<1 SD , $ME=0.03$, $SE=0.01$, $p<0.001$) and when negative emotion differentiation was high (>1 SD , $ME=0.02$, $SE=0.01$, $p<0.05$; see Figure 4.2).

Table 4.3. Multilevel model of the interaction of BP features and negative emotion differentiation as a predictor of urge intensity

| Predictor | <i>b</i> | <i>SE_b</i> | <i>z</i> | 95% <i>CI_b</i> |
|--------------|----------|-----------------------|----------|---------------------------|
| Intercept | 14.037 | 0.159 | 88.34*** | 13.725–14.348 |
| PAI-BOR | 0.078 | 0.021 | 3.82*** | 0.038–0.118 |
| ICC | 1.006 | 0.429 | 2.34* | 0.165–1.848 |
| PAI X ICC | 0.090 | 0.035 | 2.60** | 0.022–0.157 |
| GSI | -0.353 | 0.343 | -1.03 | -1.026–0.320 |
| NA intensity | 0.275 | 0.014 | 20.09*** | 0.248–0.302 |

Note: GSI = Psychopathology. NA = Negative affect. PAI-BOR = BP features. ICC = Negative emotion differentiation. N=114. * $p < 0.05$, ** $p < .01$, *** $p < 0.001$

Table 4.4. Multilevel model of the interaction of BP features and negative emotion differentiation as a predictor of self-destructive behaviour

| Predictor | <i>b</i> | <i>SE_b</i> | <i>z</i> | 95% <i>CI_b</i> |
|--------------|----------|-----------------------|----------|---------------------------|
| Intercept | 0.741 | 0.063 | 11.81*** | 0.618–0.864 |
| PAI-BOR | 0.029 | 0.008 | 3.55*** | 0.013–0.045 |
| ICC | 0.087 | 0.178 | 0.49 | -0.262–0.436 |
| PAI X ICC | 0.016 | 0.014 | 1.18 | -0.011–0.043 |
| Age | 0.053 | 0.020 | 2.60** | 0.013–0.092 |
| GSI | -0.149 | 0.143 | -1.04 | -0.429–0.132 |
| NA intensity | 0.079 | 0.022 | 3.59*** | 0.036–0.122 |

Note: GSI = Psychopathology. NA = Negative affect. PAI-BOR = Borderline personality features. ICC = Negative emotion differentiation. *N*=114. **p*<0.05, ***p*<.01, ****p*<0.001

Table 4.5. Multilevel model of the interaction of BP features (without self-harm scale) and negative emotion differentiation as a predictor of urge intensity

| Predictor | <i>b</i> | <i>SE_b</i> | <i>z</i> | 95% <i>CI_b</i> |
|------------------|----------|-----------------------|----------|---------------------------|
| Intercept | 14.039 | 0.160 | 87.74*** | 13.726–14.353 |
| PAI-BOR w/o SH | 0.084 | 0.024 | 3.51*** | 0.037–0.131 |
| ICC | 1.110 | 0.433 | 2.57* | 0.262–1.959 |
| PAI w/o SH X ICC | 0.118 | 0.043 | 2.74** | 0.033–0.202 |
| GSI | -0.179 | 0.334 | -0.54 | -0.833–0.476 |
| NA intensity | 0.274 | 0.014 | 20.03*** | 0.247–0.301 |

Note: GSI = Psychopathology. NA = Negative affect. PAI-BOR w/o SH = Borderline personality features without self-harm scale. ICC = Negative emotion differentiation. *N*=114. **p*<0.05, ***p*<.01, ****p*<0.001

Table 4.6. Multilevel model of the interaction of BP features (without self-harm scale) and negative emotion differentiation as a predictor of self-destructive behaviour

| Predictor | <i>b</i> | <i>SE_b</i> | <i>z</i> | <i>95% CI_b</i> |
|------------------|----------|-----------------------|----------|---------------------------|
| Intercept | 0.741 | 0.063 | 11.81*** | 0.618–0.864 |
| PAI-BOR w/o SH | 0.029 | 0.009 | 3.55*** | 0.013–0.045 |
| ICC | 0.087 | 0.178 | 0.49 | -0.262–0.436 |
| PAI w/o SH X ICC | 0.016 | 0.014 | 1.18 | -0.011–0.043 |
| Age | 0.053 | 0.020 | 2.60** | 0.013–0.092 |
| GSI | -0.149 | 0.143 | -1.04 | -0.429–0.132 |
| NA intensity | 0.079 | 0.022 | 3.59*** | 0.036– 0.122 |

Note: GSI = Psychopathology. NA = Negative affect. PAI-BOR w/o SH = Borderline personality features without self-harm scale. ICC = Negative emotion differentiation. *N*=114. **p*<0.05, ***p*<.01, ****p*<0.001

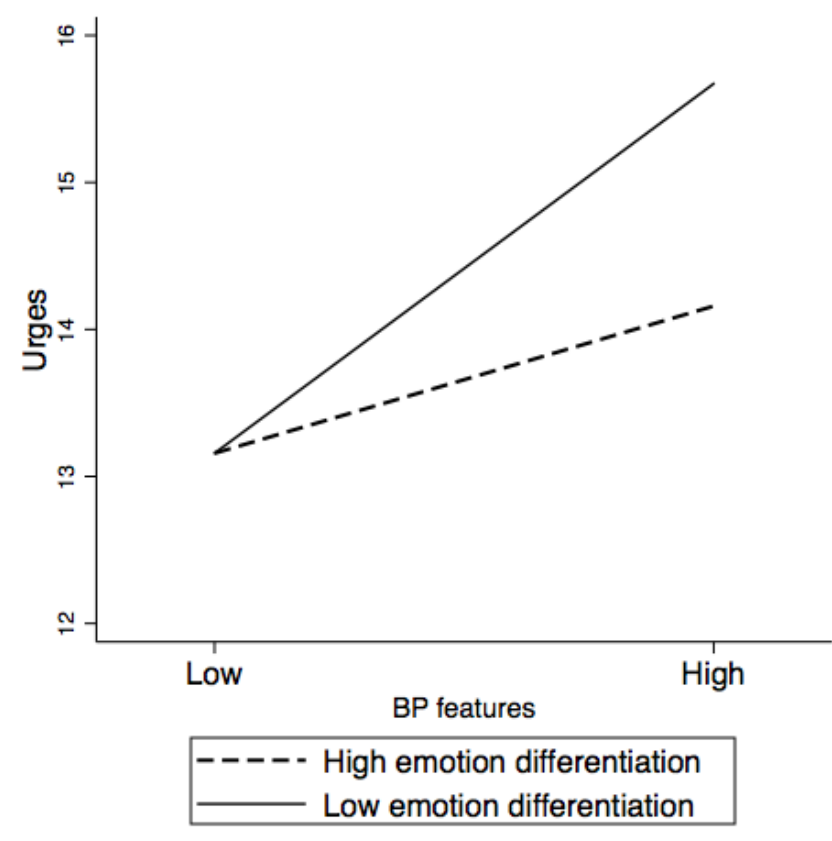


Figure 4.1. Urge intensity by BP features and negative emotion differentiation.

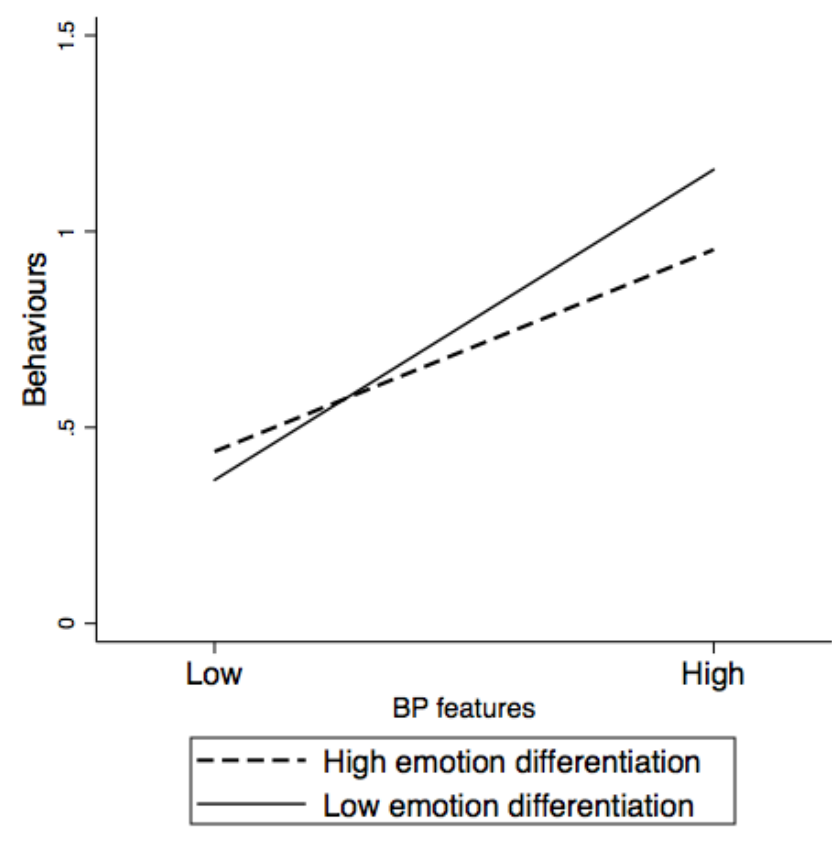


Figure 4.2. Self-destructive behaviour by BP features and negative emotion differentiation.

Individual Urges and Behaviours Analyses

MLM revealed (see Table 4.6) that negative emotion differentiation moderated the relationship between BP features and the intensity of urges for unprotected, risky sexual activity (PAI-BOR x ICC, $b=0.02$, $SE=0.007$, $p<0.05$), the intensity of urges to hit someone or throw things (PAI-BOR x ICC, $b=0.005$, $SE=0.002$, $p<0.05$), the intensity of urges to yell and scream (PAI-BOR x ICC, $b=0.009$, $SE=0.004$, $p<0.05$), and the intensity of urges to purge (e.g., vomiting, excessive exercise, laxatives; PAI-BOR x ICC, $b=0.01$, $SE=0.005$, $p<0.05$). Negative emotion differentiation did not moderate the relationship between BP features and the intensity of urges for any of the other behaviours (binge eating, drug and alcohol use, NSSI, reckless driving, reckless spending and gambling, escaping emotions by going to sleep, and escaping emotions; $ps=0.21-0.96$).

Post-hoc analyses found that BP features and intensity of urges for unprotected, risky sexual activity were positively associated when negative emotion differentiation was low ($<1 SD$, $ME=0.02$, $SE=0.005$, $p<0.001$) but not when negative emotion differentiation was high ($>1 SD$, $ME=0.006$, $SE=0.005$, $p=0.31$; see Figure 4.3). Similarly, post-hoc analysis found that BP features and intensity of urges to hit someone or throw things were positively associated when negative emotion differentiation was low ($<1 SD$, $ME=0.004$, $SE=0.001$, $p<0.001$) but not when negative emotion differentiation was high ($>1 SD$, $ME=0.001$, $SE=0.001$, $p=0.48$; see Figure 4.4). As well, post-hoc analysis found that BP features and intensity of urges to yell or scream were positively associated when negative emotion differentiation was low ($<1 SD$, $ME=0.008$, $SE=0.003$, $p<0.01$) but not when negative emotion differentiation was high ($>1 SD$, $ME=0.001$, $SE=0.003$, $p=0.83$; see Figure 4.5). Given that family-wise error control was not employed, these results should be interpreted with caution. Finally, post-hoc analysis found that BP features and intensity of urges to purge were not associated when negative emotion differentiation was low ($<1 SD$, $ME=0.004$, $SE=0.004$, $p=0.30$) nor when negative emotion differentiation was high ($>1 SD$, $ME=-0.005$, $SE=0.004$, $p=0.19$; see Figure 4.6).

MELR revealed that negative emotion differentiation did not moderate the relationship between BP features and any of the self-destructive behaviours ($ps=0.13-0.96$).

Table 4.7. Mixed effects logistic regression models of the interaction of BP features and negative emotion differentiation as a predictor of the intensity of urges for specific self-destructive behaviours

| Urge and Predictor | <i>b</i> | <i>SE_b</i> | <i>z</i> | 95% <i>CI_b</i> |
|-----------------------|----------|-----------------------|-----------|---------------------------|
| Risky Sex | | | | |
| PAI-BOR | 0.012 | 0.004 | 2.76** | 0.003–0.021 |
| ICC | 0.138 | 0.091 | 1.52 | -0.040–0.316 |
| PAI X ICC | 0.017 | 0.007 | 2.33* | 0.003–0.031 |
| GSI | -0.148 | 0.073 | -2.05* | -0.291– -0.006 |
| NA intensity | 0.006 | 0.002 | 3.26** | 0.003–0.010 |
| Intercept | 1.099 | 0.034 | 32.59*** | 1.033–1.165 |
| Hit or Throw | | | | |
| PAI-BOR | 0.003 | 0.001 | 2.56* | 0.001–0.005 |
| ICC | 0.036 | 0.022 | 1.61 | -0.008–0.079 |
| PAI X ICC | 0.005 | 0.002 | 2.55* | 0.001–0.008 |
| GSI | -0.031 | 0.018 | -1.71 | -0.065–0.004 |
| NA intensity | 0.017 | 0.002 | 9.75*** | 0.014–0.021 |
| Intercept | 1.056 | 0.008 | 131.10*** | 1.040–1.072 |
| Yell or Scream | | | | |
| PAI-BOR | 0.004 | 0.002 | 1.73 | -0.005–0.009 |
| ICC | 0.071 | 0.050 | 1.41 | -0.028–0.170 |
| PAI X ICC | 0.009 | 0.004 | 2.29* | 0.001–0.017 |
| GSI | -0.079 | 0.041 | -1.95 | -0.159–0.0004 |
| NA intensity | 0.040 | 0.003 | 15.22*** | 0.035–0.045 |
| Intercept | 1.139 | 0.019 | 61.44*** | 1.103–1.176 |

| Urge and Predictor | <i>b</i> | <i>SE_b</i> | <i>z</i> | 95% <i>CI_b</i> |
|--------------------|----------|-----------------------|----------|---------------------------|
| Purge | | | | |
| PAI-BOR | -0.001 | 0.003 | -0.25 | -0.007–0.006 |
| ICC | 0.123 | 0.067 | 1.83 | -0.009–0.255 |
| PAI X ICC | 0.012 | 0.005 | 2.21* | 0.001–0.023 |
| GSI | 0.080 | 0.054 | 1.48 | -0.026–0.185 |
| NA intensity | 0.010 | 0.002 | 4.91*** | 0.006–0.014 |
| Intercept | 1.082 | 0.025 | 43.46*** | 1.034–1.131 |

Note: PAI-BOR = BP features. ICC = Negative emotion differentiation. GSI = Psychopathology. NA = Negative affect. *N*=118. **p*<0.05, ***p*<0.01, ****p*<0.001

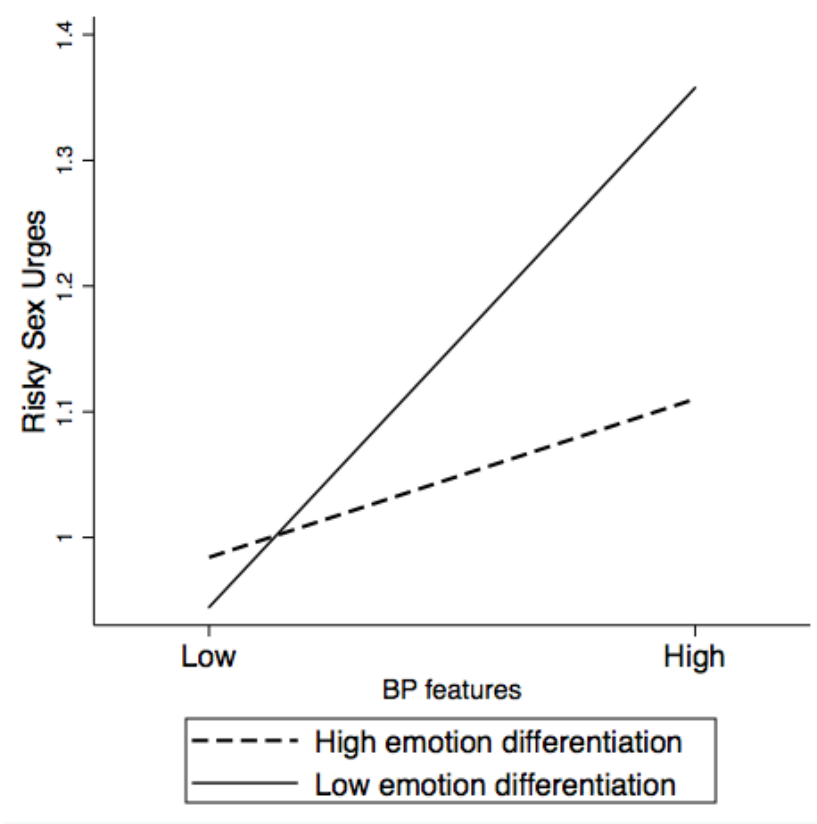


Figure 4.3. Intensity of urges for unprotected, risky sexual activity by BP features and negative emotion differentiation.

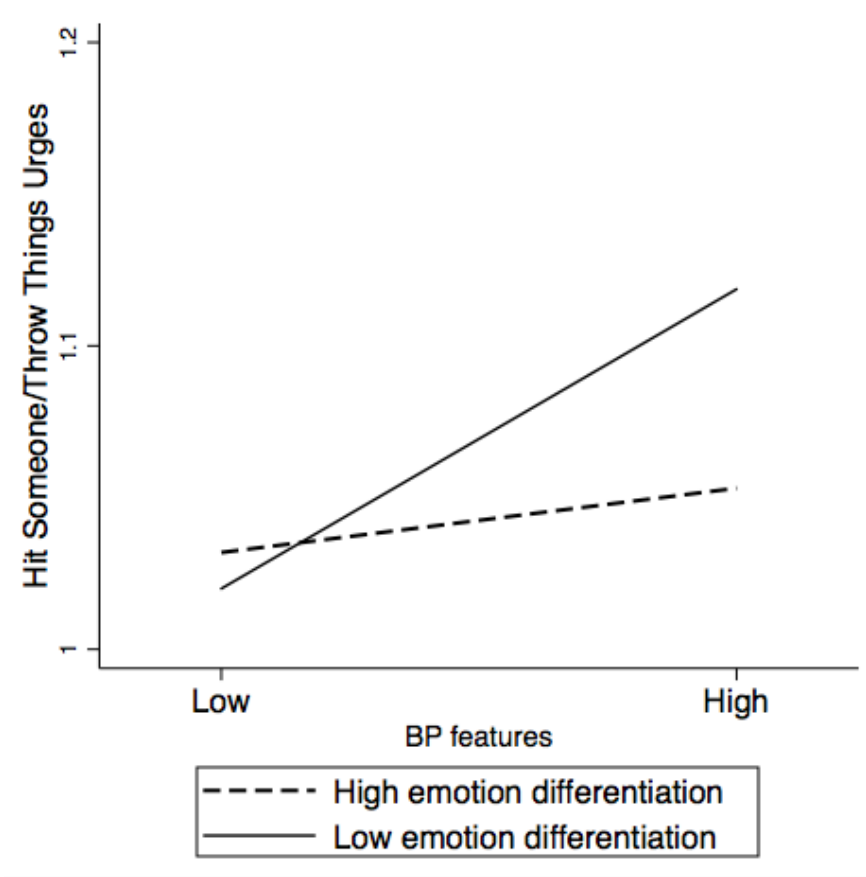


Figure 4.4. Intensity of urges to hit someone or throw things by BP features and negative emotion differentiation.



Figure 4.5. Intensity of urges to yell or scream by BP features and negative emotion differentiation.

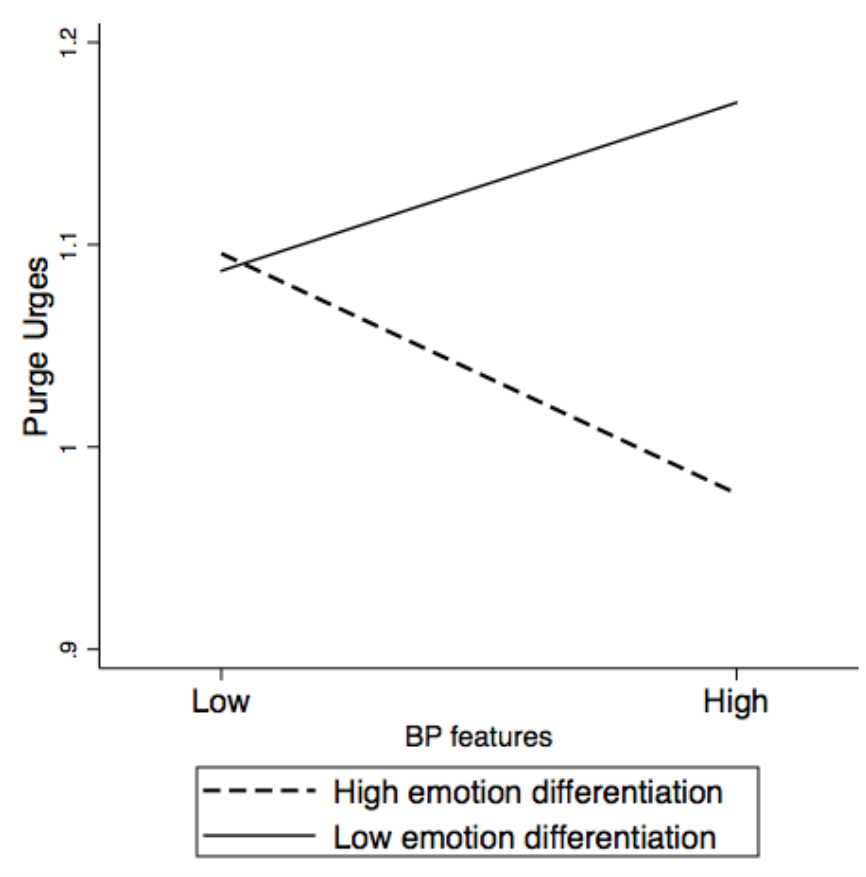


Figure 4.6. Intensity of urges to purge by BP features and negative emotion differentiation.

Chapter 5.

Discussion

I investigated the association of BP features with negative emotion differentiation and whether negative emotion differentiation moderates the association of BP features with self-destructive behaviour and urges. Findings partially supported the hypotheses and highlighted the potentially important buffering role of negative emotion differentiation in the link between BP features and urges to engage in self-destructive behaviours.

BP features were negatively associated with negative emotion differentiation. As well, negative emotion differentiation moderated the association of BP features with general urge intensity, and the intensity of urges for some specific behaviours (for unprotected, risky sexual activity, to hit someone or throw things, and to yell or scream). In contrast, negative emotion differentiation did not moderate the association of BP features and self-destructive behaviour in general, nor any specific behaviour.

The finding, that BP features were negatively associated with negative emotion differentiation in general, is consistent with past research demonstrating that BPD is associated with deficits in emotional awareness, clarity, and identification (Leible & Snell, 2004; Wolf et al., 2007), and with research that suggests that individuals with BPD demonstrate lower emotional granularity (Suvak et al., 2011) and more polarized emotion (Coifman et al., 2012), relative to controls. Although the reasons for possible deficits in emotion differentiation are unclear, as mentioned, developmental experiences supporting a useful conceptual base for emotion may be absent or inadequate for those who develop BPD or heightened BP features. It is also possible that high emotion intensity contributes to difficulty differentiating emotions, and that this association is recursive. Finally, another possibility is that those with heightened BP features are more likely than others to experience multiple discrete emotions in quick succession, complicating the differentiation of discrete emotions.

As well, emotion differentiation aids in adaptive emotion regulation (Bernstein et al., 2012), is positively associated with emotion regulation (Barrett et al., 2001), and has been demonstrated to buffer against aggression (Pond et al., 2012) and alcohol use (among underage social drinkers; Kashdan et al., 2010). In addition, brain regions

associated with emotional reactivity have demonstrated decreased activity during an emotion labelling (Lieberman et al., 2007). The finding that BP features are negatively associated with negative emotion differentiation, therefore, has important implications for the relationship between BP features and self-destructive behaviour.

I predicted that negative emotion differentiation would moderate the association of BP features with self-destructive urges and behaviour. This prediction, however, was only partially supported. As expected, negative emotion differentiation moderated the relationship between BP features and urge intensity, such that the association between BP features and urge intensity was significant when negative emotion differentiation was low, but not when it was high.

The finding that the relationship between BP features and urge intensity was moderated by negative emotion differentiation, is inconsistent with the findings of both Dixon-Gordon et al. (2014) and Wakefield et al. (2015), neither of these two studies demonstrated that negative emotion differentiation moderated the relationship between BPD or BP features and self-destructive urges. The discrepant findings between the three studies may be due to the short data collection periods in the Dixon-Gordon et al. (2014) and Wakefield et al. (2015) studies. Dixon-Gordon et al. (2014) collected data over one 12-hour period and Wakefield et al. (2015) collected data only once a day for four days. Both of these collection periods may not have been adequate to capture variability in emotions or urges. As well, participants in Wakefield et al. (2015) could choose when to complete their questionnaires, which may have reduced variability in their emotional experiences. The importance of a longer period of data collection and EMA is further supported by Zaki et al. (2013), in which participants were prompted to answer questionnaires five times a day for 21 days. In that study, negative emotion differentiation moderated the relationship between rumination and NSSI behaviour among individuals with BPD.

The finding that the relationship between BP features and self-destructive behaviour was not moderated by negative emotion differentiation, is consistent with the findings of both Dixon-Gordon et al. (2014) and Wakefield et al. (2015). Whereas those studies may not have had data collection periods long enough to capture variability in emotions or self-destructive behaviour, the lack of a significant moderation effect in the current research could be due to the use of a primarily university sample with low rates

of these behaviours and with lower levels of BP features than expected in clinical samples. It is also possible that participants had higher levels of adaptive coping than expected among individuals with BPD. This may also explain why in Zaki et al. (2013) negative emotion differentiation moderated the association of rumination and NSSI behaviour among individuals with BPD, wherein my research no moderation effect of negative emotion differentiation was found.

In terms of urges to engage in specific potentially self-destructive behaviours, negative emotion differentiation moderated the relationship between BP features and the intensity of urges for unprotected, risky sexual activity. To the best of my knowledge, this is the first study to demonstrate this effect. In past research BP features were not associated with sexual-risk taking among undergraduates (Northey, Dunkley, Klonsky, & Gorzalka, 2016), and some research suggests that risky sexual activity among individuals with BPD may occur only in the context of substance abuse (Miller, Abrams, Dulit, & Fyer, 1993). Tull et al. (2011), however, found that individuals with BPD and comorbid substance use disorders engaged in more past year penetrative sex without a condom with casual and commercial partners, and more casual sex in general, than individuals with substance use disorders without BPD. Given that the lifetime prevalence of substance use disorders among individuals with BPD is between 52-72% (Sansone & Sansone, 2011), the finding that negative emotion differentiation moderates the relationship between BP features and the intensity of urges for unprotected, risky sexual activity could have important implications for the prevention of this potentially self-destructive behaviour.

I also found that negative emotion differentiation moderated the relationship between BP features and the intensity of urges to hit someone or throw things and to yell and scream, such that the association between BP features and the intensity of these urges was significant when negative emotion differentiation was low, but not when it was high. This finding is consistent with Pond et al. (2012) in which it was demonstrated that emotion differentiation moderated the relationship between anger and aggressive tendencies. Negative emotion differentiation moderated the association between BP features and the intensity of urges for no other behaviours nor between BP features and engagement in specific self-destructive behaviours.

5.1. Limitations

Several study limitations warrant mention. First, it is unclear whether the pattern of findings can be generalized to other samples, such as community or clinical samples or people with a BPD diagnosis. Though findings have suggested that BP features may be best conceptualized along a continuum of severity (Rothschild, Cleland, Haslam, & Zimmerman, 2003 – as in the present research) and are associated in an expected manner with functional impairments among university students (Trull, 1995), future research should examine the effect of negative emotion differentiation on the association between BP features and self-destructive behaviour in more clinically severe samples. Second, the assumption of the ICC method for assessing negative emotion differentiation (that participants would experience differentiated emotional states over the span of the study) may not always apply. For example, it is possible that, at most of the time points assessed via EMA, a participant might have been experiencing the same emotion profile (e.g., anger). The restricted range of emotion would generate an ICC suggesting a deficit in negative emotion differentiation, when in reality it would be indicative of low variability in emotional states. Fortunately, the likelihood of this occurring was offset by the semi-random prompting used during the EMA component, and the 14-day span of the study, which has been demonstrated in prior research to capture adequate variability (Nock et al., 2009; Turner et al., 2015; Turner et al., 2017). Third, this study relied on self-report measures. Future studies also should incorporate diagnostic interviews to confirm the presence of BP features. Fourth, the data were not missing completely at random, and the number of missed diary entries correlated weakly with NA intensity and negative emotion differentiation. Non-randomly missing data could have biased the results. Finally, I did not exclude participants using substances (e.g., medications or drugs) or with conditions (e.g., major depression, psychosis) that may have influenced their responses to the questionnaires or their emotional experiences. The inclusion of a measure of general psychopathology (the GSI) in analyses, however, was meant to control for some potential sources of bias.

5.2. Significance

To date, published research investigating whether negative emotion differentiation has a protective effect against self-destructive behaviour for those high in

BP features has not been conclusive. In the current study, BP features and negative emotion differentiation interacted to predict the intensity of urges for self-destructive behaviour in general, as well as the intensity or urges for specific behaviours (unprotected, risky sexual activity, hitting someone or throwing things, and yelling and screaming). These results suggest a potential area for intervention.

As an underdeveloped ability to differentiate emotion is thought to result from deficiencies in an individual's conceptual base of emotion (Lindquist & Barrett, 2008), training that expands this conceptual base may result in better negative emotion differentiation, and thus protect against self-destructive behaviour. Dialectical behaviour therapy (DBT; Linehan, 1993), an existing empirically-supported treatment for BPD, provides psycho-education regarding emotion within the emotion regulation skills training module. This training in labelling emotions, however, is limited to a single group skills session, and much of the emotion labelling content is framed as optional in the manual (Linehan, 1993, 2015), and is thus not extensive. The results of the current study suggest that increased focus might be given to emotion labelling during skills training. Further, this finding could change the way providers choose to begin treatment. For instance, if providers are faced with clients engaging in self-destructive behaviours, they may choose to begin treatment with psycho-education regarding emotions and training in the differentiation of emotional states. Furthermore, in settings in which the comprehensive DBT treatment package is not feasible, such as in settings where resources are not available, or where short-term treatment is the norm, the findings from my study suggest that an abbreviated psycho-education intervention may be helpful for patients struggling with self-destructive behaviours. Indeed, a short intervention could be developed that teaches about emotions and the differences between similarly valenced emotions. This type of approach could be viable as a stand-alone training tool when longer-term treatments are not available.

5.3. Conclusion

Individuals with BPD have difficulty regulating emotions and often turn to self-destructive behaviours for relief from emotional pain (Linehan, 1993; Chapman et al., 2008). The results of this study suggest that teaching individuals high in BP features how to better differentiate negative emotions may lessen the intensity of their urges for self-destructive behaviour. This reduction in the intensity of their urges may, in turn, make

these urges easier to resist. Future research should investigate the effect of training in emotion labelling on negative emotion differentiation and self-destructive behaviour.

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