

Accepted Manuscript

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Borderline Personality Disorder and Healthy Controls

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PII: S0165-1781(17)31594-9
DOI: [10.1016/j.psychres.2018.03.078](https://doi.org/10.1016/j.psychres.2018.03.078)
Reference: PSY 11310



To appear in: *Psychiatry Research*

Received date: 3 September 2017
Revised date: 9 February 2018
Accepted date: 29 March 2018

Please cite this article as: Katrin Janke , Martin Driessen , Behnoush Behnia , Katja Wingenfeld , Stefan Roepke , Emotional Intelligence in Patients with Posttraumatic Stress Disorder, Borderline Personality Disorder and Healthy Controls, *Psychiatry Research* (2018), doi: [10.1016/j.psychres.2018.03.078](https://doi.org/10.1016/j.psychres.2018.03.078)

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Highlights

- Emotional intelligence is investigated in PTSD, BPD and PTSD with comorbid BPD
- Emotional intelligence is impaired in PTSD without comorbid BPD
- Impairment in PTSD without comorbid BPD is not restricted to specific emotions
- No significant impairment in emotional intelligence in BPD was found

ACCEPTED MANUSCRIPT

**Emotional Intelligence in Patients with Posttraumatic Stress Disorder, Borderline
Personality Disorder and Healthy Controls**

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Abstract

Emotional intelligence as a part of social cognition has, to our knowledge, never been investigated in patients with Posttraumatic Stress Disorder (PTSD), though the disorder is characterized by aspects of emotional dysfunctioning. PTSD often occurs with Borderline Personality Disorder (BPD) as a common comorbidity. Studies about social cognition and emotional intelligence in patients with BPD propose aberrant social cognition, but produced inconsistent results regarding emotional intelligence. The present study aims to assess emotional intelligence in patients with PTSD without comorbid BPD, PTSD with comorbid BPD, and BPD patients without comorbid PTSD, as well as in healthy controls.

71 patients with PTSD (41 patients with PTSD without comorbid BPD, 30 patients with PTSD with comorbid BPD), 56 patients with BPD without PTSD, and 63 healthy controls filled in the Test of Emotional Intelligence (TEMINT). Patients with PTSD without comorbid BPD showed impairments in emotional intelligence compared to patients with BPD without PTSD, and compared to healthy controls. These impairments were not restricted to specific emotions. Patients with BPD did not differ significantly from healthy controls. This study provides evidence for an impaired emotional intelligence in PTSD without comorbid BPD compared to BPD and healthy controls, affecting a wide range of emotions.

Key words: PTSD, BPD, TEMINT, emotional intelligence, social cognition

1. Introduction

PTSD is associated with disturbances in social cognition, e.g., feelings of detachment or estrangement from others. One model that captures aspects of social interaction is emotional intelligence. Emotional intelligence has been defined as the “ability to carry out accurate reasoning focused on emotions and the ability to use emotions and emotional knowledge to enhance thought.” (Mayer et al., 2008). Following this definition of emotional intelligence, it affects many aspects of social functioning and, thus, can be considered an aspect of social cognition. Social cognition is referred to as the sum of processes that allow individuals to interact with each other, consciously or unconsciously perceiving, interpreting and processing social information (Adolphs, 1999). Constructs that capture the essence of social cognition include empathy, theory of mind (Roepke et al., 2012) and emotional intelligence (Varo et al., 2017). It is widely accepted that empathy consists of at least two components, a cognitive and an emotional component. The cognitive component, referred to as cognitive empathy, means the ability to represent the mental states of others, which is also referred to as perspective taking, mentalizing or theory of mind. The emotional component, referred to as emotional empathy, is conceptualized as the emotional response to another person's affective state (Blair, 2005).

Though social cognition and subsequently emotional intelligence appear to be highly relevant theoretical constructs to understand PTSD, until now, it is an underexplored area. Research shows that the development of PTSD is mediated by interpersonal and social factors (Brewin et al., 2000; DePrince, 2005; Sharp et al., 2012; Venta et al., 2017). Many studies that aimed to identify predisposition factors for developing PTSD after experiencing traumatic events found numerous interpersonal factors (Koenen et al., 2007; Ozer et al., 2003). Moreover, low levels of perceived social support seem to be associated with the severity of PTSD symptoms (Hofman et al., 2016; Jankowski et al., 2004). According to a review about interpersonal constructs and their association with PTSD, social support, social acknowledgement and quality of intimate relationships are crucial factors for trauma processing und recovery (Nietlisbach and

Maercker, 2009). Sharp et al. (2012) suggested “social cognition as a key factor that relates a certain level of traumatic stress to the syndrome of PTSD” (p. 235). There are studies that have investigated the hypothesis of impaired social cognition and associated concepts as empathy in PTSD. One study found lower empathic resonance and higher personal distress but no clear indication of other impaired social cognitive functions (Nietlisbach et al., 2010). Most other studies found evidence for impairments in different aspects of social cognition in PTSD, e.g., impaired theory of mind and emotional empathy (Mazza et al., 2012; Mazza et al., 2015; Nazarov et al., 2014), impaired recognition of facial emotion expressions for fear and sadness (Poljac et al., 2011), and impaired ability to identify the mental state of others as expressed by the eyes (Schmidt and Zachariae, 2009). There is also evidence for an association between reduced emotional and cognitive empathic abilities in PTSD and severity of PTSD symptoms (Palgi et al., 2017). Furthermore, authors found evidence for altered brain activity in specific regions activated by empathy in PTSD patients (Mazza et al., 2015). Furthermore, altered brain activity for empathic as well as forgivability judgements have been found in PTSD patients (Farrow et al., 2005).

These findings led Mazza et al. (2012) to the conclusion that “central symptoms of PTSD as avoidance/emotional numbness or social withdrawal and emotional paralysis may underlie a deficit in the acquired inability to understand others' mental states and to understand/share emotions with others” (p. 251). Focussing on emotional intelligence in PTSD could help to specify the proposed underlying deficit mechanism that might contribute to the development or maintenance of PTSD.

Borderline Personality Disorder (BPD) is a common comorbid disorder among patients with PTSD that was shown to be present in up to 24.2% of patients suffering from PTSD (Pagura et al., 2010). PTSD and BPD both share common characteristics like high prevalence rates of experienced traumatic events, high rates of chronicity (Wittchen et al., 2009) and poor quality of interpersonal relationships (Lieb et al., 2004; Nietlisbach et al., 2010). ICD-11 proposal suggests

a differentiation between PTSD and complex PTSD (cPTSD) (Brewin et al., 2017). CPTSD is comprised of six symptom clusters, of which three are shared with PTSD (re-experiencing, avoidance, and sense of threat) and three additional symptom clusters related to disturbances in self-organization (affect dysregulation, negative self-concept and difficulties in relationships). Though there has been a debate if cPTSD is actually PTSD with comorbid BPD, current data support the hypothesis that these are distinct groups (Brewin et al., 2017; Cloitre et al., 2014; Knefel et al., 2016).

While exposure to a life-threatening traumatic event is a diagnostic criterion for PTSD in DSM-5, it is not required for the diagnosis of BPD. Nevertheless, traumatic events are so common in patients with BPD (MacIntosh et al., 2015), that we decided to include patients with PTSD with and without comorbid BPD and patients with BPD without PTSD. BPD is characterized by a pervasive pattern of instability of interpersonal relationships, self-image, affects, and marked impulsivity that begins in early childhood and is present in a variety of contexts (American Psychiatric Association, 2013). It affects up to 2.7 % of the general population (Trull et al., 2010), and is known to be a severe disorder associated with many comorbidities and psychosocial impairments (Skodol et al., 2002).

Deficits in social cognition have been shown in patients with BPD (Roepke et al., 2012) and there is evidence that a comorbid PTSD diagnosis predicts a poor outcome on social cognition tasks (Preissler et al., 2010). Studies about theory of mind in BPD have produced inconsistent findings indicating impaired, comparable and enhanced theory of mind in BPD compared to healthy controls (Roepke et al., 2012; Schilling et al., 2012; Tay et al., 2017). There is evidence that cognitive empathy in BPD is influenced by ecological validity, trauma and comorbid PTSD (Preissler et al., 2010; Roepke et al., 2012) and arousal or emotional states (Sharp et al., 2011). Studies assessing emotional empathy are also mixed. Some studies found no impairment in BPD (Jeung and Herpertz, 2014; Wingenfeld et al., 2014), other found reduced tendencies to feel empathy in more complex and emotionally distressing situations (Dziobek et

al., 2011). Again, arousal or emotional states seem to moderate outcome in emotional empathy (Dziobek et al., 2011). Whereas Harari et al. (2010) found higher emotional than cognitive empathy in patients with BPD compared to healthy controls, Kalpakci et al. (2016) could not replicate these findings. Regarding facial emotion recognition, studies found alterations and deficits in BPD (Niedtfeld, 2017), especially using multimodal social information processing designs.

Emotional intelligence has been studied in BPD and empirically assessed with the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2002) and the Test of Emotional Intelligence (TEMINT) developed by Schmidt-Atzert und Bühner (TEMINT; Schmidt-Atzert and Buehner, 2002). The MSCEIT is designed to measure the four branches of the emotional intelligence model by Mayer and Salovey (1997) and therefore consists of four subscales (perceiving emotions, using emotions to facilitate thought, understanding emotions, managing emotions) as well as an overall score for emotional intelligence. The TEMINT is an instrument that assesses emotional reasoning skills. Participants are presented with descriptions of 12 different situations and are instructed to rate the intensity of ten emotions (aversion, anger, fear, unease, sadness, guilt, happiness, pride, affection and surprise) the target person might have felt in the respective situation. The outcome of the TEMINT is a summed up deviation score of the absolute differences from the real data across situations and emotions. Studies on emotional intelligence in BPD have not produced consistent results so far. Two studies found impairments in emotional intelligence using the MSCEIT (Hertel et al., 2009; Hurtado et al., 2016), one study found impairments only in subscales of the MSCEIT, but not in overall emotional intelligence scores (Peter et al., 2013) and one found no impairments in emotional intelligence in patients with BPD compared to healthy controls (Beblo et al., 2010). One study investigated the impact of PTSD on BPD symptomatology (Cackowski et al., 2016) and found an elevated affect dysregulation in patients with BPD with comorbid PTSD in comparison to those with BPD without PTSD.

In the present study we investigated emotional intelligence using the TEMINT (TEMINT; Schmidt-Atzert and Buehner, 2002) in patients with PTSD with and without comorbid BPD and in patients with BPD without comorbid PTSD in comparison to healthy controls. Following Sharp et al. (2012), Mazza et al. (2012) and other authors we hypothesized that patients with PTSD (with and without BPD) have an impairment in emotional intelligence compared to healthy controls. Secondly, following Beblo et al. (2010), we hypothesized that patients with BPD without PTSD do not show impairments in emotional intelligence compared to healthy controls. Furthermore, we expected patients with PTSD without BPD to have higher deviation scores, especially for PTSD-associated emotions like “anger”, “fear”, “sadness” and “guilt” (American Psychiatric Association, 2013) compared to patients with BPD without PTSD and to healthy controls.

2. Methods

2.1 Design and participants

The study included 190 participants, 71 patients with PTSD (41 patients with PTSD without BPD, 30 patients with PTSD with comorbid BPD), 56 patients with BPD without PTSD and 63 healthy controls. Healthy participants were recruited via public postings. Patients were recruited from specialized personality disorder units of psychiatric hospitals (Department of Psychiatry and Psychotherapy, Charité University Medical School Berlin, Germany, Department of Psychosomatic Medicine and Psychotherapy, University Medical Center Hamburg-Eppendorf & Schön Klinik Hamburg-Eilbek, Germany and Department of Psychiatry and Psychotherapy Bethel, Ev. Hospital Bielefeld, Germany). Participants were excluded if they had a lifetime diagnosis of schizophrenia, schizoaffective disorder, bipolar disorder, depressive disorder with psychotic features, alcohol or drug dependence or were currently diagnosed with anorexia

nervosa. All diagnoses were assessed according to DSM-IV criteria by the German version of SCID I (Wittchen et al., 1997). At hospital admission, patients' drug screening (benzodiazepines, opiates, cocaine, amphetamines, and cannabinoids) yielded negative results. Patients were diagnosed according to DSM-IV criteria, assessed by the German versions of SCID I and SCID II (Wittchen et al., 1997). To assess severity of symptoms, patients also filled in German versions of Beck Depression Inventory-II (BDI-II; Beck et al., 1996), Childhood Trauma Questionnaire (CTQ; Bernstein and Fink, 1998) and Posttraumatic Diagnostic Scale (PDS; Foa et al., 1997). The PDS consists of four parts, part 1 assessing trauma type, part 2 assessing time criterion, part 3 assessing severity of PTSD symptoms, and part 4 assessing functional impairment. Healthy controls did not meet the criteria for any present or former axis I or II disorders. The study was approved by the local ethics committee. Written informed consent was obtained from all participants.

2.2 Instrument

The TEMINT (Schmidt-Atzert and Buehner, 2002) was developed to assess emotional intelligence based on the specific ability approach. The instrument consists of 12 items. Each item is comprised of a description of a specific situation that a target person is experiencing, leading to a total of 12 different situations with 12 different target persons. Each item is to be rated by the participants in regard of the potential emotions the target person might be feeling in that situation and in regard of the intensity of the emotions the target person might be feeling. The participants were instructed to complete the following tasks: "Put yourself in the position of the character. What might the person have felt and to which extend?" 10 possible emotions were to be rated on a three-point Likert scale, i.e., 0 = not at all or very weak, 1 = weak to medium, 2 = strong to very strong. The possible emotions were: "aversion", "anger", "fear", "unease", "sadness", "guilt", "happiness", "pride", "affection" and "surprise". An example item of the TEMINT is: 'A 30-year-old female computer specialist reports: "My cat was ill. I had to take it to

the veterinarian. I thought I had poisoned it with insect repellent spray.“ How did this person feel in this situation?” To analyse the outcome of the TEMINT the absolute differences from the real data was analysed and summed up into a deviation score, ranging from 0 to 161. The TEMINT is inversely poled, which means that higher scores indicate lower emotional intelligence. According to the authors of TEMINT (Schmidt-Atzert and Buehner, 2002), the instrument offers high internal consistency (Cronbach’s $\alpha = .77$) and high convergent, divergent and incremental validity as demonstrated by numerous other studies. For example Amelang and Steinmayr (2006) found internal consistencies (α) of .76, Blickle et al. (2009) reported a Cronbach’s $\alpha = .82$ as well as high construct and criterion-related validity (Blickle et al., 2011; Blickle et al., 2009).

2.3 Data analysis

Statistical analyses were performed using SPSS Version 22.0. Demographic data were analyzed using Pearson’s Chi²-test for categorical data and analysis of variance (ANOVA) for continuous data. Effects of the main factor group (PTSD without BPD, PTSD with BPD, BPD without PTSD, healthy controls) on emotional intelligence were analyzed using analysis of variance (ANOVA). Effect sizes are reported in Cohen’s d . Further analyses were performed using multivariate analysis of variance (MANOVA). In a last step, if groups differed, we performed an analysis of covariance (ANCOVA) to test if the variable had a significant influence on emotional intelligence. Looking at the descriptive data of the four different groups we found one outlier in the group of PTSD with BPD. This participant had a total score of 103 in TEMINT which is +4 SD from the sample mean (40.8) and therefore we decided to exclude the participant from further analysis.

3. Results

3.1 Sample characteristics

The basic demographic and clinical characteristics are shown in table 1. Age differed in groups ($F(3, 187) = 4.8, p < .01$). Bonferroni-corrected post hoc analysis showed a significant difference between PTSD without BPD and BPD without PTSD ($p < .001$). Sex also differed in groups ($\chi^2(3) = 19.67, p < .001$). Bonferroni-corrected pairwise comparisons showed a significant difference between healthy controls and BPD without PTSD ($p < .008$) as well as between healthy controls and PTSD with BPD ($p < .008$).

Please insert table 1 about here

Eight healthy controls (12.7%) had been exposed to a traumatic event, but didn't meet the criteria for PTSD, 13 participants from the group of BPD without PTSD had been exposed to a traumatic event (23.2%), but didn't meet the criteria for PTSD.

3.2 Effects of the main factor group (healthy controls, PTSD without BPD, PTSD with BPD, BPD without PTSD) on emotional intelligence

We performed an analysis of variance (ANOVA) to analyze the effect of group (PTSD with and without comorbid BPD, BPD without PTSD, healthy controls) on emotional intelligence. A main group effect ($F(3, 167) = 6.9, p < .001$) was found. The group means (and standard deviations) are the following: healthy controls: 35.0 (7.9), PTSD without BPD: 44.7 (15.2), PTSD with BPD: 38.3 (8.7) and BPD without PTSD: 36.7 (9.7) (see figure 1).

Bonferroni-corrected post hoc analysis showed a significant difference in emotional intelligence between the PTSD without BPD group and healthy controls ($p < .001$) with a large effect size ($d = .86$) as well as between the PTSD without BPD group and the BPD without PTSD group ($p = .003$) with a medium effect size ($d = .65$). There were no significant differences in emotional intelligence between the PTSD with BPD group and all of the other groups. Furthermore, there was no significant difference between the BPD without PTSD group and

healthy controls with a very small effect size ($d = .19$). As age and sex differed in groups, we controlled for these variables but found no influence on emotional intelligence (separately introduced as covariates into the ANCOVA).

Please insert figure 1 about here

3.3 Effects of the main factor group (healthy controls, PTSD without BPD, PTSD with BPD, BPD without PTSD) on emotional intelligence in the 10 different emotions presented in the TEMINT

To detect performance differences of the groups regarding the 10 different emotions in the TEMINT, we chose MANOVA analysis. Using Hotelling's trace statistic, there was a significant effect of the main factor group on the 10 different emotions ($T = 0.32$, $F(30, 527) = 1.88$, $p < .005$).

For seven emotions, we found significant differences of group means in emotional intelligence, these emotions were: "aversion", "anger", "fear", "sadness", "guilt", "happiness" and "affection". There were no significant group differences for the emotions "unease", "pride" and "surprise" (for details see table 2). Bonferroni-corrected post hoc analysis showed a significant difference in emotional intelligence between the PTSD without BPD group and healthy controls for the emotions "aversion", "anger", "fear", "sadness", "guilt", "happiness" and "affection". The PTSD without BPD group differed also significantly from the BPD without PTSD group in emotional intelligence for the emotions aversion, anger, fear and sadness whereas no difference could be found between the BPD without PTSD group and healthy controls.

Please insert table 2 about here

4. Discussion

To our knowledge, this is the first study to investigate emotional intelligence in patients with PTSD compared to a clinical (patients with BPD) and a non-clinical control group.

Results reveal a significant impairment in emotional intelligence in patients with PTSD without BPD. No significant impairment in emotional intelligence was found for patients with PTSD with BPD and for patients with BPD without PTSD. Impairments in PTSD without BPD were not specific to PTSD-associated emotions, but related to many different emotions including PTSD-associated emotions.

Thus, there are three major results of our study to be discussed: Emotional intelligence in PTSD, emotional intelligence in BPD, and specific impairments of emotions.

4.1 Emotional intelligence in PTSD

Our results support findings of impairments in aspects of social cognition in PTSD, e.g., emotion recognition, theory of mind, emotional empathy or empathic resonance (Mazza et al., 2012; Mazza et al., 2015; Nazarov et al., 2014; Nietlisbach et al., 2010; Palgi et al., 2017). The results also strengthen the idea of an important role of impaired social cognition in PTSD in terms of an underlying deficit (Sharp et al., 2012). However, a causal relationship between the two variables remains unclear. One possible link between impairment in social cognition and PTSD was proposed by DePrince (2005). The author refers to betrayal trauma theory and argues that on condition of being dependent on a perpetrator, it might be helpful to not detect violations of social contract in order to preserve attachment. Accordingly, having a lower emotional intelligence could prove a lifesaving strategy for patients with PTSD. Therefore having a low emotional intelligence could be interpreted as a coping strategy of patients with PTSD, which is in line with research finding evidence for passive coping strategies (e.g., immobility, disengagement) and low coping flexibility in patients with PTSD (Olf et al., 2005; Park et al., 2015). A similar possible relation could be a low pretraumatic emotional intelligence as risk factor for experiencing interpersonal traumatic events in terms of misinterpretation of signals.

This would be in line with PTSD risk factor research that found a multitude of influencing interpersonal factors (Brewin et al., 2000; DePrince, 2005; Sharp et al., 2012). Hofman et al. (2016) proposed lack of social support, which itself is related to low emotional intelligence, as an important factor in the development or maintenance of PTSD. Other authors also pointed out the important role of social support, social acknowledgement and quality of intimate relationships for trauma processing and recovery (Jankowski et al., 2004; Nietlisbach and Maercker, 2009). Social support may even mitigate PTSD severity by reducing negative posttraumatic cognitions (Zang et al., 2017). Still, the causal relationship between impairment in emotional intelligence, social support and PTSD symptoms is not clear and should be investigated in longitudinal future studies. Even more so, as the authors of a recent study with pre-post design suggested that social cognitive impairment underlies the presence of PTSD symptoms and found that adequate social cognition is associated with PTSD recovery, e.g., via influencing one's ability to reach out for help after experiencing a traumatic stressor (Venta et al., 2017).

Another possible explanation for impairment in emotional intelligence in patients with PTSD without BPD might be explained by core symptoms of PTSD. A recent review by Woud et al. (2017) described an attentional bias to threat in PTSD, either for trauma-related or general-threat related or trauma- and threat-related material (Cisler and Koster, 2010; Depierro et al., 2013; Naim et al., 2014). This bias could have influenced performance in TEMINT in patients with PTSD without BPD. In contrast to findings about attentional bias to threat, we did not find impairments in only trauma-associated emotions but impairments affecting many different emotions. Other PTSD symptoms that could have an impact on performance in TEMINT are intrusions or dissociations. In fact, there is evidence for a bias away from trauma-related material, in relation to severity of intrusions in recent trauma victims (Elsesser et al., 2004) and impairment in social cognition tasks related to severity of dissociation (Nazarov et al., 2015; Nazarov et al., 2014). Furthermore, there is a growing body of evidence pointing towards a relation between dissociative symptoms and impaired social cognition across psychiatric illnesses, including PTSD

and BPD (McKinnon et al., 2016). However, we did not find a significant impairment in emotional intelligence in patients with BPD without PTSD compared to healthy controls. Sumner et al. (2017) found neurocognitive deficits in patients with PTSD that could also result in worse performance in TEMINT. Again, patients with BPD showed deficits across multiple neurocognitive domains, too. Those with comorbid PTSD, however, performed more poorly (Thomsen et al., 2017). According to dysfunctional trauma-related appraisals and interpretations in PTSD, research has shown that PTSD patients exhibited enhanced expectations for threat-related interpretations (Kimble et al., 2012) and are unable to inhibit the potentially negative meaning (Amir et al., 2002). Although patients with BPD show evaluation biases (e.g., that others are malevolent) (Roepke et al., 2012) an influence of dysfunctional trauma-related appraisals on emotional intelligence tasks is conceivable.

In contrast to findings of Preissler et al. (2010) who found that comorbid PTSD in BPD contributed to impaired social cognition, we did not find significant differences in emotional intelligence between patients with PTSD with BPD and patients with BPD without PTSD or between patients with PTSD and comorbid BPD and healthy controls. However, Preissler et al. (2010) assessed cognitive empathy whereas emotional intelligence was assessed in the current study. Further, small sample size in the group of PTSD with BPD could be a limitation in the interpretation of group differences between patients with PTSD with BPD and patients with BPD without PTSD. It might also be possible that, due to the overlap of symptoms in the groups of BPD and PTSD, for instance dissociations and hyperarousal, there might be an over-diagnosing of PTSD in the PTSD with BPD group. Following the approach of an altered use of coping strategies in patients with PTSD (Olf et al., 2005; Park et al., 2015) it might also be possible that the PTSD with BPD group developed coping strategies different from the PTSD without BPD group and might not be able to use emotional avoidant coping strategies.

4.2 Emotional intelligence in BPD

In accordance to the results of Beblo et al. (2010) our data reveal no significant difference in emotional intelligence between the group of BPD without PTSD and healthy controls. The effect size is very small, especially when comparing to the large effect between PTSD without BPD and healthy controls. These results seem to be in contrast to other studies (Hertel et al., 2009; Hurtado et al., 2016; Peter et al., 2013) that found a significant impairment in emotional intelligence in BPD. Inconsistencies of the results might, however, be partly attributed to varying assessment instruments as some studies used the MSCEIT to measure emotional intelligence. The authors of the TEMINT (Schmidt-Atzert and Buehner, 2002) conceptualized the instrument to focus on the ability of emotional reasoning, which is one of the core competencies of emotional intelligence (Mayer et al., 2008; Mayer and Salovey, 1997). In a construct validation study of the TEMINT, it was shown that the TEMINT was associated most closely to the “understanding emotion” branch of the MSCEIT (Blickle et al., 2011). Still, some authors found impairments in emotional intelligence in the part testing for “understanding emotions” of the MSCEIT in patients with BPD (Gardner & Qualter, 2009; Hertel et al., 2009; Peter et al., 2013) whereas Beblo et al. (2010) and our data do not support this. One study found a correlation between BPD severity and emotional intelligence by means that higher BPD severity scores result in a lower overall emotional intelligence (Peter et al., 2013). In fact, our sample of patients with BPD can be classified as moderate severe, since it meets, similar to Beblo et al. (2010), 6.27 of the necessary DSM-IV criteria, and, thus, could be held accountable for divergent findings. Another possible explanation might be that we controlled for PTSD in the BPD-group, which was not reported in other studies. Since patients with PTSD without BPD have a lower emotional intelligence as patients with BPD without PTSD and healthy controls this could be an important confounding variable. It is important to mention that the TEMINT does not use complex ecologically valid material, as it has been shown before that deficits in cognitive and emotional empathy of BPD patients were only found when presenting with more complex or ecologically highly valid material in emotionally distressing situations (Roepke et al., 2012). Recent studies also

emphasize the importance of contextual factors for mental state understanding in BPD and demonstrate an increase in empathy compared to healthy controls, especially concerning emotionally relevant material (Miano et al., 2017).

4.3 Specific impairments of emotions

According to our third hypothesis, we expected patients with PTSD without BPD to perform worse when measuring specific PTSD-associated emotions like “anger”, “fear”, “sadness” and “guilt” (American Psychiatric Association, 2013) compared to patients with BPD without PTSD and to healthy controls. Our hypothesis was confirmed for the emotions anger, fear and sadness. Patients with PTSD without BPD also showed worse performance score than healthy controls for “guilt”, but overall, the group of patients with PTSD with BPD had the worst performance score compared to the three other groups. PTSD without BPD also differed significantly from healthy controls regarding the emotions “happiness” and “affection” and differed significantly from healthy controls and patients with BPD without PTSD regarding “aversion”. No significant differences could be found for “unease”, “pride” and “surprise”. One could argue that “unease” and “surprise” are rather unspecific emotions, especially concerning their valence and therefore did not produce consistent results, whereas “pride” could be unspecific or irrelevant to BPD without PTSD and PTSD without BPD. In sum, we found impairments in emotional intelligence in patients with PTSD without BPD in seven of ten emotions irrespective of positive or negative valence of the emotions. Even though the TEMINT does not offer direction of deviation in emotions as a standard measure, we have been interested in the hypothesis that patients with PTSD might have a tendency to over- or underestimate emotions. No specific pattern of over- or underestimating emotions for patients with PTSD was apparent in our dataset.

4.4. Limitations

We could not investigate effects of gender on emotional intelligence since our sample was too small and only few men participated. Therefore, our results are restricted to women. Another limitation for our specific hypothesis is that the TEMINT only analyses 10 emotions and misses some characteristic PTSD-associated emotions like “shame” or “disgust”. The TEMINT uses short descriptions of situations with emotional valence and does not use real situations or video sequences which restricts ecological validity. Since the majority of the participants of our PTSD group was exposed to repeated interpersonal traumatic events, further research is warranted to investigate the role of emotional intelligence in PTSD patients who were exposed to accident-related and mono-traumatic events.

4.5 Conclusions

In summary, patients with PTSD without BPD show impairments in emotional intelligence compared to patients with BPD without PTSD and compared to healthy controls. These impairments were not specific to any emotions but affected the performance of all emotions, except “unease”, “pride” and “surprise”. Possible explanations for these impairments e.g., core symptoms of PTSD, lack of social support or an underlying deficit in emotional intelligence, are discussed. Further research is necessary to investigate whether the detected deficit in emotional intelligence proves to be a risk factor for developing PTSD or if it is a result of the symptomatology of PTSD. Future research should furthermore assess whether it is beneficial to include emotional intelligence training sessions in PTSD psychotherapy treatment.

Declaration of interest

There are no conflicts of interest, financial or otherwise, to declare.

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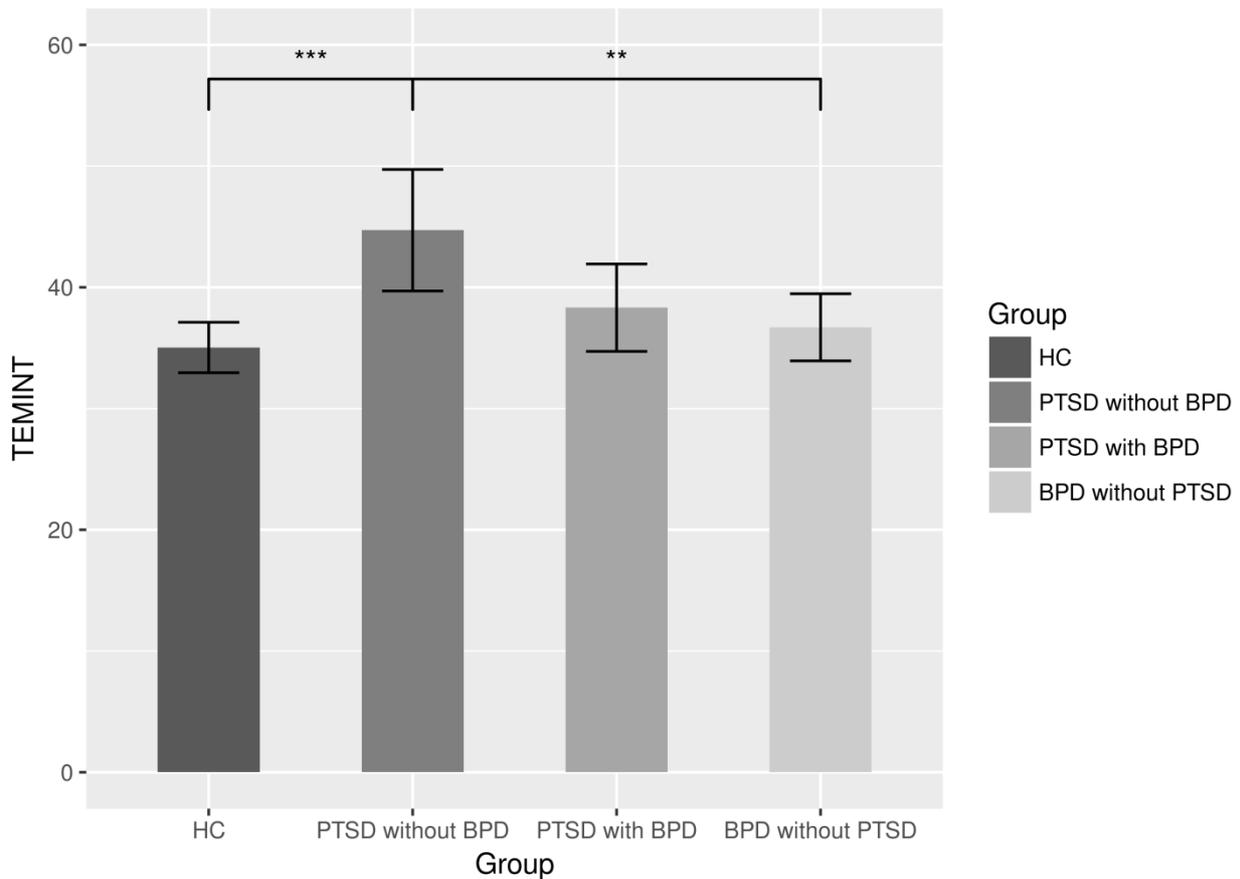
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Figure 1: Effect of Main Factor Group (HC, PTSD without BPD, PTSD with BPD, BPD without PTSD) on Emotional Intelligence, Based on ANOVA



Note: HC = healthy controls; PTSD = Posttraumatic Stress Disorder; BPD = Borderline Personality Disorder; TEMINT = Test of Emotional Intelligence; confidence intervals (CIs) 95% are represented in the figure by the error bars attached to each column, higher scores indicate lower emotional intelligence; asterisks mark the level of significance ** $p < 0.01$, *** $p < 0.001$

Table 1: Sample Characteristics

	HC (n = 63)	PTSD without BPD (n = 41)	PTSD with BPD (n = 30)	BPD without PTSD (n = 56)
Age <i>M (SD)</i>	31.7 (10.3)	34.8 (10.6)	30.6 (8.4)	27.4 (7.5)
Sex (F/M)	40/23	34/7	29/1	50/6
Exposure to any trauma (<i>n</i>)	8	41	30	13
Exposure to interpersonal trauma (<i>n</i>)	5	36	30	11
Exposure to more than one traumatic event (<i>n</i>)	3	29	22	8
Type of trauma* : military combat (<i>n</i>)	0	1	0	0
Type of trauma* : physical assault (<i>n</i>)	2	23	22	7
Type of trauma* : sexual assault	3	12	7	3
Type of trauma* : child abuse (<i>n</i>)	1	22	21	2
Type of trauma* : natural disaster (<i>n</i>)	0	0	0	0
Type of trauma* : accident (<i>n</i>)	2	15	8	1
Type of trauma* : imprisonment or hostage/abduction (<i>n</i>)	0	1	0	1
Type of trauma* : witnessing a traumatic event (<i>n</i>)	1	3	0	0
Type of trauma* : other trauma (<i>n</i>)	1	6	1	3
BDI <i>M (SD)</i>	3.0 (5.4)	28.7 (11.4)	32.2 (9.4)	24.7 (8.8)
PDS part 3 <i>M (SD)</i>	3.5 (1.5)	32.7 (1.5)	33.3 (1.7)	18.7 (1.4)
CTQ <i>M (SD)</i>	40.1 (3.1)	73.3 (3.1)	75.9 (3.7)	55.3 (3.0)
No Axis I DSM-IV Comorbidity <i>n (%)</i>	63 (100%)	12 (29.3%)	7 (23.3%)	19 (33.9%)
Major Depressive Disorder (<i>n</i>)	0	13	10	25
Substance Abuse (<i>n</i>)	0	4	4	4
Eating disorders (<i>n</i>)	0	10	11	10
Obsessive-Compulsive Disorder (<i>n</i>)	0	2	4	1
Social Phobia (<i>n</i>)	0	4	2	3
Panic Disorder (+/- Agoraphobia) (<i>n</i>)	0	1	5	5
Somatic Symptom Disorder (<i>n</i>)	0	2	1	0
No Axis II DSM-IV Comorbidity <i>n (%)</i>	63 (100%)	30 (73.2%)	21 (70%)	52 (92.9%)
Avoidant Personality Disorder (<i>n</i>)	0	7	6	2
Dependent Personality Disorder (<i>n</i>)	0	0	1	2
Obsessive-Compulsive Personality Disorder (<i>n</i>)	0	0	0	1
Paranoid Personality Disorder (<i>n</i>)	0	0	1	0
Unspecified Personality Disorder (<i>n</i>)	0	4	1	0

Note: HC = healthy controls; PTSD = Posttraumatic Stress Disorder; BPD = Borderline Personality Disorder; *M* = mean; *SD* = standard deviation; *according to PTSD-section of the German version of SCID I (Wittchen et al., 1997); multiple answers possible

Table 2: Means (Standard Deviations) for Emotions of the Test of Emotional Intelligence (TEMINT)* in Groups Based on MANOVA and Bonferroni-corrected Post Hoc Analysis

	HC <i>M (SD)</i>	PTSD without BPD <i>M (SD)</i>	PTSD with BPD <i>M (SD)</i>	BPD without PTSD <i>M (SD)</i>	<i>p</i> -value
Aversion	.52 (.02)	.62 (.02)	.54 (.03)	.53 (.02)	<i>p</i> = .008; -BPD+PTSD > +BPD-PTSD, -BPD+PTSD > HC
Anger	.26 (.02)	.36 (.03)	.26 (.03)	.25 (.02)	<i>p</i> = .014; -BPD+PTSD > +BPD-PTSD, -BPD+PTSD > HC
Fear	.39 (.02)	.49 (.03)	.41 (.03)	.38 (.02)	<i>p</i> = .009; -BPD+PTSD > +BPD-PTSD, -BPD+PTSD > HC
Sadness	.32 (.02)	.43 (.02)	.36 (.03)	.36 (.02)	<i>p</i> = .001; -BPD+PTSD > +BPD-PTSD, -BPD+PTSD > HC
Guilt	.49 (.02)	.61 (.03)	.63 (.03)	.53 (.02)	<i>p</i> = .000; -BPD+PTSD > HC, +BPD+PTSD > HC, +BPD+PTSD > +BPD-PTSD
Happiness	.03 (.01)	.1 (.02)	.06 (.02)	.05 (.01)	<i>p</i> = .004; -BPD+PTSD > HC
Affection	.44 (.03)	.56 (.04)	.54 (.04)	.46 (.03)	<i>p</i> = .022; -BPD+PTSD > HC
Unease	.68 (.04)	.72 (.04)	.69 (.05)	.68 (.04)	<i>p</i> = .888
Pride	.41 (.02)	.43 (.02)	.46 (.02)	.44 (.02)	<i>p</i> = .284
Surprise	.76 (.02)	.81 (.02)	.77 (.03)	.76 (.02)	<i>p</i> = .322

Note: HC = healthy controls; PTSD = Posttraumatic Stress Disorder; BPD = Borderline Personality Disorder; *M* = mean; *SD* = standard deviation; PTSD without BPD = -BPD+PTSD; PTSD with BPD = +BPD+PTSD; BPD without PTSD = +BPD-PTSD; *higher scores indicate lower emotional intelligence