Title

Multiple and interpersonal trauma are risk factors for both PTSD and Borderline Personality Disorder (BPD): A systematic review on the traumatic backgrounds and clinical characteristics of comorbid PTSD / BPD groups versus single disorder groups

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Abstract

Background: Both BPD and PTSD are associated with exposure to traumatic events and are highly comorbid. No review to date has addressed the clinical presentations and traumatic backgrounds associated with these disorders although this work is essential for the development of effective interventions.

Objectives: To systematically explore similarities and differences in traumatic history and clinical presentation in comorbid BPD and PTSD as compared to PTSD or BPD alone.

Method: The Web of Science, Cochrane Library, PsychInfo, Medline, and PILOTS databases were searched systematically. Eligible studies included adult populations, compared comorbid BPD/PTSD to a single disorder, and published in English.

Results: 10,147 cases across 33 studies were included; 2057 comorbid BPD/PTSD, 2648 BPD only, and 5442 PTSD only. The comorbid group overall reported greater exposure to multiple and interpersonal trauma and elevated emotion dysregulation compared to both single disorder groups. In terms of methodological quality, most papers achieved a Fair rating with improvements required in minimising bias through recruiting adequate and representative samples, and reporting on traumatic exposure.

Conclusion: Multiple and interpersonal trauma might have a unique role in the development of comorbid BPD/PTSD features, particularly so for emotion dysregulation. Future research is required to unravel the unique characteristics of interpersonal trauma that can generate BPD and PTSD symptoms.

Practitioner Points

- Practitioners should routinely assess for interpersonal trauma considering its impact

- Tackling emotional regulation difficulties might promote recovery from both PTSD and BPD symptoms
- Presence of self – injury might be used to discriminate between PTSD and BPD and offer suitable interventions

Introduction

Exposure to traumatic events is common, with epidemiological studies estimating that as many as 81-90% of the general population have experienced at least one such event (Frans et al., 2005; Kilpatrick et al., 2013). Such highly stressful experiences have been implicated as a risk factor for psychiatric impairment including mood disorders, psychosis, anxiety, addiction problems and eating disorders (D'Andrea et al., 2012). Two disorders particularly associated with a history of trauma and are often comorbid are those of Post-Traumatic Stress Disorder (PTSD) and Borderline Personality Disorder (BPD), and yet the relationship between these presentations is not well understood.

Individuals with BPD commonly present with a history of adversity, and several studies have demonstrated that the proportion of those with comorbid PTSD is relatively high, ranging from 25-55.9% in cross-sectional studies (Mueser et al., 1998; Zanarini et al., 1998; Zimmerman et al., 1999; Mcglashan et al., 2000; Yen, Shea & Battle, 2002; Golier et al., 2003; Grant et al., 2008). A 10-year longitudinal study on the rate of PTSD in BPD patients found that 87% of those with the comorbidity at baseline had remission of PTSD by follow-up; 40% of those in remission later developed a recurrence of PTSD; 27% who did not meet PTSD criteria at baseline developed a new onset of PTSD which is three to five times higher than the rate seen in similar studies on holocaust survivors and Vietnam veterans (Zanarini et al., 2011). This demonstrates firstly the strong overlap between the two disorders, yet the high PTSD remission rates and stability of BPD also points at their disparity.

The trauma trajectories that lead to each presentation and their overlap are not well understood. Traumatic events vary in the situation (accident vs interpersonal abuse), form (physical, sexual, emotional, neglect), age at which the individual was exposed, the number, frequency and severity of events, whether the perpetrator was a caregiver or a stranger, and are therefore challenging to quantify and capture trends in research. A development that highlights the importance of understanding the relationship between PTSD and BPD is the introduction of the Complex PTSD (CPTSD; WHO, 2018) construct, a diagnosis recently accepted into the International Classification of Diseases, 11th Edition (ICD-11) to describe a more severe response to trauma characterised by difficulties in emotion regulation, interpersonal relationships, and self-concept over and above the PTSD criteria. This has emerged as it was noted that survivors of particularly traumatic, repeated, and intense events such as childhood abuse or torture presented qualitatively differently to those with PTSD stemming from more discrete events (Cloitre, Garvert, Brewin, Bryant, & Maercker, 2013). However, these three areas of additional difficulty could overlap with those commonly seen in BPD. The high rates of comorbidity and shared clinical features have led to the hypothesis that CPTSD could be equivalent to BPD comorbid with PTSD, calling into question the clinical utility of having another diagnostic category. It has therefore become particularly important to differentiate factors that are attributable to long-term personality traits, and which have emerged as a result of trauma and are amenable to trauma-focused interventions.

The rates of PTSD may be higher in BPD than in the general population, however, previous research has demonstrated similar rates in other personality disorders (Golier et al., 2003; Berenbaum et al., 2008), with a meta-analysis reporting a higher prevalence of PTSD in paranoid and avoidant personality types than in BPD (Friborg et al., 2013). This weakens the argument that CPTSD represents comorbid BPD/PTSD as the same association is seen in other personality disorders that have difficulties beyond emotion regulation, interpersonal

relationships, and self-concept. Instead, it gives weight to the approach that people with personality disorders may be more vulnerable to being exposed to traumatic events and developing PTSD. Alternatively, PTSD and other psychopathologies including personality disorders share common vulnerability factors upon exposure to stress. It is important to remember that a large proportion of those with BPD do not develop PTSD following exposure to traumatic events, with one epidemiological study identifying that 31.6% had a comorbid PTSD, indicating that 68.4% did not (Grant et al., 2008). BPD is a disorder associated with traumatic histories like many psychopathologies, however this is not a prerequisite to its development. The factors that unite or differentiate these presentations are yet to be fully understood, however the overlapping clinical features has made it increasingly important for researchers and clinicians to be able to differentiate between these disorders for the purposes of diagnosis and treatment.

Individuals with BPD that develop comorbid PTSD from early adverse events or those encountered later in adulthood may present with a complex array of symptoms that are difficult to disentangle. For instance, emerging research suggests that emotion dysregulation in BPD may increase vulnerability to the development of PTSD due to greater appraisals of threat, diminished coping resources, and intense emotional responding peri-traumatically (Bardeen et al., 2013). Furthermore, the impulsivity seen in BPD may increase exposure to risky situations and the likelihood of encountering further traumatic events (Frias & Palma, 2015).

One avenue of disentangling the relationship between BPD and PTSD is to look at whether specific forms of childhood abuse and traumatic events can predict which individuals develop BPD. Several theories have attempted to explain the relationship of childhood abuse to the development of borderline features; one of the most influential has been by Linehan (1993) who posited that BPD stems from a biological predisposition to emotion dysregulation that interacts with an invalidating social rearing environment, i.e. one in which an individual's

emotional expressions are not treated as valid responses to events around them. There is emerging research into the impact of specific abuse forms that drive this invalidating environment, with a growing recognition of the specific roles of emotional abuse and neglect. Although individuals with BPD have been shown to report greater levels of childhood sexual abuse than other clinical groups, sexual abuse rarely occurs in isolation and is often in the context of broader parental neglect and emotional abuse (Kuo, Khoury, Metcalfe, Fitzpatrick, & Goodwill, 2015). A recent study that investigated the impact of specific and multiple forms of abuse on the development on BPD features in adolescence highlighted the role of emotional and sexual abuse over and above other trauma forms compared to other clinical groups (Infurna et al., 2015). The authors hypothesise that these particular interpersonal experiences may uniquely contribute to disrupting the development of healthy emotion regulation strategies. Therefore, it may be that certain forms of early abuse foster invalidating environments, which interact with a biological predisposition leading to the development of BPD. Although interpersonal trauma is understood to be common in these presentations, as yet there has been no review to systematically compare the specific traumatic experiences of PTSD and BPD which would inform the unique trajectories to these presentations.

The impact of comorbid PTSD in BPD is significant. Those with comorbid BPD/PTSD have been found to have greater functional impairment and a reduced response to BPD treatment (Barnicot & Priebe, 2013). It has been argued that emotion dysregulation in BPD can exacerbate self-injury as a form of coping with the additional distress of re-experiencing from a comorbid PTSD, increasing the severity of the clinical picture (Harned et al., 2010). Comorbid PTSD has also been identified as a predictor of suicide attempts in individuals with BPD, as has depression, substance use, dissociation, and emotion dysregulation (Wedig et al., 2012). The risks in self-harm and emotion dysregulation have often excluded individuals with BPD from evidence-based trauma-focused cognitive behavioural therapy (Tf-CBT) for PTSD,

and presence of comorbid PTSD has been shown to limit recovery in individuals with BPD receiving Dialectical Behavioural Therapy (DBT) for BPD (Harned et al., 2008). The comorbidity clearly accrues a great cost to individuals and their services. The associated difficulties of anxiety and mood problems, dissociation, substance use, self-harm, interpersonal difficulties and emotion regulation are commonly reported yet poorly understood.

The emerging focus on the relationship between BPD and PTSD requires an evidence-based understanding of these presentations, their associated traumatic events, and the common difficulties of the comorbidity to identify treatment targets and allow for confident differential diagnoses. To date there has been only one narrative review looking at the overlap between these disorders (Frias & Palma, 2015). This review was limited to two databases and focused largely on neuroanatomical and neuroendocrine correlates and treatment outcome. To the best of our knowledge, this is the first systematic review to explore trauma backgrounds and clinical characteristics that may overlap with or differentiate comorbid BPD/PTSD from the single disorders. We originally intended to include studies comparing ICD-11 CPTSD and BPD groups, however no such studies were identified and therefore the review focused on PTSD and BPD.

In this review, the following research questions will be addressed:

1) Are there differences in traumatic histories between the comorbid BPD/PTSD and single disorder groups?
2) Are there differences in clinical presentation, namely features of depression, anxiety, self-injury, dissociation, substance abuse, emotion dysregulation, self-concept and interpersonal difficulties, between the comorbid BPD/PTSD and single disorder groups?

Method

The review was developed and registered with Prospero (ID: CRD42017055277) prior to data extraction and was conducted in accordance with PRISMA guidelines (Preferred Reporting Items for Systematic Reviews and Meta-Analyses; Moher, Liberati, Tetzlaff, & Altman, 2009).

Search strategy

This review is based on a search of peer-reviewed articles published prior to June 2017. The search was repeated in May 2018 to screen for more recently published papers prior to completion. The search adhered to the three guidelines set by PRISMA:

i) The databases of Web of Science, Cochrane Library, Medline (Ovid), PsycINFO (Ovid), and PILOTS (Published International Literature on Traumatic Stress) were searched. The search terms for PTSD and Complex PTSD included: "PTSD OR posttrauma* OR post-trauma* OR maltreatment OR Compl* PTSD OR CPTSD OR DESNOS OR chronic abuse OR torture OR severe trauma OR prolonged trauma OR prolonged abuse OR chronic trauma OR disorder of extreme stress". These were combined with the search terms for BPD: "Borderline Personality OR BPD". The following filters were applied to each search: English language, human sample, published from 1992 (the conceptualization of CPTSD by Herman, 1992) to present.

ii) The reference lists of relevant papers and reviews were screened.

iii) A hand search of relevant journals including trauma-specific journals and journals in which multiple papers had been identified from.

Following the removal of duplicate papers, 1888 abstracts were screened in accordance to the following criteria: i) age of participants >18 and ii) assessed both BPD and PTSD using standardised measures. Studies were excluded if they were: i) unpublished dissertations/theses

ii) not empirical papers (e.g. reviews, book chapters), iii) not published in English, or iv) had no direct comparison between the clinical groups of interest (e.g. case studies, moderation analyses).

The inclusion criteria identified 248 articles for a full-text review. Of these, 215 were excluded due to:

i) Not directly comparing clinical groups of BPD and PTSD (n=165)

ii) Case studies (n=25)

iii) Discussion papers (n=15)

iv) Literature reviews (n=10)

This resulted in a total of 33 papers eligible for the current review. Figure 1 illustrates the article screening process. Data extraction and quality assessment methods can be found in Supplement I.

Figure 1 about here

Results

The sample characteristics and extracted findings from the 33 eligible papers are presented in Table 1 (In supplementary tables). The findings describe whether the comorbid group were significantly different to the comparison group(s) on the domains of interest. Further information on the assessment tools used to measure clinical characteristics can be found in Supplementary Material.

Sample characteristics

Sample size

A total of 10,147 cases across 33 studies were included in the present review; 2057 of these had comorbid BPD/PTSD, had 2648 BPD only, and 5442 had PTSD only. The sample

sizes of individuals with comorbid BPD/PTSD in the eligible studies ranged widely from 6 to 643, with an average of 60.5; s.d. = 138.3; median = 18 participants. Seven studies included PTSD-only control groups, these ranged in size from 18 to 3074, with an average of 456.0; s.d.= 973.4; median = 52.5. Sixteen studies included a BPD-only control group, these ranged in size from 6 to 1290, with an average of 98.1; s.d. = 255.4; median = 20. Five studies included both BPD- and PTSD-only control groups.

Age

Out of the three population studies (Connor, 2002; Pagura, 2010; Scheiderer, 2015) that reported age range, ages spanned over an average of 41.7 years. The broadest ranging sample was from 20-65+ (Scheiderer, 2015). The majority of studies (91.2%) presented the mean age of participants, with an overall average of 31.5 years; s.d. = 4.5; median = 30.72). The age of participants across the eligible studies therefore did not vary widely.

Gender

The studies overall included a female majority. The average percentage of females across the studies was 89.2%, s.d. = 20.9; median = 100%. Twenty-two (64.7%) studies included only females. One study (Frewen, 2014) was limited by recruiting from a female-only treatment program. Mauchnik (2010) and Sauer (2014) discuss sex differences in physiological emotional responding which could have confounded their experiment had they included males. Only one study employed an all-male sample and this was with veterans (Southwick, 2003).

Inclusion and exclusion criteria

Common exclusion criteria included a history of psychotic illness and/or current psychotic symptoms and this was employed by twenty-three studies (69.7%). Eighteen studies excluded those with recent or lifetime substance abuse (54.5%). Sixteen studies excluded a diagnosis of Bipolar Disorder (48.5%). Having an intellectual disability formed an exclusion

criterion for fourteen studies (42.4%). Eight studies (24.2%) required participants to be medication free for 1-4 weeks prior to the study. Four studies (12.1%) excluded comorbid depression, five excluded comorbid anorexia (15.2%), and four others (12.1%) excluded medical conditions. Four studies (12.1%) explicitly required participants to have experienced childhood or adulthood sexual abuse. Four studies (12.1%) had inclusion criteria of active self-injury or suicidality, whereas three studies excluded those with active suicidality (9.1%).

Methodological quality

Studies were assessed for their methodological quality regarding their strength in contributing to the question posited by this review, i.e. the quality of the assessment of baseline characteristics was evaluated and not the design of an intervention or experimental condition. The papers were evaluated for the degree of selection and measurement bias. Overall, two independent raters concluded that ten of the studies (30.3%) achieved a Good rating, twenty (60.6%) Fair, and three (9.1%) a Poor rating.

Overall, significant levels of selection and measurement bias were found in the included studies which limits the ability to draw conclusions and the clinical findings summarised below should be considered in this context. Further detail on these assessments can be found in Supplement IV.

Clinical findings

Interpersonal trauma history

In methodologically stronger studies that compared to a PTSD-only group, the comorbid group was found to have had greater exposure to emotional abuse (Heffernan, 2000), sexual abuse (Feeny, 2002; Pagura, 2010; Scheiderer, 2015; Heffernan, 2000) with one smaller study reporting no difference (Williams, 2017), and increased neglect (Pagura, 2010; Scheiderer, 2015) with one study finding no difference (Zlotnick, 2003). Some studies

evidenced that the comorbid group was exposed to interpersonal abuse at an earlier age than those with PTSD-only (Heffernan, 2000; Pagura, 2010). No studies found an increase in the PTSD-only group on any trauma history variable. There were mixed findings on physical abuse, with two stronger studies finding increased exposure in the comorbid group (Pagura, 2010; Scheiderer, 2015) and two smaller studies reporting no difference (Rüsch, 2011; Zlotnick, 2003).

Out of the twenty-seven studies that included a BPD-only comparison group, sixteen reported differences in traumatic exposure. The comorbid group again demonstrated greater traumatic exposure than the BPD-only group with four strong quality studies finding a higher number of total traumatic events in the comorbid group (Harned, 2010; Mauchnik, 2010; Pagura, 2010; Zlotnick, 2003), with three poorer quality studies with small samples finding no difference (Bruehl, 2013; Driessen, 2004; Wingenfeld, 2013). Two good quality studies identified increased emotional abuse (Frewen, 2014; Zlotnick, 2003); four good quality studies found increased physical abuse (Frewen, 2014; Pagura, 2010; Schiederer, 2015; Zlotnick, 2003) and three fair quality papers found no difference (Rüsch, 2011; Weniger, 2009; Wingenfeld, 2009); six mainly good quality studies found increased sexual abuse (Frewen, 2014; Mauchnik, 2010; Pagura, 2010 [repeated event]; Scheiderer, 2015; Weniger, 2009; Zlotnick, 2003), and two found no difference (Wingenfeld, 2009; Pagura, 2010 [single event]); and three stronger studies demonstrated increased neglect (Frewen, 2014; Pagura, 2010; Scheiderer, 2015) with two others finding no difference (Weniger, 2009; Zlotnick, 2003). Three studies identified no difference in witnessing violence (Harned, 2010; Pagura, 2010 [repeated event]; Wingenfeld, 2009) whereas two found an increase in the comorbid group (Pagura, 2010 [single event]; Scheiderer, 2015). One study found no difference in the age of exposure (Harned, 2010). No study found increased exposure in the BPD-only group compared to the comorbid group.

Overall, results from the higher quality studies indicate that the comorbid group was exposed to a greater number of interpersonal traumatic events than both the BPD-only and PTSD-only groups. Those with a comorbidity appear to have been multiply traumatised across a range of interpersonal trauma forms.

Self-injury

Compared to PTSD-only, four good quality studies (Heffernan, 2000; Pagura, 2010; Connor, 2002; Zlotnick, 2003) identified increased self-injury in the comorbid group and one study found no difference (Zlotnick, 2002). In studies that compared to a BPD-only group, a majority of seven studies (Barnicot, 2013; Boritz, 2016; Harned, 2010b; Rüsch, 2007; Sauer, 2014; Zlotnick, 2002; Zlotnick, 2003) found no difference between the groups on self-injurious behaviour, with one study (Pagura, 2010) reporting an increase in the comorbid group. Overall, these findings indicate that self-injurious behaviour is more associated with BPD presentations and does not appear to be impacted by a comorbid PTSD.

Interpersonal difficulties

In studies that included a PTSD-only comparison group, three studies (Heffernan, 2000; Scheiderer, 2015; Zlotnick, 2003) reported increased interpersonal difficulties in the comorbid group with three similar quality studies but with much smaller samples (Cloitre, 2001; Feeny, 2002; Zlotnick, 2002) finding no difference. Compared to BPD-only, three studies (Bolton, 2006; Harned, 2010; Zlotnick, 2002) found no difference and two similar quality studies (Scheiderer, 2015; Zlotnick, 2003) found an increase in the comorbid group. Overall, there were mixed findings with regard to interpersonal difficulties across these groups with similar quality studies using the same tool finding different results.

Emotion dysregulation

Four higher quality studies (Feeny, 2002; Heffernan, 2000; Scheiderer, 2015; Zlotnick, 2003) consistently found increased emotion dysregulation in the comorbid group compared to PTSD alone. In studies that included a BPD-only comparison group, six strong studies (Harned, 2010; Limberg, 2011; Sauer, 2014; Scheiderer, 2015; Scheiderer, 2016; Zlotnick, 2003) had a consensus of increased emotion dysregulation in the comorbid group compared to BPD-only, with three smaller studies (Bolton, 2006; Rüsch, 2007; Schmahl, 2009) reporting no difference. Taken together, the findings from higher quality studies indicate that emotion dysregulation is elevated in the comorbid group compared to both single disorder groups.

Depression

For depression, one strong study found an increase in the PTSD-only group compared to the comorbid group (Pagura, 2010) whereas two smaller and fair quality studies found no difference (Rüsch, 2011; Southwick, 2003). For self-reported depression symptoms, one study found an increase in the comorbid group (Williams, 2017) yet four studies found no difference (Heffernan, 2000; Rüsch, 2011; Cloitre, 2001; Feeny, 2002). Compared to BPD-only, three studies found increased depression diagnoses in the comorbid group (Limberg, 2011; Pagura, 2010; Sauer, 2014) whereas nine found no difference (Frewen, 2014; Harned, 2010; Harned, 2010b; Mauchnik, 2010; Rüsch, 2011; Barnicot, 2013; Boritz, 2016; Bruehl, 2013; Kraus, 2009). For self-reported depression, four mixed quality studies found an increase in the comorbidity (Bolton, 2006; Limberg, 2011; Sauer, 2014; Scheiderer, 2016) however eight found no difference (Driessen, 2004; Lange, 2005; Mauchnik, 2010; Rüsch, 2007; Rüsch, 2011; Weniger, 2009; Wingenfeld, 2009; Wingenfeld, 2013). Overall, there was no apparent difference in depression between the groups.

Anxiety

For anxiety disorders compared to PTSD-only, the comorbid group was found to have increased rates of diagnoses in one study (Pagura, 2010) and two smaller, fair quality studies found no difference (Rüsch, 2011; Southwick, 2003). For self-reported anxiety on the STAI, two studies identified increases in the comorbid group (Heffernan, 2000; Feeny, 2002) whereas two found no difference (Rüsch, 2011; Cloitre, 2001). Compared to BPD-only, the comorbid group had increased diagnoses of anxiety disorders in three good quality studies (Frewen, 2014; Harned, 2010; Pagura, 2010) and seven smaller studies found no difference (Rüsch, 2011; Barnicot, 2013; Boritz, 2016; Bruehl, 2013; Driessen, 2004; Harned, 2010b; Kraus, 2009). For self-reported anxiety there were mixed findings with two studies finding an increase (Bolton, 2006; Wingenfeld, 2009) and three stronger studies finding no difference (Mauchnik, 2010; Rüsch, 2007; Rüsch, 2011). Therefore, the collective results on anxiety are inconclusive.

Dissociation

On levels of dissociation compared to PTSD-only, one study found an increase in the comorbid group (Heffernan, 2000) and one found no difference (Zlotnick, 2003). Compared to BPD-only, four studies found an increase (Frewen, 2014; Sauer, 2014; Harned, 2010b; Niedtfeld, 2013), five studies found no difference (Driessen, 2004; Kraus, 2009; Limberg, 2011; Mauchnik, 2010; Zlotnick, 2003), and one weaker study found an increase in the BPD group (Ludascher, 2010). Again, these mixed findings are insufficient to draw conclusions about the nature of dissociation in comorbid BPD/PTSD.

Substance abuse

Compared to PTSD-only, substance abuse was found to be increased in the comorbid group by two studies (Connor, 2002 [drug use]; Pagura, 2010) with no difference reported in four studies (Connor, 2002 [alcohol]; Heffernan, 2000; Rüsch, 2011; Southwick, 2003). Six studies unanimously found no difference in substance abuse compared to the BPD-only group

(Barnicot, 2013; Frewen, 2014; Harned, 2010; Kraus, 2009; Pagura, 2010; Rüsch, 2011). Overall these results indicate that substance abuse may not be elevated in comorbid BPD/PTSD.

Discussion

The present review systematically identified and evaluated thirty-three studies that investigated the differences between those with comorbid BPD/PTSD and those with BPD or PTSD alone. Eligible studies were assessed for methodological quality and their findings were summarised in terms of traumatic histories and clinical presentations. The review firstly sought to understand whether there are differences in traumatic histories between the comorbid BPD/PTSD and single disorder groups. Higher quality studies suggest that individuals in the comorbid BPD/PTSD group had increased exposure to multiple, interpersonal traumatic events in both childhood and adulthood than either BPD or PTSD alone. Interpersonal trauma was a common risk factor for both conditions. The second aim was to investigate differences in clinical presentation, and the majority of studies indicated that the comorbid group presented with more severe emotion dysregulation, however this construct was measured through various methods (e.g. self-report and experimental paradigms) which cannot be reliably compared. Higher quality studies identified that self-injury was more attributed to the BPD groups and did not appear to be impacted by a comorbid PTSD, whereas findings on interpersonal problems, dissociation, and anxiety were inconclusive. Substance misuse and depression did not appear to be elevated in the comorbid group. In terms of study design and construct measurement, studies were found to vary widely and so these conclusions are to be interpreted cautiously. We discuss these findings with particular attention given to recommendations for future research that will help to further our understanding of these clinical groups.

Emotion dysregulation was found to be elevated in comorbid BPD/PTSD, indicating its role as a shared characteristic of the disorders. This finding is in line with work by Ford and Courtois (2014) who hypothesise that emotion dysregulation in BPD may increase the vulnerability of developing PTSD due to increased threat appraisals and reduced coping peri-traumatically. The impulsive risk-taking in BPD may also increase the risk of exposure to further traumatic events. This could help to explain why rates of PTSD are elevated in BPD compared to other clinical groups, however, this has not yet been applied to other personality disorders where PTSD is also elevated. There was also general consensus that self-injury is predominantly associated with BPD compared to PTSD or their comorbidity. This supports previous work demonstrating that emotion dysregulation in BPD is expressed through self-injury and suicidality due to general distress intolerance as opposed to a way of coping with PTSD symptoms (Cloitre et al., 2014). The comorbid group was exposed to higher rates of multiple and interpersonal trauma. Briere et al. (2010) found emotion dysregulation to mediate the relationship between multiple interpersonal trauma exposure and "dysfunctional avoidance" (defined as behaviours of self-injury, substance use, risky sexual behaviour, and dissociation). The present review supports the emerging theories that environments of interpersonal trauma impact upon the ability to regulate emotions. Poly-traumatisation, particularly exposure to interpersonal trauma, may be a risk factor for the development of comorbid BPD and PTSD.

The mechanisms by which interpersonal trauma may lead to these diverse clinical presentations is not yet fully understood. There is building evidence that environments of interpersonal trauma may diminish the ability to regulate emotions through the disruption of attachment relationships (Mikulincer, Shaver, & Soloman, 2015). One study (Oshri et al., 2015) identified emotional and sexual abuse as being specifically linked to an insecure adult attachment style, emotion dysregulation, and engagement in risk behaviours (substance abuse

and risky sexual behaviour) in a non-clinical sample. Environments of multiple interpersonal abuse appear to foster insecure attachment styles, disrupting the development of emotion regulation strategies.

The importance of attending to these trans-diagnostic features has been highlighted by the development of treatments for these groups. High levels of self-injury and emotion dysregulation have previously prevented individuals with BPD and PTSD from accessing trauma treatment. The recently developed Dialectical Behaviour Therapy with Prolonged Exposure protocol has been effectively applied in individuals with comorbid BPD/PTSD who are actively self-harming (Harned, Korslund, & Linehan, 2014) and demonstrates the ability to adapt and increase access for comorbid groups. It also points towards advocating for the sensitive assessment of PTSD in individuals presenting with emotion dysregulation as this feature could reflect underlying trauma. Developing trauma-informed treatments that account for trans-diagnostic features is crucial for the provision of care for those with debilitating comorbidities excluded from mainstream treatments.

The review permitted a summary of the quality of research to date in terms of study design and construct measurement, and studies were found to vary widely. A key limitation to summarising the evidence in this area is the wide range of measurement tools used to infer the same constructs. Most of the studies used validated tools whereas others inferred constructs such as emotion dysregulation or dissociation through the use of attentional interference or physiological measures within experimental paradigms. It will be important for future research to clearly define how these constructs are measured and determine whether experimental approaches are tapping into the same feature as the self-report measures in order to reliably compare findings.

Emotion dysregulation is a broad construct that can be expressed in many ways that may not yet be sensitively captured in research. In BPD, it can take the form of under-regulation characterised by difficulties in recovering from intense negative affect through rage and impulsivity whereas in post-traumatic syndromes it is often an over-regulation through attempts to hide, inhibit, or suppress emotional expression (Ford & Courtois, 2014). The collective studies in the present review identified increased emotion dysregulation, however, this was across a range of measurement methodologies. A more nuanced understanding of how emotion dysregulation, specifically over- and under-regulation, presents across these groups would be an important way to build on the research thus far.

The review also attempted to report on negative self-concept, a feature of Disturbances in Self Organisation that forms part of the CPTSD diagnostic criteria in ICD-11. However, only three studies in the review included a measure of self-concept and these measures were each tapping into different aspects of the self-concept (anxiety-proneness, guilt proneness, and negative cognitions) and it was not possible to amalgamate their findings. Further attention to self-concept will be important in future research aiming to understand the relationships between trauma, BPD, PTSD, and CPTSD. In particular, reporting on specific BPD characteristics such as identity disturbance rather than BPD scale total in order to differentiate from negative self-concept as conceptualised in CPTSD would provide insights into how self-concept is affected in these presentations.

Many studies did not assess trauma histories or limited their assessment to sexual abuse or childhood events. For example, one study (Wingenfeld, 2009) did not screen for events but asked participants to report one traumatic event that had “current relevance”. Stringent exclusion criteria were commonly employed, with most studies excluding those with substance misuse and self-harm, features commonly seen in BPD and PTSD (Buckholdt et al., 2015). Therefore, the heterogeneity and scope of assessment methods in the literature so far limits the

generalisability of the results and our understanding of these client groups. The methodological quality of studies was found to vary widely with a minority of studies achieving a "Good" rating; there were high levels of selection and measurement bias within the data. Many studies introduced bias by recruiting self-referrals from multiple sources and not using validated tools.

The majority of studies recruited female-only populations and this has significant implications for the generalisability of the findings. Previous research on gender differences have identified women with BPD are more likely to have comorbid PTSD, eating disorders, and identity disturbance, whereas men with BPD are more likely to have comorbid SUD or another personality disorder (Johnson et al., 2003). The investigation of whether findings on clinical presentations hold across male populations, for instance levels of substance misuse and trauma histories, will be an important avenue for future research to ensure these groups are represented and evidence-based treatments are available.

The review included a range of study designs, which allowed for a comprehensive overview of the field, however led to great heterogeneity in the results. Focusing the review on a particular study design such as treatment trials or experimental paradigms may have increased the ability to draw conclusions. The exclusion criteria also introduced limitations to the review; studies were not included if they were unpublished dissertations, not in peer-reviewed journals, or not in English.

Although firm conclusions cannot be drawn regarding the clinical findings due to the heterogeneous samples and measurement methods, the directions for meaningful future research can now be outlined. Stronger studies methodologically included more detailed information on the traumatic backgrounds of their samples. One study broadly assessed the presence of "childhood adversity" (Connor, 2002) and many did not assess traumatic history at all. Moving forward it will be important for studies to assess not only the type of traumatic

event but also the severity, frequency, age of onset, nature of the perpetrator (i.e. relative or non-relative), and time since onset. This will provide a more nuanced understanding of the types of factors that lead to these overlapping presentations. Where trauma history was presented, studies described clinical features for the whole group. More studies where clinical features are presented separately for each specific trauma type and severity are needed. For instance, Oshri et al., (2015) found differences in emotion dysregulation relating to emotional and sexual, but not verbal abuse. This provides a critical window into the types of environments that lead to these difficulties and underpin the formulations that guide interventions.

Considering the finding that multiple trauma appears to play an important role in the comorbidity of BPD/PTSD, research now needs to direct focus specifically onto the impact of multiple and interpersonal trauma. There are findings from a U.S. population study that women with multiple offenders were found to have higher rates of additional traumas than those of chronic abuse from one perpetrator (Casey & Nurius, 2005). This group also reported greater levels of PTSD, depression, substance abuse, and poorer physical health than those from a single incident or ongoing abuse from the same perpetrator. There appear to be important differences in clinical presentations stemming from multiple trauma that need further investigation.

Many of the included studies had small sample sizes and uneven comparison groups highlighting the importance of recruiting sufficient numbers in order to effectively compare these important characteristics. Many reports of no differences between groups were being discussed as attributable to a lack of power. Findings on interpersonal difficulties, anxiety, and dissociation were inconclusive and further work needs to be done on these areas as well. Furthermore, the use of gold standard assessments and clinical interviews are recommended for the reliable evaluation of clinical characteristics that would promote consistency in this research field.

Included studies in the present review predominantly used clinical populations with high variations in severity, comorbidity, impairment, and often employed strict exclusion criteria. Further research building on the community and population-based studies would allow for an understanding of the impact of different types and severities of trauma on emotion regulation, subclinical PTSD symptoms and personality characteristics. This would help to inform the trajectories for those at the more severe clinical level. Research so far has primarily relied on cross-sectional, retrospective reporting of trauma, and the area is now developed enough to design comprehensive, longitudinal studies that monitor the impact of interpersonal and multiple trauma on clinical features over time and in response to evidence-based treatments.

Reviewing the evidence on comorbid BPD/PTSD is important to contextualise the emerging understanding of Complex PTSD as a new diagnosis describing difficulties in interpersonal relationships, emotion regulation, and self-concept in addition to PTSD criteria. The conceptual closeness of these difficulties to BPD has led to discussions that Complex PTSD reflects BPD comorbid with PTSD. The current review has highlighted emotion dysregulation as a feature possibly relating to the shared trauma background of these groups. An important consideration of the research on clinical populations in this field to date is the likelihood of individuals having been diagnosed with BPD, or comorbid BPD/PTSD, rather than as having Complex PTSD that might better describe their difficulties (Herman, 1992). Population-based research on these characteristics is needed to delineate these features and provide clearer differential diagnoses.

It is concluded that multiple, interpersonal trauma is integral in the co-occurance between BPD and PTSD and the creation of emotion dysregulation, a common feature of both PTSD and BPD. The review has also highlighted the importance of minimising selection bias, using consistent assessment methodology, as well as the need to represent male populations in

this research area. Developing the field in line with these recommendations will enable our understanding of these presentations and formulating effective treatment directions in the context of the ICD-11 Complex PTSD diagnosis.

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