THE RELATIONSHIP BETWEEN BORDERLINE PERSONALITY FEATURES AND DEPRESSIVE AND GENERALIZED ANXIETY SYMPTOMS IN A SAMPLE OF TREATMENT-SEEKING PERINATAL WOMEN

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Title: The Relationship Between Borderline Personality Features and Depressive and Generalized Anxiety Symptoms in a Sample of Treatment-Seeking Perinatal Women

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Lay Abstract

The perinatal period (pregnancy until 12 months postpartum) represents a time of heightened vulnerability to poor mental health. Prior research has mainly focused on perinatal depression and anxiety, while perinatal personality disorders have received comparably less attention. Borderline personality disorder (BPD) is a severe psychiatric disorder associated with diminished ability to regulate emotions, disturbances in self-image, troubled interpersonal relationships, and impulsive behaviour. This thesis investigated the relationship between self-reported borderline personality features (BPF) and depressive and generalized anxiety symptoms in a sample of perinatal women seeking treatment at a psychiatric clinic. We hope that this research sheds light on the nature of perinatal BPD, as well as its associations with other mental health conditions, to improve both immediate and multi-generational maternal and infant well-being.

Abstract

Introduction: Borderline personality disorder (BPD) is a severe psychiatric disorder characterized by emotion dysregulation, interpersonal dysfunction, and poor impulse control. Little research has investigated BPD in the context of major life events. The perinatal period (pregnancy until 12 months postpartum) is an important milestone that involves major role transitions and novel challenges. This thesis examined the associations between borderline personality features (BPF) and depressive and generalized anxiety symptoms in a sample of treatment-seeking perinatal women.

Methods: 74 perinatal women were recruited from the Women's Health Concerns Clinic (WHCC) at St. Joseph's Healthcare Hamilton, Canada, and enrolled in the WHCC Registry study. Participants were sent online intake questionnaires to collect data about demographic, personality, and other psychosocial variables. They also completed three self-report mental health measures: the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD), the Edinburgh Postnatal Depression Scale (EPDS), and the Generalized Anxiety Disorder Scale (GAD-7). Logistic regression was used to determine whether a positive MSI-BPD screen (score ≥ 7) was associated with a higher likelihood of screening positive on the EPDS or GAD-7 (score ≥ 13).

Results: A positive screen on the MSI-BPD was significantly associated with an almost eighteen-fold increase in the odds of screening positive on the EPDS in our treatment-seeking perinatal sample (OR 17.84, 95% CI[2.11, 218.80], $p<0.05$). A positive screen on the MSI-BPD was not associated with higher odds of screening positive on the GAD-7, rather only childhood trauma and a positive screen on the EPDS emerged as significant predictor variables. Our findings may reflect

the greater symptomatic overlap observed between BPD and perinatal depression as well as the comparatively lower comorbidity observed between GAD and BPD in non-perinatal research.

Conclusions and Future Directions: The use of self-report measures, low statistical power, and a treatment-seeking sample are limitations to consider when interpreting our findings. To our knowledge, this research study offers one of the first explorations into the relationship between BPD and generalized anxiety symptoms during the perinatal period. Future research should aim to better characterize perinatal BPD and investigate its relationship with other mental health conditions.

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Figures and Tables

CHAPTER 2

CHAPTER 3

List of Abbreviations

BPD: Borderline Personality Disorder
BPF: Borderline Personality Features
CLPS: Collaborative Longitudinal Personality Study
CTQ: Childhood Trauma Questionnaire
EPDS: Edinburgh Postnatal Depression Scale
GAD: Generalized Anxiety Disorder
GAD-7: Generalized Anxiety Disorder Scale
MBU: Mother and Baby Unit
MSAD: McLean Study of Adult Development
MSI-BPD: McLean Screening Instrument for Borderline Personality Disorder
PD: Personality Disorder
PTSD: Post-Traumatic Stress Disorder
TIPI: Ten Item Personality Inventory
WHCC: Women's Health Concerns Clinic

Declaration of Academic Achievement

The present thesis is composed of one systematic review and one original research study in Chapters 2 and 3, respectively. Regarding the review, Dr. Taiane de Azevedo Cardoso, Nirushi Kuhathasan, and I were responsible for designing the study and conducting the searches. Nirushi Kuhathasan and I screened the studies for inclusion, extracted the data, and completed the quality assessment. Dr. Taiane de Azevedo Cardoso provided a third opinion whenever there was a conflict and assisted in the interpretation of the data. I wrote the initial manuscript, which was then revised by Nirushi Kuhathasan, Dr. Taiane de Azevedo Cardoso, and Dr. Benicio N. Frey.

The original research study in Chapter 3 was a sub-study under the Women's Health Concerns Clinic (WHCC) Registry. The WHCC Registry was designed and implemented onto REDCap prior to my arrival as a graduate student. The original principal investigators for this project were: Dr. Benicio N. Frey, Dr. Rafael H. Candiago, Sawayra Owais, Dr. Ryan J. Van Lieshout, and Dr. Luciano Minuzzi. Once I began my graduate work, I was responsible for independently managing the WHCC Registry, though I received periodic assistance from Dana Waldern during the first few months. As the lead graduate student on this project, I recruited participants through flyers and consent to contact forms that were forwarded to me by Tesla Purtell at the WHCC. I independently reviewed the study consent forms with prospective participants and administered REDCap questionnaires on a scheduled basis. I also designed and wrote ethics amendments for the WHCC Registry (i.e., for online consent, the addition of new questionnaires, etc). I was responsible for processing and interpreting the data for the research study and would like to thank Dr. Anastasiya Slyepchenko for her assistance with the statistical analysis.

Overall, I was responsible for independently writing the initial versions of all chapters of this thesis. I would like to thank Dr. Benicio N. Frey, Dr. Taiane de Azevedo Cardoso, and Dr. Anastasiya Slyepchenko for reviewing all the chapters of this work and for sharing their detailed feedback.

Chapter 1: Introduction

Borderline Personality Disorder

Borderline personality disorder (BPD) is a severe psychiatric disorder that is marked primarily by affective and interpersonal instability (American Psychiatric Association (APA), 2013). It is estimated that BPD affects 2.7% of the general population, 10% of psychiatric outpatients, and 15 to 25% of psychiatric inpatients, making it the most observed personality disorder (PD) in clinical samples (Trull et al. 2010; Leichsenring et al. 2011). BPD carries a substantial economic burden, as individuals with this disorder utilize more psychiatric and non-psychiatric treatment services compared to individuals with mood and anxiety disorders, as well as other PDs (Ansell et al. 2007). For instance, a study by Soeteman et al. (2008) reported the total mean medical costs of individuals with PDs in the Netherlands as €11,126 per patient, with the total mean cost of BPD being higher than most other PDs (Soeteman et al. 2008). Another study found that the mean saved costs for treating BPD amounted to $2987.82 USD per patient per year, showcasing the economic importance of addressing this disorder (Meuldijk et al. 2017).

BPD is formally recognized within the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a Cluster B PD (APA, 2013). To obtain a diagnosis, individuals must meet five of the following nine diagnostic criteria: extreme fear of abandonment, unstable and intense interpersonal relationships, identity disturbance, self-destructive impulsivity, recurrent suicidal behaviour and/or self-harm, affective lability, chronic feelings of emptiness, inappropriate and intense anger, and transient stress-related paranoid ideation and/or severe dissociative symptoms (APA, 2013).

In the past, the etiology of BPD has received considerable attention and has pointed toward there being a significant genetic component to BPD (Amad et al. 2014; Distel et al. 2008). Heritability estimates in the literature range from 40 to 60% (Amad et al. 2014), and a study by Distel et al. (2008) found that BPD features were substantially influenced by both additive genetic factors (42%), as well as unique environmental factors (58%; Distel et al. 2008). Additionally, work by Links et al. (1998) indicated that BPD is more common among first-degree relatives of individuals with the disorder (Links et al. 1998). Abnormal serotonergic functioning has also been implicated in BPD, especially given the involvement of the serotonin transporter gene in suicide, impulsive behaviour, and affective instability (Ni et al. 2006).

Perhaps the most discussed risk factor for BPD is childhood abuse, as adverse childhood experiences are highly common among individuals with this disorder. Approximately 40% to 71% of patients with BPD report childhood or adolescence sexual abuse, and across multiple PD diagnoses, BPD is most strongly associated with childhood abuse (Zanarini, 2000; Battle et al. 2004). Interestingly, despite the overwhelming presence of these traumatic events in BPD, some adults with a history of childhood abuse do not go on to develop significant psychopathology. This has led to a consensus that childhood abuse is neither a sufficient nor necessary risk factor for BPD (Fruzzetti et al. 2005). However, it is a critical part of the clinical picture, given its association with more severe BPD symptomatology and increased suicidality (Soloff et al. 2002).

As BPD causes significant vocational disability, both low socioeconomic status (SES) and low education have been linked to the disorder (Cohen et al. 2008). In a ten-year longitudinal study, individuals with BPD were found to be less likely to and slower to transition into a higher-

income group compared to participants with other PDs (Niesten et al. 2016). The importance of early life events was reiterated through this study, as findings showed that childhood abuse was linked with a higher likelihood of having a lower income, while years of education and higher IQ increased the likelihood of having a high income (Niesten et al. 2016).

As in the case of other PDs, personality traits have naturally been implicated in BPD. Neuroticism has been proposed as the core personality trait involved in this disorder, though others from the Five Factor Model (FFM: openness to experience, conscientiousness, extraversion, and agreeableness) have also shown importance (Widiger et al. 2018; Costa & McCrae, 1990; Distel et al. 2009). For example, an analysis by Distel et al. (2009) indicated that all five FFM traits significantly predicted self-reported BPD scores and that a combination of high neuroticism and low agreeableness accounted for the greatest variance in scores (Distel et al. 2009). This result has been bolstered by longitudinal findings that show that a decrease in BPD symptomatology is accompanied by decreasing neuroticism as well as increasing agreeableness and conscientiousness (Wright et al. 2015).

Two large prospective studies, the McLean Study of Adult Development (MSAD) and the Collaborative Longitudinal Personality Study (CLPS), offer a wealth of information regarding trajectories of BPD (Biskin et al. 2015). They have helped dispel the long-held pessimism surrounding the course of the disorder and have provided hope that individuals with BPD can experience improvement in their symptoms (Biskin et al. 2015). Across ten years of follow-up, the MSAD and CLPS have reported that 88% and 85% of patients achieve remission, respectively (Zanarini et al. 2006; Gunderson et al. 2011). However, not all patients remit simultaneously;

several factors, including younger age, absence of childhood sexual abuse, low neuroticism, and high agreeableness, are associated with an earlier time to remission (Zanarini et al. 2006). Other work has also proposed that BPD symptoms may be divided into subgroups that have different courses of illness (Zanarini et al. 2007). The first group, temperamental symptoms, encompasses symptoms such as depression, general impulsivity, intolerance of aloneness, and abandonment concerns (Hopwood, Donnellan, & Zanarini, 2010). The second group, acute symptoms, includes symptoms such as affective instability, quasi-psychotic thoughts, self-mutilation, and turbulent relationships (Hopwood, Donnellan, & Zanarini, 2010). Research has suggested that these symptom groups show different patterns of stability over time, with one study reporting that 20 to 40% of BPD patients who endorsed temperamental symptoms at baseline continued to have them at a 10-year follow-up point, whereas only around 15% of patients with acute symptoms at baseline retained them at the same follow-up (Zanarini et al. 2007). One explanation for these findings is that acute symptoms are reactions to the environment that remit over time, while temperamental symptoms are deeper personality traits and tendencies that characterize BPD and thus exhibit greater stability (Zanarini et al. 2007).

Regarding mortality, BPD is characterized by a risk eight-fold higher than that of the general population (Kjær et al. 2020). Even in comparison to personality-disordered individuals, a substantially greater number of those with BPD die of both suicide and non-suicide causes (Temes et al. 2019). Longitudinal research has shown mixed findings regarding suicidality in BPD (Kjær et al. 2020; Wedig et al. 2012). One study by Wedig et al. (2012) reported that the prevalence rates of suicide attempts and self-harm showed more than a 70% decrease between baseline and the 16-year follow up point, encouraging optimism regarding the course of suicidality in BPD (Wedig et

al. 2012). However, a nationwide study by Kjær et al. (2020) found that while suicide was the leading cause of death among younger individuals with BPD aged 15 to 29 years, suicidality rates only peaked in the 40 to 49 year age group (Kjær et al. 2020). This higher suicide rate among older individuals with BPD has been found in other research and may be explained by greater disappointment surrounding failed treatments and persistent BPD symptoms that cause individuals in this age group to feel helpless and overwhelmed (Kjær et al. 2020; Paris and Zweig-Frank, 2001; Paris, 2003). Risk factors for suicide attempts in BPD include self-harm, diagnosis of major depression, substance use disorder, severe dissociation, and completion of suicide by a caregiver (Wedig et al. 2012). With respect to specific BPD criteria, identity disturbance, chronic feelings of emptiness, and frantic efforts to avoid abandonment have been linked to an increased risk of suicide (Yen et al. 2021).

While BPD during general adulthood has been studied well, the presentation and course of this disorder during major life events, specifically the perinatal period, have failed to receive comparable attention (Kouppis et al. 2020). The perinatal period, which spans pregnancy until twelve months postpartum, is a time of great upheaval and change. Expecting women and new mothers undergo numerous biological, psychological, and lifestyle changes that prepare them for the challenging yet rewarding experiences of childbirth and motherhood. Understanding BPD within a perinatal context is essential for multiple reasons. First, perinatal BPD has been linked to a wide range of negative outcomes for maternal and offspring well-being (Nagel et al. 2021; Pare-Miron et al. 2016; Blankley et al. 2015; Eyden et al. 2016). Mothers with BPD display higher rates of unplanned pregnancy and are more likely to use substances during pregnancy (Nagel et al. 2021). They are also at greater risk for many health conditions, including gestational diabetes,

premature rupture of membranes, and chorioamnionitis (Pare-Miron et al. 2016). With regards to offspring, maternal BPD has been associated with preterm birth, lower Apgar scores, and special care nursery referral (Blankley et al. 2015), in addition to internalizing and externalizing problems, depression, and BPD symptoms in children and adolescents (Eyden et al. 2016). Troublingly, multiple studies have also found that maternal BPD significantly increases the risk of childhood protective services involvement, suggesting that this disorder has an impact on parenting capacity (Blankley et al. 2015; Nagel et al. 2021).

Second, as BPD is primarily characterized by severe difficulties in forming and maintaining healthy relationships, motherhood may be particularly challenging for affected women to navigate (Newman et al. 2005). Indeed, research has shown that mothers with BPD are less sensitive and structured in their interactions with their infant, reporting lower levels of satisfaction and lower feelings of competency, in addition to more distress (Newman et al. 2007). Mothers with BPD also make more errors in inferring their infant's mental states, and their infants show less interest and eagerness in interacting with their mothers (Marcoux et al. 2017; Newman et al. 2007). Studying BPD during the perinatal period is imperative to better understand the disorder and support mothers with personality disturbance in their journey through motherhood.

Third, in non-perinatal populations, BPD shows high comorbidity with mood and anxiety disorders (Grant et al. 2008). It has been estimated that 75% and 74.2% of individuals with a lifetime BPD diagnosis will meet criteria for a lifetime depressive disorder and anxiety disorder, respectively (Grant et al. 2008). This comorbidity is particularly relevant in the context of the perinatal period, as this is a high-risk period when women are vulnerable to developing anxiety

and depressive symptoms (Ross et al. 2006; Gaynes et al. 2005). Indeed, perinatal mental health conditions are the most common complication of childbearing, with untreated mood and anxiety disorders costing $14 billion dollars in the United States alone (Howard et al. 2020; Luca et al. 2020). Given that a strong connection between BPD and depression and anxiety has been established outside of the perinatal period, it follows that BPD should be investigated within the perinatal period when these comorbid conditions are highly prevalent. The following sections will provide an overview of perinatal depression and anxiety and their relationship with BPD.

Perinatal Depression

Major depressive disorder (MDD) is a psychiatric disorder characterized by a consistently depressed mood and loss of interest or pleasure over at least a two-week period (APA, 2013). MDD also includes symptoms such as fatigue, weight loss, sleep disturbance, feelings of worthlessness, psychomotor agitation, difficulty concentrating, and recurrent thoughts of death (APA, 2013). Conferring substantial impairment across multiple areas of functioning, MDD is a highly debilitating disorder that affects 264 million people worldwide (APA, 2013). After adolescence, females are at greater risk for MDD compared to males, and this risk is further exacerbated during the perinatal period (APA, 2013).

Perinatal depression is recognized in the DSM-5 under a “peripartum onset” specifier for MDD, which refers to a depressive episode onset during pregnancy or within the first four weeks postpartum (APA, 2013). However, many experts agree that the first year after delivery is a period of risk, thus perinatal depression is often operationalized as depression anytime during pregnancy until 12 months postpartum (Gaynes et al. 2005). Though perinatal depression is highly similar to

MDD, it often involves symptoms that are specifically related to the infant and motherhood. For instance, women with perinatal depression may suffer from constant doubts regarding their parenting capacity and fear their inability to establish an emotional attachment with their infant (National Institute of Mental Health, 2020). It is estimated that 8.5 to 11.0% of women experience depression during pregnancy, while 6.5 to 12.9% of women experience depression during postpartum (Gaynes et al. 2005).

Regarding risk factors, research has frequently found a link between a history of psychopathology and perinatal depression. A prospective longitudinal study by Martini et al. (2015) showed that the strongest predictors of depressive disorders during the perinatal period were anxiety and depressive disorders before pregnancy, while another study by Silverman et al. (2018) found that women with a history of depression had 21 times the risk of developing postpartum depression compared to women without such history (Martini et al. 2005; Silverman et al. 2017). Additionally, psychiatric disorders during pregnancy, as well as familial history of psychopathology, have also been associated with postpartum depression (Josefsson et al. 2002, Boyce et al. 2003; Kimmel et al. 2015).

Demographic and psychosocial factors have been implicated as well, with studies finding that young age, low income and low educational attainment, poor social support, and low-quality marital relations are all risk factors for perinatal depression (Leigh & Milgrom, 2008; Qi et al. 2021; Robertson et al. 2003). A history of childhood trauma has also been reported as an important risk factor, with a study by Lara et al. (2015) finding that women with a history of childhood sexual

abuse (CSA) and multiple abuses were 2.60 and 3 times as likely to develop antenatal depressive symptoms (Lara et al. 2015; Meltzer-Brody et al. 2013).

In addition to these factors, personality traits, particularly neuroticism, have been linked to perinatal depression. High neuroticism has been identified as a risk factor for both antenatal and postpartum depression separately (Bunevicius et al. 2009; Verkerk et al. 2005). A one year follow-up study by Verkerk et al. (2005) showed that a combination of high neuroticism and high introversion emerged as an independent predictor of postpartum depression in the first year after delivery (Verkerk et al. 2005). This finding remained significant even after controlling for antenatal depression, suggesting that personality traits may place individuals at additional risk for postpartum depression over and above their psychiatric history. Across the perinatal period, Podolska et al. (2010) conducted a cross-sectional study and found that higher neuroticism significantly increased the likelihood of depressive symptoms during the perinatal period (Podolska et al. 2010). Interestingly, extraversion, openness to experience, high agreeableness, and conscientiousness were associated with a lower risk of depression in pregnant participants, however, no factors other than neuroticism were associated with depressive symptoms in postpartum participants (Podolska et al. 2010).

While personality traits are not directly equivalent to psychopathology, certain personality profiles may render individuals more vulnerable to developing poor mental health. An interesting hypothesis by Meuti et al. (2014) proposed that personality traits may underlie depressive symptoms that present during the perinatal period, representing the "vulnerability mechanism [by which] the pathology itself is established, thus determining the clinical presentation, course, and

response to treatment" (Meuti et al. 2014, p. 2). In their study of perinatal women with depression, a hierarchical cluster analysis was conducted using Minnesota Multiphasic Personality Inventory-2 scores and three clusters were identified based on personality organization: psychasthenic, defensive, and dysphoric. The last cluster of women described as dysphoric comprised about 14% of the sample and had the most elevated personality profile, with depressive features accompanied by anger, hostility, distrust, and interpersonal sensitivity; this group also had the highest mean EPDS score (Meuti et al. 2014). Interestingly, the authors highlighted that the combination of traits displayed by this group bore great resemblance to the typical personality profile found in individuals with BPD (Meuti et al. 2014).

As described earlier, non-perinatal research has shown that BPD is highly comorbid with mood disorders (Grant et al. 2008). Though work in the perinatal literature is limited, a few studies have suggested that a similarly close relationship may exist between BPD and perinatal depression. For instance, di Giacomo et al. (2020) assessed a sample of pregnant women who scored 12 or more on the EPDS and found that 37.1% had BPD (di Giacomo et al. 2020). In the postpartum period, Apter et al. (2012) found that twice as many depressed mothers in their sample met criteria for a PD compared to non-depressed mothers. Cluster B disorders, and BPD specifically, were the most observed PDs (Apter et al. 2012). Findings from the current literature on perinatal BPD extend support for Meuti et al.'s (2004) hypothesis that personality dysfunction could constitute a vulnerability to depressive symptoms during pregnancy or postpartum. However, scarce literature has specifically addressed the relationship between perinatal BPD and perinatal depression, and to our knowledge, no work has investigated whether individuals with either condition are at greater risk for the other.

Perinatal Anxiety

Perinatal anxiety has been investigated relatively less widely, though estimates suggest that its prevalence is at least as common as, if not more common than, perinatal depression (Green et al. 2015; Ross et al. 2006). Research has shown that the prevalence of at least one anxiety disorder during the perinatal period is 20.7%, and specifically, GAD has been suggested as the most common anxiety disorder at this time (Fawcett et al. 2019; Ross et al. 2006).

In the DSM-5, GAD is operationalized as a psychiatric disorder where excessive anxiety and worry toward many events or activities are present (APA, 2013). This anxiety is challenging to control and must last for at least 6 months, causing significant impairment and occurring alongside three or more of the following symptoms: restlessness, fatigue, trouble concentrating, irritability, muscle tension, and sleep problems (APA, 2013). In community samples, the 12-month prevalence of GAD is approximately 2.9%, and like depression, females are twice as likely to have GAD compared to males (APA, 2013). The higher risk that women already face may be exacerbated during the stressful and demanding times of pregnancy and postpartum. It has been estimated that the prevalence of GAD is 8.5% during pregnancy and between 4.4 and 8.2% during postpartum, with a systematic review proposing that GAD may be more common during the perinatal period than at other times in a woman's life (Ross et al. 2006). Compared to non-perinatal women, perinatal women with GAD appear to have a narrower range of worries that are predominantly targeted toward parenting and the well-being of offspring (Goldfinger et al. 2019).

Multiple factors have been found to increase the risk of anxiety during the perinatal period, specifically a history of psychopathology (Bayrampour et al. 2016; Dennis et al. 2016). Research

has shown that a history of mental health issues is associated with greater risk of both perinatal anxiety and depression (Bayrampour et al. 2016). Furthermore, Dennis et al. (2016) found that a history of psychopathology and anxiety at 1 week postpartum were associated with having continued anxiety at 8 weeks postpartum, suggesting that anxiety experienced earlier in the perinatal period has implications for the later months (Dennis et al. 2016).

Multiple demographic factors have also been linked with a greater risk of perinatal anxiety. A systematic review by Leach et al. (2017) found that younger age, being unpartnered, and having lower education were risk factors for perinatal anxiety (Leach et al. 2017). Socioeconomic status was also a risk factor, such that women of lower SES were more likely to experience elevated levels of anxiety (Leach et al. 2017). Indeed, these women may experience more worries about making ends meet during the psychologically and financially demanding time of pregnancy and childbirth, and thus may be more prone to developing symptoms of anxiety. Research on parity has shown mixed findings, with some studies proposing that first-time mothers are more likely to be anxious, while others posit that mothers with more than one child are at greater risk (Leach et al. 2017; Adewuya et al. 2006). Various studies have also identified stressful life events, poor social support, and childhood maltreatment as risk factors for perinatal anxiety (Leach et al. 2017; Bayrampour et al. 2016; Choi et al. 2016).

Little research has investigated personality traits in relation to perinatal anxiety. One longitudinal study showed that higher neuroticism, lower extraversion, and lower conscientiousness were associated with antenatal anxiety (Peñacoba-Puente et al. 2016), while another reported a link between high neuroticism and anxiety during pregnancy and postpartum

(van Bussel et al. 2009). As neuroticism consistently emerges as a significant predictor across studies, more research is needed to investigate the relationship between perinatal anxiety and personality factors. Personality disorders are also of interest, specifically BPD, as non-perinatal research has highlighted that personality profiles of this disorder are similar to those observed in perinatally anxious women (Wright et al. 2015; Peñacoba-Puente et al. 2016). For instance, Wright et al. (2015) found that BPD symptoms were strongly associated with neuroticism, agreeableness, and conscientiousness. Though personality profiles do not necessarily indicate the presence of a PD, it should be noted that the observed similarities call into question whether comorbidity exists between perinatal anxiety and BPD.

Given that recent work has pointed toward a connection between perinatal depression and BPD, perinatal anxiety should be investigated as well, as previous research has supported the presence of a strong relationship between BPD and non-perinatal anxiety. For instance, in a large national study of more than 34, 000 adults, Grant et al. (2008) found that 74.2% of individuals with BPD met criteria for a lifetime anxiety disorder, and this rate increased to more than 80% when only females were considered (Grant et al. 2008). As there appears to be a high degree of comorbidity between BPD and anxiety disorders, it is probable that BPD and perinatal anxiety, specifically GAD, share a relationship as well. However, there are few investigations on this topic, and thus further work is required to understand whether BPD and generalized anxiety during the perinatal period are related.

Summary

In sum, despite there being a dearth of research on perinatal BPD, existing work emphasizes the importance of further investigating this topic. Moreover, findings from non-perinatal research encourage exploration into the relationships that perinatal BPD may have with other conditions that are common during pregnancy and postpartum, such as depression and anxiety. While greater efforts directed toward the presentation, course, and comorbidities of perinatal BPD are vital, the first step to stimulating research interest and improving current understanding is determining how common this pathology is during pregnancy and postpartum. The following thesis was conducted to investigate the relationships between borderline personality features (BPF), depression, and generalized anxiety during the perinatal period. The term BPF refers to symptoms of BPD, as measured by self-report or clinician interviews, when the full criteria for BPD may or may not be met. First, in order to synthesize current literature, a systematic review was undertaken in Chapter 2 to assess the prevalence of perinatal BPF and BPD. To extend these findings, an original research study was conducted in Chapter 3 to explore the relationship between BPF and perinatal depressive and generalized anxiety symptoms in a sample of treatment-seeking perinatal women. Lastly, Chapter 4 includes a discussion of the entire thesis and implications for future research.

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Chapter 2: The Prevalence of Borderline Personality Features and Borderline Personality Disorder During The Perinatal Period: A Systematic Review

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Abstract

Purpose: Borderline personality disorder (BPD) is a psychiatric disorder marked by severe affective instability and poor interpersonal functioning. Existing literature has highlighted that perinatal individuals with BPD are at greater risk for a wide range of adverse physiological and psychosocial outcomes; however, to date, no systematic review has addressed this topic. The objective of this review was to assess the prevalence of BPD and BPF during the perinatal period.

Methods: A systematic review was conducted by searching three databases (PubMed, PsycINFO, and Embase) on April 6th, 2021. Research articles and conference abstracts that evaluated BPF or BPD in pregnant, postpartum, or mixed perinatal populations were included.

Results: Sixteen publications met inclusion criteria (n=14 research articles, n=2 conference abstracts), ten of which included clinical samples. Prevalence rates of BPF, as measured through self-report or clinician interview, ranged from 6.9% to 34% during pregnancy and 9.7% at postpartum. Prevalence rates of BPD ranged from 0.4% to 37.1% during pregnancy and 1.7% to 23.7% at postpartum. Two studies did not distinguish between pregnant and postpartum participants and reported BPD prevalence rates of 0.3% and 35.2% across the perinatal period.

Conclusion: This review suggests an elevated prevalence of borderline personality pathology among clinical perinatal samples. Appropriate validated screening methods are encouraged in order to identify and treat BPD as early as possible.

Keywords

Borderline personality disorder, borderline personality features, perinatal period, pregnancy, postpartum.

Introduction

Borderline personality disorder (BPD) is characterized by dysfunction in various areas, including emotion regulation, interpersonal relationships, and impulsive behaviour (APA, 2013; Reichl & Kaess, 2021). BPD has a mean societal cost greater than almost all other personality disorders (PD, Soeteman et al. 2008), which may be partly attributed to the high rates of behavioral instability and suicidality observed in this disorder (Black et al. 2004; Reichl & Kaess, 2021). Moreover, BPD is associated with substantial physical and mental impairment, and in particular, women with BPD report greater levels of disability in comparison to men with BPD (Grant et al. 2008).

While BPD is debilitating under typical circumstances, it may be especially troubling during pregnancy and motherhood. The perinatal period, defined as pregnancy until the first twelve months postpartum, marks the arrival of numerous biological, psychological, and lifestyle changes. Accompanied by high levels of stress and unfamiliar situations that are challenging to navigate, the perinatal period is a time of vulnerability for women as they are at greater risk for experiencing poor mental health (Howard & Khalifeh, 2020; Kendell et al. 1987; Munk-Olsen et al. 2016). While perinatal depression and perinatal anxiety have received considerably more attention from researchers (Gaynes et al. 2005; Leach et al. 2017), BPD has been relatively poorly investigated in this context (Blankley et al. 2015).

Recent work striving to fill the research gap has found that BPD may be both common during the perinatal period and associated with many adverse outcomes for mothers and babies (Blankley et al. 2015; Pare-Miron et al. 2014). Studies have reported that women with BPD display

poor levels of engagement with antenatal care services and are more likely to use substances during pregnancy (Blankley et al. 2015; Nagel et al. 2021). Additionally, perinatal women with BPD appear to be at greater risk for gestational diabetes, chorioamnionitis, and preterm birth, and are also six times as likely to have child safety services involvement (Pare-Miron et al. 2014; Nagel et al. 2021). The breadth and severity of these outcomes necessitate a dedicated focus on BPD in the context of pregnancy and postpartum.

Little is currently known about the prevalence of borderline personality features (BPF) and BPD during the perinatal period. This information is essential to better understand the burden of the disease and its pathology in this population, as well as to encourage further research on perinatal BPD. The objective of this systematic review is to describe the prevalence of BPF and BPD in pregnant, postpartum, and mixed perinatal populations.

Methods

The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines were utilized for the present review (Moher et al. 2009). This review was registered on PROSPERO under the ID CRD42021249096.

Search Strategy

A literature search with no year or language restrictions was conducted on April 6th, 2021, using the following databases: PubMed, PsycInfo, and Embase. Our search strategy was defined as: (“perinatal” OR “peripartum” OR “pregnan*” OR “antenatal” OR “antepartum” OR "prenatal"

OR “postpartum” OR “postnatal”) AND (“borderline pathology” OR “borderline personality” OR “borderline features” OR “borderline traits” OR “borderline personality disorder” OR “BPD”).

Inclusion and Exclusion Criteria

The present review used the following inclusion criteria: a) primary research studies involving perinatal participants (pregnant and up to 12 months postpartum) who were assessed for BPF or BPD, and b) the evaluation of BPF and/or BPD through self-report, semi-structured interview and/or clinician diagnosis. The exclusion criteria were: a) reviews, b) case reports, c) interventional studies, and d) non-primary research articles, with the exception of conference abstracts. Abstracts were included based on Scherer & Saldanha (2019), who recommended that abstracts should be considered for reviews when available data is scarce or conflicting (Scherer & Saldanha, 2019). Given that there is currently a lack of perinatal BPD research, we decided to consider conference abstracts to account for as much existing data as possible and to provide a comprehensive overview of the literature. All abstract authors were contacted to inquire if the data was published in a peer-reviewed full journal article elsewhere. If no response was provided or a full-text publication was not available, the original abstracts meeting our inclusion criteria were included in the present review. To clarify, these abstracts were only included if they featured the relevant data to calculate prevalence (the number of cases and the total number of individuals).

Screening

All titles and abstracts obtained in the initial search were independently reviewed by DP and NK. At the next stage, full-texts were reviewed by DP and NK. Any disagreements were resolved by consulting and discussing with a third reviewer (TAC).

Quality Assessment

Each paper was independently assessed by two blinded reviewers (DP and NK) using the Joanna Briggs Institute Checklist for Prevalence Studies (Munn et al. 2015). Discrepancies were resolved by seeking a third opinion (TAC) and discussing the assessment as a group.

Data extraction

Two researchers (DP and NK) were involved in the data extraction process. The following information was extracted from each publication: authorship, year, the country where the study took place, publication type, study design, sample size and population, type of borderline personality pathology assessed, method of assessment, and main results.

When borderline pathology other than the formal clinical diagnosis of BPD was assessed (i.e. traits, features, disturbance, symptoms), findings were reported using the original terminology provided by the authors. However, in the results and discussion sections, these results are all grouped under the umbrella term "borderline personality features".

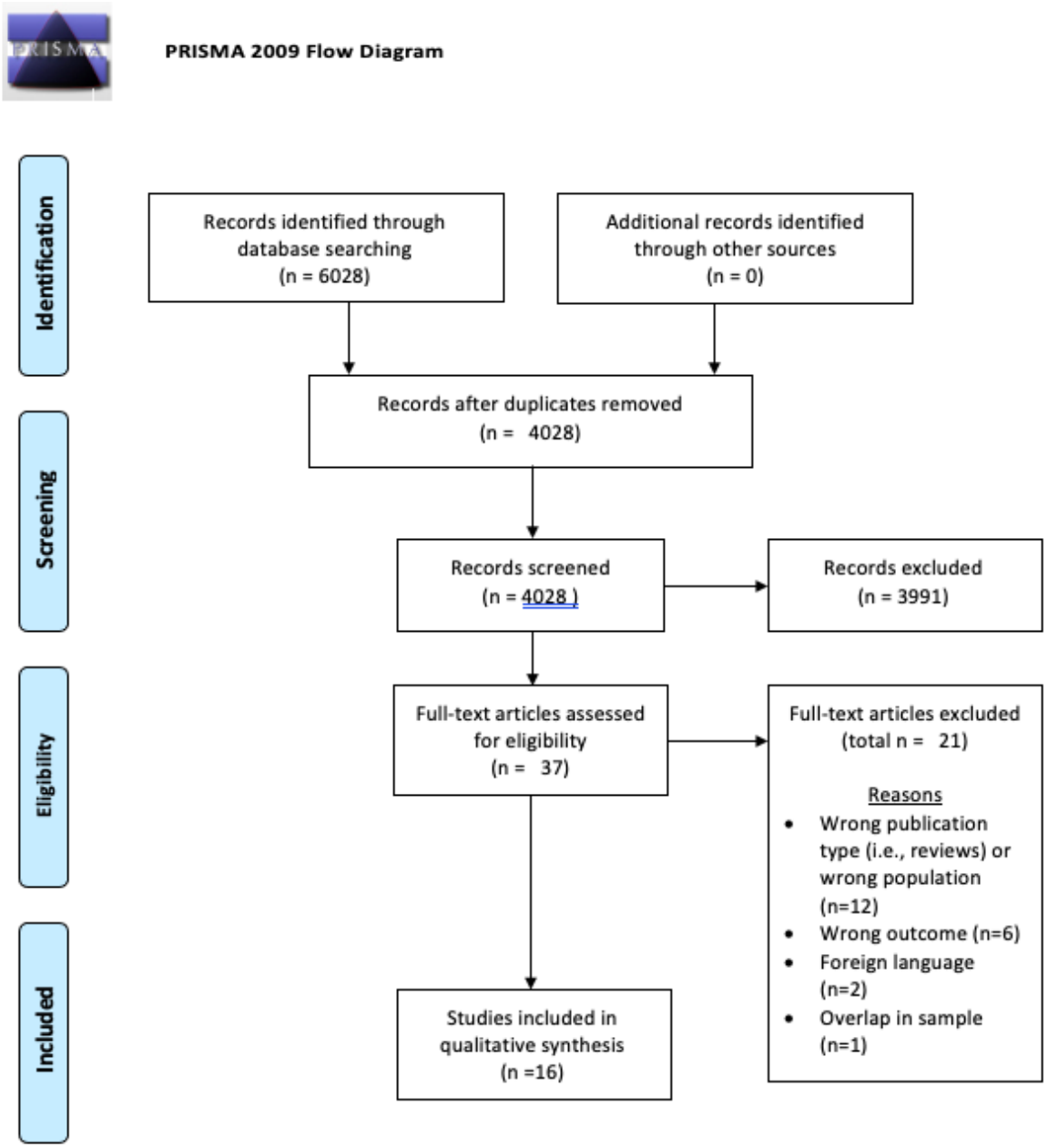
Results

Selection of Studies

The primary search yielded 6028 records and after duplicates were removed, 4028 remained. These records were then screened based on title and abstract and 3991 were excluded. The full-texts of 37 records were assessed, leading to the exclusion of 21 records for the following reasons: wrong publication type, wrong population, wrong outcome, or foreign language. Additionally, one author confirmed that two papers from the full-text stage had overlapping

samples, in which case the paper with the larger sample size was chosen (Nagel et al. 2021). Thus, a total of 16 publications fulfilled inclusion criteria and were included in the present review (Figure 1).

Figure 1: PRISMA flow diagram of the study selection process, outlining the number of studies at each stage: identification, screening, eligibility, and inclusion (Moher et al. 2009).



Study and Participant Characteristics

Fourteen articles and two abstracts were included (Table 1). These data were published between 2007 and 2021, showcasing the recency of research efforts to evaluate perinatal borderline personality pathology. More than half the studies took place in Australia and the remaining were conducted in the USA, UK, Norway, and Italy. Most study designs were cross-sectional, although four longitudinal studies were also included.

Nine publications considered borderline personality pathology in pregnant samples while five considered borderline personality pathology in postpartum samples. Two publications did not separate pregnant and postpartum participants and instead assessed perinatal samples altogether. Three publications only considered BPF, which included terminology such as "traits", "disturbance", and "symptoms", while ten publications only evaluated BPD as a diagnosis. Three publications considered the full spectrum of borderline personality pathology (both features and diagnosis).

Assessment of Borderline Personality Pathology

Ten publications assessed borderline personality pathology using DSM-IV, DSM-IV-TR, or DSM-5 criteria. Of these, four utilized the SCID-II (Howard et al. 2018; Bye et al. 2020; di Giacomo et al. 2020; Maiorani et al. 2019), though it should be noted that one study used a self-administered version (Maiorani et al. 2019). Two publications used the International Classification of Diseases (ICD) coding (ICD-9-CM: Pare-Miron et al. 2016; ICD-10: Oyewopo et al. 2016). One study used both the DSM-IV and ICD-10 (Harvey & Pun, 2007).

While the Diagnostic Interview for Borderlines – Revised is considered the "gold standard" for assessing BPD, there appears to be no such standard for measuring BPF through self-report (Biskin & Paris, 2012). Thus, three studies in the present review each used different self-report measures to determine the presence of BPF; Kurdziel-Adams et al. (2020) employed the Personality Assessment Inventory Borderline Features Scale (PAI-BOR), Haabrekke et al. (2015) used Millon's Clinical Multiaxial Inventory - III (MCMI-III), and Lin et al. (2019) used the Borderline Symptom Short List Version (BSL-23). Additionally, Whalen et al. (2020) asked participants to self-report any previous or current mental health diagnoses.

Table 1: Characteristics of the studies included in the present systematic review, including author and year, publication type, country, study design, sample size and population, type of borderline personality pathology assessed, assessment method, and results.

Author & Year	Publication Type	Country	Study Design	Sample Size and Population	Pathology Assessed	Assessment Method	Results
Kurdziel-Adams et al. (2020)	Journal Article	United States	Cross-Sectional	n= 93 women, 18 years or older and in their second trimester or beyond, in a high-risk pregnancy clinic (n=55 opioid users, 38= high-risk due to medical factors)	BPF	PAI-BOR, clinical cut-off of ≥38 suggestive of a clinical diagnosis of BPD	34% of women scored at or above cut-off for BPD.
Howard et al. (2018)	Journal Article	United Kingdom	Cross-Sectional	n= 545 pregnant women attending initial antenatal appointment, 16 years or older (258 Whooley negative, 287 Whooley positive)	BPD	SCID-II	0.7% (95%CI 0-1) of women had BPD (according to SCID); 4% of women who were Whooley positive, 0.4% of women who were Whooley negative. Whooley questions: a) "During the past month, have you often been bothered by feeling down, depressed, or hopeless?" and b) "During the past month, have you often been bothered by little interest or pleasure in doing things?")

Bye et al. (2020)	Journal Article	United Kingdom	Cross-Sectional	n= 543 pregnant women, 16 years or older, attending an antenatal booking appointment	BPD	SCID-II	13 (2%) of the sample met criteria for BPD. 19% of women with current ED), 2% of non-current ED; 5% of lifetime ED, 2% of non-lifetime ED.
Pare-Miron et al. (2016)	Journal Article	United States	Retrospective Population-Based Cohort	n= 8,487,892 births between 2003 and 2012	BPD	ICD-9-CM	989 mothers had a diagnosis of BPD, leading to an overall incidence of 11.65 in 100, 000 births over 10 years.
Haabrekke et al. (2015)	Journal Article	Norway	Prospective Longitudinal	n= 18 pregnant women in residential treatment institutions for substance abuse, n= 22 pregnant women from psychiatric outpatient treatment, and n=30 pregnant women from well-baby clinic (total n= 70)	Borderline Personality Traits	MCMI-III borderline trait subscales (score of 75 or greater is considered clinically significant)	23.8% of mothers in the psychiatric group had clinically significant borderline symptoms. No mothers in the other two groups reported clinically significant borderline symptoms.
Nair et al. (2010)	Journal Article	Australia	Cross-Sectional	n=149 consecutive admissions to a specialist inpatient parent-infant psychiatric service during a 2-year period (Jan 2006-Dec 2007)	BPD	DSM-IV-TR	22 out of 149 (14.8%) mothers had a BPD diagnosis.
Harvey & Pun (2007)	Journal Article	Australia	Cross-Sectional	n= 102 pregnant women referred to the consultation liaison psychiatry service from 2003 to 2005, due to positive EPDS scores	BPD	DSM-IV criteria and ICD-10 coding	One woman (2%) had borderline personality disorder.
Nagel et al. (2021)	Journal Article	Australia	Cross-Sectional	n= 318 pregnant women referred to the perinatal consultation-liaison psychiatry service	BPD and Borderline Personality Traits	DSM-5	32 women (10.1%) had BPD and 62 (19.5%) had clinically significant borderline personality traits, meaning that they had two or more traits present. These traits were most frequently affective instability and inappropriate intense anger.
di Giacomo et al. (2020)	Correspondence Article	Italy	Cross-Sectional	n= 150 pregnant women referred to the perinatal psychiatric department for evaluation	BPD	DSM-IV and SCID-II	30 women (20%) had BPD Among those scoring above cut-off on the EPDS (n=62), 23 (37.1%) women had BPD.

Maiorani et al. (2019)	Journal Article	Italy	Prospective Longitudinal	n= 500 pregnant women participating in a preparatory course for child delivery	Borderline Personality Disturbance	SCID-II for DSM-IV	18.7% women had above threshold borderline personality disturbance, while 8.0% endorsed borderline personality disturbance below threshold. 73.3% of women had an absence of borderline personality disturbance.
Oyewopo et al. (2016)	Conference Abstract	Australia	Retrospective Case Note Review	n= 105 women assessed and managed by a perinatal psychiatric team	BPD	ICD-10	37 (35.2%) women were identified as having BPD.
Blankley et al. (2015)	Journal Article	Australia	Retrospective Case Review	n= 824 women referred to a perinatal mental health service	BPD	DSM-IV	42 women (5.7%) were identified as having BPD. This group represented 0.3% of all women receiving obstetric care during this period.
Brown et al. (2014)	Conference Abstract	Australia	Cross-Sectional	n= 813 women who were inpatients at a mother and baby unit between 2007 and 2013	/BPD and Borderline Personality Traits	DSM-IV	115 (14.1%) patients were identified as having a BPD diagnosis or borderline personality traits.
Whalen et al. (2020)	Journal Article	Australia	Longitudinal (as part of larger RCT)	n= 120 postpartum women 18 years or older, with an asthma diagnosis and symptoms and/or treatment for asthma in the last 12 months	BPD	Self-reported mental health diagnosis	2 participants out of 120 (1.7%) had diagnoses of both depression and BPD.
Yelland et al. (2015)	Journal Article	Australia	Cross-Sectional	n= 117 consecutive admissions to a mother and baby unit, n=93 with infants 0-12 months	BPD and Borderline Personality Traits	DSM-IV	22 (23.7%) women had a diagnosis of BPD and 9 (9.7%) women had a diagnosis of BPD traits.
Lin et al. (2019)	Journal Article	United States	Cross-Sectional	n= 162 pregnant women, 26-40 weeks gestation, approached at obstetrics and gynecology clinics	BPD	BSL-23 (total scores were calculated by averaging the score on all items: 0–1.49: nonsignificant symptoms, 1.5–1.99: subclinical symptoms, and 2–4: clinically significant symptoms)	2.5% had sub-clinical BPD symptoms and 4.4% had clinical BPD symptoms (6.9% in total).

Legend: BPD: Borderline Personality Disorder; BPF: Borderline Personality Features; SCID: Structured Clinical Interview for the DSM-5; EPDS: Edinburgh Postnatal Depression Scale; ED: Eating Disorder; DSM: Diagnostic and Statistical Manual of Mental Disorders; ICD: International Classification of Diseases; MCMI-III: Millon's Clinical Multiaxial Inventory- III; PAI-BOR: Personality Assessment Inventory - Borderline Features Scale; RCT: Randomized Controlled Trial; BSL-23: Borderline Symptom Short-List Version.

Evidence for Borderline Personality Features During Pregnancy

Five studies assessed BPF during pregnancy (Maiorani et al. 2019; Lin et al. 2019; Nagel et al. 2021; Haabrekke et al. 2015; Kurdziel-Adams et al. 2020). **Maiorani et al. (2019)** conducted a prospective longitudinal study with a sample of 500 pregnant women participating in a child delivery preparatory course. Using a self-administered SCID-II assessment for the DSM-IV, 8.0% of women reported subclinical borderline personality disturbance and 18.7% of women reported clinical borderline personality disturbance (total: 26.7%; Maiorani et al. 2019). This value may have been influenced by the use of a self-report SCID-II, as opposed to a clinician-administered version. Another study by **Lin et al.** (2019) assessed a sample of 162 pregnant women attending obstetrics and gynecology clinics using the Borderline Symptom List Short Version (BSL-23). The authors averaged scores across all items to calculate a total score, which was interpreted using the following definitions: 0–1.49: non-significant symptoms, 1.5–1.99: subclinical symptoms, and 2–4: clinically significant symptoms (Lin et al. 2019). Results indicated that 2.5% and 4.4% (total: 6.9%) of participants had subclinical and clinical BPD symptoms, respectively (Lin et al. 2019).

Nagel et al. (2021) assessed DSM-5 borderline personality traits in a sample of 318 pregnant women who were referred to a perinatal psychiatric team and found that 62 (19.5%) participants endorsed two or more borderline personality traits (Nagel et al. 2021). The most commonly present borderline personality traits were affective instability and inappropriate and intense anger (Nagel et al. 2021).

Kurdziel-Adams et al. (2020) cross-sectionally investigated BPF in a sample of 93 women attending a high-risk pregnancy clinic, 55 of whom were opioid users and 38 of whom were considered high-risk due to medical factors. Using the PAI-BOR and a cut-off of 38 or higher to signify "a clinical diagnosis of BPD", results indicated that 34% of the sample scored at or above cut-off for BPD (Kurdziel-Adams et al. 2020). **Haabrekke et al.** (2015) conducted a prospective longitudinal study and assessed borderline symptoms in three groups of pregnant women (n=70) at baseline: 18 who were receiving treatment for substance abuse, 22 who were psychiatric outpatients, and 30 who were recruited from a well-baby clinic. Millon's Clinical Multiaxial Inventory - III (MCMI-III) borderline trait subscale was used and a score of 75 or greater was deemed clinically significant. Of the mothers in the psychiatric outpatient group, 23.8% were determined as having clinical borderline symptoms (Haabrekke et al. 2015). No mothers in the substance abuse or well-baby clinic group were found to have borderline symptoms that reached clinical significance (Haabrekke et al. 2015).

Across the five studies, overall prevalence rates of BPF during pregnancy ranged from 6.9% to 34%. Though the highest prevalence rate was observed in a sample of women with high-risk pregnancies, some of whom were opioid users, it should be noted that **Maiorani et al. (2019)** found a comparable rate (26.7%) even among pregnant women attending a general delivery course.

Evidence for Borderline Personality Disorder Diagnosis During Pregnancy

Five studies assessed the prevalence of BPD diagnosis during pregnancy (Howard et al. 2018; di Giacomo et al. 2020; Harvey & Pun, 2007; Nagel et al. 2021; Bye et al. 2020). **Howard et al.** (2018) conducted a cross-sectional study with a sample of 545 pregnant women attending

their initial antenatal appointment. Participants were asked the two Whooley questions ("During the past month, have you often been bothered by feeling down, depressed, or hopeless?" and "During the past month, have you often been bothered by little interest or pleasure in doing things?") and the sample was almost evenly composed of women who screened positive (W+) and negative (W-) on this brief assessment. BPD diagnoses were made based on the SCID-II PD module for BPD and results showed that 0.7% (95% CI 0-1) of women met criteria for the disorder (Howard et al. 2018). Specifically, 4% of women who were W+ and 0.4% of women who were W- received a diagnosis (Howard et al. 2018).

An article by **di Giacomo et al. (2020)** shared results of a study involving 150 pregnant women referred for psychiatric assessment. In this sample, 30 (20%) women had a diagnosis of BPD, and among those who screened positive on the EPDS (n=62 of 150), 23 (37.1%) had a diagnosis of BPD (di Giacomo et al. 2020). **Harvey & Pun** (2007) also cross-sectionally assessed 102 pregnant women who were referred for psychiatric treatment due to a clinically significant EPDS score of 12 or greater. BPD diagnoses were made according to DSM-IV criteria and the ICD-10. One woman (2%) in the sample was found to have BPD (Harvey & Pun, 2007). More recently, **Nagel et al.** (2021) assessed 318 pregnant women who were referred to a psychiatric service and results showed that, according to DSM-5 criteria, 32 (10.1%) women met criteria for BPD.

Bye et al. (2020) cross-sectionally investigated 543 pregnant women from the same sample from **Howard et al.** (2018), with a special focus on eating disorders (EDs). In this study, the

prevalence of BPD was found to be much higher among women with a current ED (19%) or a lifetime ED (5%), when compared to those without a current or lifetime ED (2%; Bye et al. 2020).

Overall, prevalence rates of BPD during pregnancy ranged from 0.4% to 37.1% among these samples. The lowest prevalence rate was observed among a sample of women who screened negative (W-) on the Whooley questions, whereas the highest rate was observed among a clinical group of women with a positive EPDS screen and referral for psychiatric assessment.

Of note, one large retrospective population-based cohort study by **Pare-Miron et al.** (2016) investigated the incidence of BPD. The ICD-9 codes of almost 8.5 million births from the Healthcare Cost and Utilization Project Nationwide Inpatient Sample that occurred between 2003 and 2012 were assessed. The authors found that 989 mothers had a BPD diagnosis, resulting in an incidence of 11.65 BPD cases in 100,000 births (Pare-Miron et al. 2016).

Evidence for Borderline Personality Features During Postpartum

Only one study by **Yelland et al.** (2015) reported on borderline personality traits during the postpartum period. The study included 117 consecutive admissions to a mother and baby unit (MBU), and of these, 93 mothers were within the present definition of the postpartum period (having infants between 0 to 12 months of age). A clinical interview with a psychiatrist was used to assess borderline personality traits according to DSM-IV criteria. Nine (9.7%) women were identified as having BPD traits, despite not meeting full criteria for BPD (Yelland et al. 2015).

Evidence for Borderline Personality Disorder Diagnosis During Postpartum

Three studies investigated the prevalence of BPD diagnosis during the postpartum period (Yelland et al. 2015; Nair et al. 2010; Whalen et al. 2020). The aforementioned study by **Yelland et al.** (2015) also assessed BPD in their sample of women admitted to an MBU. Through a clinical interview, DSM-IV diagnoses were made and results showed that 22 (23.7%) women met criteria for BPD (Yelland et al. 2015). Similarly, **Nair et al.** (2010) evaluated 149 consecutive admissions to a specialist inpatient parent-infant psychiatric service. Assessment using DSM-IV-TR criteria indicated that 22 (14.8%) mothers had a BPD diagnosis (Nair et al. 2010).

Whalen et al. (2020) conducted an observational study as part of a larger randomized controlled trial related to asthma management for pregnant women. Participants were pregnant women with an asthma diagnosis who were later assessed again at 6 weeks postpartum. At the postpartum time point, investigators asked participants to declare any previous or current presence of a mental health condition. Out of 120 participants, 2 (1.7%) reported a diagnosis of both depression and BPD together.

Of note, one conference abstract published by **Brown et al.** (2014) did not separate the prevalence of BPD diagnosis and BPF in their findings. This abstract was based upon a cross-sectional study where the diagnoses of 813 inpatients at an MBU were reviewed. The diagnoses were made based on DSM-IV criteria. Results indicated that 115 (14.1%) patients had a BPD diagnosis or borderline personality traits (Brown et al. 2014).

Overall, prevalence rates of BPD ranged from 1.7% to 23.7% among postpartum samples. The lowest prevalence rate was observed in a group of asthmatic mothers who self-reported previous diagnoses, whereas the highest prevalence rate was found in a psychiatric sample of mothers with severe mental health concerns (Whalen et al. 2020; Yelland et al. 2015).

Evidence for Borderline Personality Diagnosis Across The Perinatal Period

Two publications assessed BPD across the perinatal period, without specifically discriminating between pregnancy and postpartum. **Blankley et al.** (2015) conducted a retrospective case review of 824 women referred to a perinatal mental health service. Diagnoses were determined using DSM-IV criteria, with results showing that 42 (5.7%) of women had BPD. Overall, women with BPD represented 0.3% of all women receiving obstetric care during that time period (Blankley et al. 2015). A conference abstract published by **Oyewopo et al.** (2016) shared findings from another retrospective case review of 105 women assessed and managed by a perinatal psychiatric team after being referred from either the community or hospital obstetric departments. BPD diagnoses were coded using the ICD-10 and 37 (35.2%) women were identified as having BPD (Oyewopo et al. 2016). Though little detail is provided regarding the methods of Oyewopo et al. (2016), the difference in their prevalence rate compared to that of Blankley et al.'s (2015) may be attributed to the former study's focus on patients who were "assessed and managed" by a psychiatric team and the latter study's evaluation of patients who received a referral. This implies that Oyewopo et al. (2016) may have included more severe cases of BPD, where individuals needed professional management, potentially explaining the higher prevalence rate in their sample.

Quality Assessment

The quality of each publication was assessed using the Joanna Briggs Institute (JBI) Checklist for Prevalence Studies (Table 2; Munn et al. 2015). The scores ranged from 2 to 8, with a mean of 5 points. All publications, except one, failed to include a sample size calculation and many did not appropriately discuss non-response rates, which could have led to biased prevalence estimates.

Table 2: Quality assessment ratings of the studies included, based on the Joanna Briggs Institute (JBI) Checklist for Prevalence Studies.

	JBI Prevalence Checklist Criteria									
Author	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**Total Score**
Kurdziel-Adams et al.	0	0	0	1	0	1	1	1	0	4
Howard et al.	1	1	1	1	0	1	1	1	1	8
Bye et al.	1	1	0	1	0	1	1	1	1	7
Pare-Miron et al.	1	1	0	1	0	1	1	1	0	6
Haabrekke et al.	0	0	0	1	0	1	0	1	0	3
Nair et al.	1	1	0	1	0	1	1	1	0	6
Harvey & Pun	1	1	0	0	0	1	1	1	0	5
Nagel et al.	1	1	0	1	0	1	1	1	0	6
di Giacomo et al.	1	1	0	0	0	1	1	1	0	5
Maiorani et al.	0	0	0	1	0	1	0	1	0	3
Oyewopo et al.	1	1	0	0	0	1	1	1	0	5
Blankley et al.	1	1	0	1	0	1	1	1	0	6
Brown et al.	0	1	0	0	0	1	0	1	0	3
Whalen et al.	0	0	0	1	0	0	0	1	0	2
Yelland et al.	0	1	0	1	0	1	1	1	0	5
Lin et al.	0	0	0	1	1	1	1	1	1	6

Legend: JBI Items

1. Was the sample frame appropriate to address the target population?
2. Were study participants sampled in an appropriate way?
3. Was the sample size adequate?
4. Were the study subjects and the setting described in detail?
5. Was the data analysis conducted with sufficient coverage of the identified sample?
6. Were valid methods used for the identification of the condition?
7. Was the condition measured in a standard, reliable way for all participants?
8. Was there appropriate statistical analysis?
9. Was the response rate adequate, and if not, was the low response rate managed appropriately?

Discussion

The present systematic review described the literature on BPD and BPF during the perinatal period. During pregnancy, results showed that the prevalence rates of BPF ranged from 6.9% to 34% and that the prevalence rates of BPD diagnosis ranged from 0.4% to 37.1%. In the postpartum period, the only study investigating BPF reported a rate of 9.7% in a clinical sample of mothers, and the overall prevalence of BPD diagnosis among all postpartum studies ranged from 1.7% to 23.7%. Across the entire perinatal period, prevalence rates for BPD were found to be 0.3% among women receiving obstetric care to 35.2% among women managed by a perinatal psychiatric team.

Results from this systematic review indicate that borderline personality pathology may be common in the perinatal period, especially among clinical and/or treatment-seeking samples. This includes the full diagnosis of BPD, as well as BPF, the latter of which should not be ignored or overlooked, as even individual features have been associated with significant psychosocial impairment (Ellison et al. 2016). For instance, Ellison et al. (2016) found that the BPD criteria of impulsivity, affective instability, anger, and emptiness were individually associated with psychosocial impairment. Specifically, emptiness was associated with impairment across all areas

of psychosocial morbidity, including suicidality, psychiatric hospitalizations, and social and work dysfunction (Ellison et al. 2016). These findings stress that professionals should be attentive to both BPD and BPF, as the presence of either is likely to have important consequences for the functioning and well-being of perinatal women.

The findings of this review also suggest that rates of borderline personality pathology in clinical samples could be comparable to those of perinatal depression and anxiety (Gaynes et al. 2005; Leach et al. 2017). This may be attributed to the high degree of comorbidity observed between these disorders in non-perinatal populations, such that 75% and 74.2% of individuals with a lifetime diagnosis of BPD meet criteria for a lifetime mood disorder or anxiety disorder, respectively (Grant et al. 2008). Though depression was not the focus of this review, multiple included studies did find substantial rates of borderline personality pathology among women who had an EPDS score indicative of probable depression. Comorbidities are particularly important to be mindful of during the perinatal period, as it is well understood that women are vulnerable to developing symptoms of depression and anxiety at this time (Dowse et al. 2020; Gaynes et al. 2005). Importantly, BPD has major implications for the treatment of these comorbidities, as previous research has found that this disorder significantly affects remission rates of MDD (Gunderson et al. 2004) and negatively impacts the course of GAD and social anxiety disorder (Keuroghlian et al. 2015).

Our results are also important given a recent study that showed associations between BPD and numerous adverse outcomes for perinatal women and their offspring; women with BPD were found to perceive delivery as traumatic, report high rates of comorbidity with substance abuse, and

have poor engagement with antenatal care (Blankley et al. 2015). They were also more likely to deliver an infant who achieved lower Apgar scores and needed referral for special care nursery services (Blankley et al. 2015). Later in the postpartum period, other research has shown that mothers with BPD are less sensitive and structured in their interactions with their infant, and in turn, their infants are less attentive, eager, and regulated in their interactions with their mother (Newman et al. 2007). Such suboptimal outcomes are unlikely to be limited to infancy and may continue to detrimentally affect offspring as they transition into adolescence and adulthood. Indeed, a review by Eyden et al. (2016) found associations between maternal BPD and offspring BPD symptoms, internalizing and externalizing problems, as well as poor emotion regulation (Eyden et al. 2016). Another study found a high prevalence of maternal BPD among parents of children being followed by youth protection services, suggesting that this group of women may be at particular risk of losing full or partial custody of their children (Laporte et al. 2018). These findings suggest that intervention for and management of perinatal BPD is not only a matter of psychological well-being for the mother and child, but also safety and quality of life.

The findings of this review should be considered in light of the following limitations. First, while the inclusion of two abstracts contributed to a more comprehensive overview of the current perinatal BPD literature, these publications also featured scarce detail regarding sample characteristics, methods, and results. This inevitably led to lower scores on the quality assessment and a poorer average quality rating across all studies. Additionally, the upper bound value of the prevalence estimates for BPD diagnosis across the whole perinatal period was obtained from an abstract (Oyewopo et al. 2016). As such, it is possible that since more rigorous peer-reviewed research studies found lower rates of BPD in perinatal populations, our upper bound estimate was

slightly inflated by this abstract. Second, varying definitions of BPF were used - while some studies used clinical judgement, others labelled the presence of two or more features as substantial. Multiple assessment tools were also used to estimate the prevalence of BPF and BPD, increasing heterogeneity across studies and compromising accurate cross-comparison. Lastly, the biggest limitation was that many studies were conducted with clinical samples (i.e. women with EPDS scores suggesting probable depression, women with high-risk pregnancies, and mothers admitted to an MBU). Additionally, more than half of the studies were conducted in Australia, with no studies being done in Asia or South America. These two factors limit the generalizability of our findings and our ability to discern true population prevalence rates of perinatal BPD. In the future, larger, cross-cultural, community-based studies should investigate the prevalence of borderline personality pathology among perinatal women.

Lastly, the prevalence estimates obtained in this review ranged widely from 0.3% to 37.1%. This was likely caused by multiple factors, such as inconsistent definitions of BPF, the use of various self-report measures, and assessment of heterogeneous populations (i.e. general clinic populations vs. individuals referred to a psychiatric clinic or in an MBU). A meta-analysis may be conducted for a future publication that focuses on a more homogenous group (i.e., either clinical or community perinatal women). Despite these limitations, the present review offers, to the best of our knowledge, the first consideration of BPF and BPD prevalence rates during the perinatal period. This work includes research from pregnant and postpartum samples, allowing for a comprehensive review of the existing literature in the field.

Implications for Clinical Practice

The present review supports early screening and identification of BPF and BPD during the perinatal period. Similar to the EPDS, a brief, reliable, and valid assessment of borderline personality pathology should be validated for routine perinatal examinations and psychiatric appointments. This is especially important in perinatal populations with depressive symptoms, as prior research has suggested BPD, rather than depression, should be treated first between the two (Gunderson et al. 2004). Professional awareness of subclinical features and disorder diagnosis are imperative in understanding how to appropriately intervene and support perinatal women affected by borderline personality pathology.

Currently, both psychotherapy and pharmacotherapy are used for the management of BPD in non-puerperal populations. However, during pregnancy or postpartum, women may be hesitant to take psychotropic medication, emphasizing the importance of having psychotherapeutic options available at this time. Little research has explored treatments for perinatal BPD, though one treatment approach, mother-infant dialectical behaviour therapy (MI-DBT), has been recently investigated (Sved Williams et al. 2021). MI-DBT is a form of DBT that addresses parenting skills and the mother-infant relationship over the course of approximately four months, imparting skills related to emotion regulation, distress tolerance, and the socioemotional development of the infant (Sved Williams et al. 2021). A pilot study assessed the effectiveness of this therapy and found that mothers with BPD experienced significant improvement in depressive, anxiety, and BPD symptoms, in addition to feelings of greater parenting competence and better mentalization capacity regarding their infant's mental states (Sved Williams et al. 2021). Unfortunately, following MI-DBT, no significant changes were observed in the quality of mother-infant

relationships or the socioemotional development of the infant, suggesting that future interventions may require specific components that target dyadic challenges (Sved Williams et al. 2021).

Overall, though there is sparse interventional literature for perinatal BPD, researchers should first focus on better understanding the presentation of this pathology. Once this has been clarified, psychotherapeutic programming should be developed with objectives of promoting both maternal well-being and healthy mother-infant relationships.

Conclusion

The present review suggests that the prevalence of BPF and BPD is substantial during pregnancy and postpartum. This is concerning, as emerging literature shows that borderline personality disturbance can have devastating consequences for women and their offspring. Future efforts should be dedicated to better profiling the experience of BPD during the perinatal period, as well as determining how the anticipation and challenges of motherhood shape its features.

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Chapter 3: Original Research Chapter

Introduction

The perinatal period, which spans pregnancy until twelve months postpartum, marks a time where women are vulnerable to developing poor mental health (Gaynes et al. 2005; Dennis et al. 2017). It is estimated that depression affects up to 11% of women during pregnancy and 12.9% of women during postpartum, while anxiety disorders may be more common, affecting 15.2% of pregnant women and 9.9% of postpartum women (Gaynes et al. 2005; Dennis et al. 2017). Both perinatal depression and anxiety significantly impact maternal well-being, as they are associated with poor engagement with medical care, inadequate nutrition, smoking, and substance abuse (Kendig et al. 2017). These conditions are also linked to numerous adverse outcomes for offspring, such as preterm birth and low birth weight, as well as poorer socioemotional, cognitive, language, motor, and behavioural development (Cox et al. 2016; Rogers et al. 2020).

Due to their impact on the well-being of mothers and their infants, perinatal depression, and more recently perinatal anxiety, have received considerable attention. Though these strides have been immensely valuable for perinatal psychiatry, they also emphasize the disparity that exists in PD research during pregnancy and postpartum, specifically related to BPD.

BPD is recognized as a personality disorder marked by pervasive symptom patterns related to affective instability, interpersonal functioning, identity, and impulsivity (Leichsenring et al. 2011). According to the DSM-5, an individual must meet five of the following nine criteria in order to obtain a diagnosis of BPD: frantic efforts to avoid abandonment, a pattern of unstable and intense interpersonal relationships, identity disturbance, impulsivity in at least two potentially self-

damaging areas, recurrent suicidal behaviour, affective instability, chronic emptiness, inappropriate and intense anger, and transient stress-related paranoid ideation or dissociative symptoms (APA, 2013). As the criteria suggest, BPD is highly debilitating and confers significant impairment across various areas of functioning. Epidemiological studies estimate that the prevalence of BPD is 2.7% in the general population, 10% in psychiatric outpatients, and 15 to 25% among psychiatric inpatients, making it the most frequently observed PD in clinical populations (Trull et al. 2010; Grant et al. 2008; Leichsenring et al. 2011). Moreover, BPD has a suicide completion rate of 10%, which is fifty times greater than that observed in community samples (Black et al. 2004; Leichsenring et al. 2011).

On its own, BPD presents severe challenges that are difficult to manage and treat. However, it is likely that this disorder is even more harrowing during the perinatal period, given the intense stress and demands that accompany childbearing and early motherhood. Briefly, the reasons for studying BPD in the perinatal context are three-fold. First, in non-perinatal research, BPD often shows strong comorbidity with both depression and anxiety (Grant et al. 2008) and has been found to affect the remission of both conditions (Keuroghlian et al. 2015; Gunderson et al. 2004). Given that perinatal depression and anxiety are prevalent during the perinatal period, BPD should naturally also be investigated given its high comorbidity and pervasive effects. Second, the systematic review in Chapter 2 highlights that the prevalence of BPD is substantial during the perinatal period, affecting 0.4% to 37.1% of women during pregnancy and 1.7% to 23.7% of women at postpartum, depending upon the sampling frame. The prevalence of borderline personality features (BPF) also appears to be high, ranging from 6.9% to 34% during pregnancy, and 9.7% at postpartum (Yelland et al. 2015). Though further work is required to accurately refine

these estimates, the current numbers are comparable to prevalence rates of perinatal depression and anxiety and support the need for deeper exploration in the perinatal BPD space.

The third reason for studying perinatal BPD stems from the consequences of borderline personality pathology. The sizable number of women that endorse BPF or meet criteria for BPD is particularly worrying given that this pathology confers great risk for maternal and infant-related negative outcomes. Indeed, perinatal BPD has been linked to unplanned pregnancy, substance abuse, gestational diabetes, poor engagement with healthcare, preterm birth, and higher likelihood of intrauterine fetal death (Nagel et al. 2021; Pare-Miron et al. 2016; di Giacomo et al. 2020). Furthermore, research has shown that infants of mothers with BPD are more likely to have lowered Apgar scores and referral for special care nursery, and that mothers with BPD display impaired bonding with their infant and are almost six times more likely to become involved with child protective services (Blankley et al. 2015; Newman et al. 2007; Nagel et al. 2021). The severity of these findings urges further investigation into perinatal BPD to better elucidate its presentation, course, and treatment during pregnancy and postpartum.

Currently, the literature on perinatal BPD is scarce and in its early stages. To our knowledge, there exist no studies that have investigated BPF in relation to depressive and generalized anxiety symptoms during the perinatal period. The objective of this study is to determine whether the endorsement of BPF (defined as a positive screen on the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD)) increases the likelihood of endorsing clinically significant perinatal depressive or generalized anxiety symptomatology (defined as a positive screen on the Edinburgh Postnatal Depression Scale (EPDS) or Generalized Anxiety

Disorder Scale (GAD-7), respectively) in a sample of perinatal women seeking psychiatric treatment.

Methods

The Women's Health Concerns Clinic Registry

The Women's Health Concerns Clinic (WHCC) is an outpatient psychiatric clinic at St. Joseph's Healthcare Hamilton in Canada that offers assessment and treatment for women experiencing mental health symptoms surrounding reproductive milestones, including the perinatal period (Caropreso et al. 2020). This clinic is integrated into the Hamilton community and receives over 1300 referrals annually from physicians and midwives in the community, in addition to self-referrals. The WHCC Registry was developed as an online, non-interventional prospective cohort study of perinatal mental health by psychiatrists and graduate students affiliated with the clinic. This study is ongoing, and two groups of participants are eligible to join: perinatal women seeking treatment at the WHCC, recruited from clinic consent forms (further information is provided below) and perinatal women from the community, recruited through advertisements in community clinics and online platforms.

Inclusion criteria for this study are: a) 18 years of age or older, and b) being currently pregnant or up to 12 months postpartum. Participants are requested to complete questionnaires about mental health, maternal-infant interactions, and infant behaviour on REDCap at ten time points throughout the perinatal period: 3-, 6-, and 9-months gestation, and 2 weeks, 1, 2, 3, 6, 9, and 12 months postpartum. Additionally, participants receive a set of intake questionnaires upon enrolment, which includes surveys about demographic information and medication history, as well

as the following questionnaires: Ten-Item Personality Inventory (TIPI), MSI-BPD, and the Childhood Trauma Questionnaire (CTQ). The current investigation is a sub-study under the WHCC Registry and is further explained in the following section.

Present Study

The present study focused solely on the baseline data of WHCC patients enrolled in the WHCC Registry study, in order to explore associations between BPF and perinatal depressive and generalized anxiety symptomatology. Specifically, the objective of this study was to answer the following research question: is screening positive for BPF (as measured by a positive screen on the MSI-BPD) associated with greater odds of screening positive for perinatal depression or generalized anxiety (as measured by the EPDS or GAD-7) among treatment-seeking perinatal women? The perinatal period was considered as opposed to specific time points during pregnancy or postpartum in order to maximize the generalizability of the results across the perinatal period.

Participants were enrolled after completing a "Consent to Contact" form at their initial clinic consultation, being contacted and screened by a researcher, and reviewing and signing a written informed consent form. As women visiting the WHCC were seeking psychiatric treatment, they are referred to as "treatment-seeking women" in this work.

Following the general protocol of the WHCC Registry, all participants were invited to complete intake questionnaires and the questionnaires associated with the first time point they were eligible for. For instance, if a participant was recruited at 3 months post-delivery, they were sent the intake and 3 months postpartum questionnaires upon joining the study.

Demographic Questionnaires

Within the intake set of questionnaires, the first questionnaire was used to collect information regarding participants' perinatal status (pregnant/postpartum), age, education, and marital status. A separate questionnaire inquired about participants' current use of psychotropic medication.

Ten-Item Personality Inventory

The Ten-Item Personality Inventory (TIPI) is a self-report questionnaire that assesses personality traits based on the Five Factor model (extraversion, agreeableness, conscientiousness, emotional stability/neuroticism, and openness to experience; Gosling et al. 2003). Each item features a paired set of words and participants are asked to rate the degree to which the item applies to them. Items may be rated 1 through 7, corresponding to "disagree strongly" and "agree strongly", respectively. The TIPI displays high test-retest reliability and validity, in comparison to other short personality measures (Furnham, 2008). For the purpose of this study, scores on the emotional stability subscale were used as a measure of neuroticism. This subscale has been shown to have acceptable test-retest reliability and adequate convergent and discriminant validity (Gosling et al. 2003). Neuroticism was assessed given its implication in depression and anxiety during and outside of the perinatal period (van Bussel et al. 2009; Podolska et al. 2010; Sauer-Zavala & Barlow, 2014).

Childhood Trauma Questionnaire – Revised

The Childhood Trauma Questionnaire – Revised (CTQ) is a retrospective self-report instrument that is used to capture traumatic experiences that occurred in the responder's childhood

(Bernstein et al. 1998). The CTQ features 28 items that evaluate physical and emotional abuse, physical and emotional neglect, and sexual abuse. Responses are provided using a 5-point Likert-style scale with options ranging from "never true" to "very often true". The CTQ has shown adequate consistency among community samples, including pregnant women (Scher et al. 2001; Cammack et al. 2015). In this study, total scores on the CTQ were analyzed as a measure of trauma during the responder's childhood. Childhood trauma was assessed as it has been associated with increased risk of perinatal depression and anxiety (Choi & Sikemma, 2016; Lara et al. 2015).

Mental Health Measures

McLean Screening Instrument for Borderline Personality Disorder

The McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD) is a ten-item self-report questionnaire that assesses symptoms of BPD (Zanarini et al. 2003). Items in this measure are answered using yes/no and correspond one-to-one with the DSM-IV criteria for BPD, with the exception of two items being present for the dissociation/paranoid ideation criterion. Higher scores on the MSI-BPD suggest the presence of a greater number of BPF in the responder. Though the MSI-BPD has been previously validated in a community sample of women (Patel et al. 2011), its use in perinatal populations has been relatively limited (Bright et al. 2021; Sved Williams et al. 2021). In non-perinatal populations, a cut-off of 7 or higher is recommended, as there is both high sensitivity (0.81) and specificity (0.85; Zanarini et al. 2003). This cut-off was used in the present study to signify a "positive screen" for BPF.

Edinburgh Postnatal Depression Scale

The Edinburgh Postnatal Depression Scale (EPDS) is a ten-item self-report instrument that measures depressive symptoms over the past seven days (Cox et al. 1987). Each item has four possible answers and is awarded a score of 0, 1, 2, or 3, with higher total scores suggesting the presence of greater depressive symptomatology. The EPDS has been utilized in numerous perinatal studies and has been found to have great accuracy (Chorwe-Sungani & Chipps, 2017). A cut-off score of 13 or greater was used in the present study to signify clinically significant depressive symptoms (i.e. a "positive screen"). This cut-off has been recommended if perinatal individuals with higher symptom levels are to be identified, while a lower cut-off of 11 optimizes combined sensitivity and specificity and may be more useful to capture all individuals with major depression (Levis et al. 2020). The cut-off of 13 or greater was chosen for the present study in order to maintain consistency and enable comparison with other studies that investigated BPD in a similar population (Nagel et al. 2021).

Generalized Anxiety Disorder Scale – 7 (GAD-7)

The Generalized Anxiety Disorder Scale (GAD-7) is a 7-item self-report measure that assesses symptoms of GAD over the past 2-week period (Spitzer et al. 2006). Each item involves four response options ranging from "not at all" to "nearly every day" that are scored as 0 to 3 points. The GAD-7 is validated in perinatal populations and has been reported as especially useful in identifying GAD in perinatal patients with comorbid major depression (Simpson et al. 2014). This measure has also been used for panic disorder, social anxiety disorder, and post-traumatic stress disorder (PTSD), and is often used in perinatal settings to assess general anxiety and distress (Kujanpaa et al., 2014; Fairbrother et al. 2019). A cut-off of 13 or greater was used in the present

study to signify clinically significant generalized anxiety symptomatology (i.e. a "positive screen" for perinatal GAD), based on recommendations by Simpson et al. (2014).

Statistical Methods

All statistical analyses were performed using R 3.6.1. Normally distributed and non-normally distributed continuous variables were analyzed using independent t-tests and Mann-Whitney U Tests, respectively. Normality was determined using the Shapiro-Wilk test. Categorical variables were assessed using Fisher's Exact Test (if cell values were <5) or Chi-Square Test. In the next step, total scores on the two outcome measures of interest, the EPDS and GAD-7, were dichotomized into positive/negative screens. This was done in order to prepare the data for binary logistic regression analysis. In order to facilitate clear interpretation of the data, MSI-BPD total scores were also similarly dichotomized for consistency. Three-step logistic regression was conducted with a positive MSI-BPD screen as a predictor variable and a positive EPDS or GAD-7 screen as the outcome. In Step 1, a positive MSI-BPD screen was input as the sole predictor variable. Step 2 incorporated three demographic covariates: age, currently pregnant (yes/no), marital status (single/married), and educational attainment (high school or less/more than high school completed) as predictor variables. Educational attainment was chosen as a proxy for socioeconomic status as it has been suggested as a more stable indicator of performance and behaviour among individuals with personality disorders (Kouppis et al. 2020). In Step 3, all of the predictors from Steps 1 and 2 were added, in addition to three final covariates: screening outcome on the GAD-7 or EPDS (positive/negative), emotional stability, and childhood trauma. In models 2 and 3, covariates were included to control for factors associated with greater risk of perinatal depression or generalized anxiety. Multicollinearity among variables was assessed by computing

the variance inflation factor for the final regression models for both the EPDS and GAD-7 outcomes. Statistical significance on all tests was determined if $p<0.05$.

Results

Demographic Information of Current Sample

Seventy-four individuals were enrolled from the Women's Health Concerns Clinic to participate in the WHCC registry. Twenty-four (32.4%) participants were pregnant when joining the study, while the remaining 50 (67.6%) were postpartum. The demographic characteristics of the current sample are provided in Table 3. The mean age of participants was 32.08 years, with the majority of them (86.5%) being married or in a common-law relationship and having completed a level of schooling above high school (79.7%). The mean score on the CTQ was 41.39 (SD: 15.52), while the mean score on the emotional stability subscale of the TIPI was 4.74 (SD: 0.94) Forty-five (60.8%) participants reported taking psychotropic medication at the time of intake. A total of 72 (97.3%) participants received at least one psychiatric diagnosis by a professional WHCC clinician during their first consultation appointment. The 2 remaining participants had no DSM-5 psychiatric diagnoses recorded, though one was described as having an anxious temperament. Participants most frequently received a clinician diagnosis of GAD (n=46, 62.2%) or MDD (n=38, 51.3%). Nine (12.1%) participants received a clinician diagnosis of BPD and an additional 3 participants (4.1%) were recorded as having clinically significant borderline or Cluster B traits. Regarding the self-report study measures, 20 (27.0%) participants screened positive on the EPDS, 14 (18.9%) participants screened positive on the GAD-7, and 20 (27.0%) participants screened positive on the MSI-BPD.

The most frequently endorsed items on the MSI-BPD among all WHCC participants were extreme moodiness (74.3%) and acting in an angry or sarcastic manner (54.5%, see Table 4 and Figure 2). Between 32.4% and 45.9% of the sample endorsed the MSI-BPD items related to troubled interpersonal relationships, self-harm, impulsivity, paranoid ideation, chronic emptiness, identity disturbance, and efforts to avoid abandonment. The least frequently endorsed BPD item was dissociation (14.8%). In terms of comorbidity, during the initial WHCC consultation, 20 (27%) participants had current comorbid GAD and MDD diagnoses, 5 (6.75) participants had current comorbid BPD and GAD, and 2 (2.7%) had current comorbid BPD and MDD. On the self-report measures, 11 (14.9%) participants screened positive on both the MSI-BPD and EPDS, while 7 (9.4%) screened positive on both the MSI-BPD and GAD-7. Additionally, 11 (14.9%) participants screened positive on both the GAD-7 and EPDS, while 9 (12.2%) and 3 (4.1%) participants screened positive only on the EPDS or GAD-7, respectively. A total of 6 (8.1%) participants screened positive on all three measures.

No significant differences were found between the age, pregnancy status, marital status, or emotional stability scores of individuals who screened positive and negative on the EPDS or the GAD-7 (Table 3). Additionally, there was no significant difference between the number of participants with a psychiatric diagnosis who screened positive on the EPDS or GAD-7 and those who had no psychiatric diagnosis at their consultation. Participants who screened positive on the EPDS were more likely to have screened positive on the MSI-BPD compared to participants who screened negative on the EPDS ($p<0.01$), though a similar result was not observed for the GAD-7. Additionally, participants who screened positive on the EPDS or the GAD-7 were more likely

to have reported greater total trauma scores on the CTQ ($p<0.05$) than those who screened negative. Spearman correlations for all predictor and outcome variables are available in Table 5.

Borderline Personality Traits as Predictors of Depressive Symptoms

To investigate the relationship between a positive screen on the MSI-BPD and a positive screen on the EPDS, three logistic regression models were created (Table 6). Through all three iterations, a positive screen on the MSI-BPD emerged as a significant predictor for a positive screen on the EPDS. Odds ratios indicated that in the final model, a positive screen on the MSI-BPD was associated with almost an eighteen-fold increase in the odds of screening positive on the EPDS (OR 17.84, 95% CI[2.11, 218.80], $p<0.05$). The final model also revealed that a positive screen on the GAD-7 was an even stronger predictor of a positive screen on the EPDS, increasing the likelihood by more than forty-eight-fold (OR 48.30, 95% CI[6.16, 769.36], $p<0.05$).

Borderline Personality Traits as Predictors of Anxiety Symptoms

Logistic regression modelling was also conducted to determine the relationship between a positive screen on the MSI-BPD and a positive screen on the GAD-7. Results from the first logistic regression showed that a positive screen on the MSI-BPD was significantly associated with greater odds of screening positive on the GAD-7 (Table 7). However, in models two and three, once demographic and mental-health factors were considered, the association was no longer maintained. The final model revealed only two significant predictors of a positive screen on the GAD-7: a positive screen on the EPDS and childhood trauma as measured by the CTQ. A positive screen on the EPDS increased the likelihood of screening positive on the GAD-7 by almost forty-eight-fold (OR 47.60, 95% CI[6.62, 711.81], $p<0.001$), whereas a one point increase in childhood trauma

total scores increased the risk of a positive GAD-7 screen by 1.06 times (OR 1.06, 95% CI[1.00, 1.13], $p<0.05$).

Discussion

Using three self-report instruments, the EPDS, GAD-7, and MSI-BPD, we explored the relationship between BPF and depressive and generalized anxiety symptomatology in a sample of perinatal women seeking psychiatric treatment. Overall, we found that 20 of the 74 (27%) individuals included in this study screened positive for depression, 20 (27.4%) screened positive for BPD, and 14 (18.9%) screened positive for generalized anxiety. Results from our logistic regression analyses show that screening positive on the MSI-BPD is significantly associated with a greater likelihood of reporting clinically significant depressive, but not generalized anxiety, symptoms among treatment-seeking perinatal women. This investigation revealed that participants who screened positive on the MSI-BPD were almost 18 times as likely to screen positive on the EPDS compared to participants who screened negative on the MSI-BPD. However, when perinatal generalized anxiety as measured by the GAD-7 was considered as the outcome, a positive MSI-BPD screen did not emerge as a significant predictor; rather, only a positive EPDS screen and childhood trauma were significantly associated with increased odds of screening positive on the GAD-7. Though childhood trauma has been implicated as a risk factor in both perinatal mood and anxiety disorders (Choi & Sikkema, 2016), it has been suggested that such abuse is more prevalent in GAD compared to MDD (Prenoveau et al. 2013). This may offer one explanation as to why total scores on the CTQ reached significance in the final GAD-7 regression model, but not the final EPDS regression model.

The self-reported rates of depression and generalized anxiety observed in our study are similar to those published by Nagel et al. (2021), who explored psychiatric diagnoses in a sample of perinatal women referred for psychiatric treatment (Nagel et al. 2021). In their study, 25.5% and 15.1% of participants were diagnosed with a depressive or anxiety disorder, respectively. With regards to BPD, a Canadian study by Korzekwa et al. (2008) found that 22.6% of individuals in a general outpatient psychiatric clinic met criteria for BPD (Korzekwa et al. 2008). This study assessed participants using the Revised Diagnostic Interview for Borderlines (DIB-R), which requires the administrator to have significant clinical experience. Thus, our rate of 27% using self-report aligns well with Korzekwa et al.'s (2008) finding in an outpatient sample. In the perinatal period specifically, Bright et al. (2021) assessed a large sample of pregnant women using the MSI-BPD and reported that 111 of 887 (12.5%) scored "near the cut-off of 7"; the rate of 12.5% in a non-clinical sample also provides context for the higher rate observed in our treatment-seeking sample (Bright et al. 2021). Additionally, our inclusion of both pregnant and postpartum women may have contributed to a higher rate, as motherhood and caring for an infant may magnify the interpersonal difficulties associated with BPD (Newman et al. 2005). Results regarding the two most frequently endorsed items on the MSI-BPD, extreme moodiness or acting in an angry or sarcastic manner, support findings from Nagel et al. (2021) as well. This study involved clinical interviews and thus, our self-report results are promising as they align with this more robust method of determining BPD pathology.

Our results suggest that a positive screen on the MSI-BPD is associated with an increased risk of screening positive on the EPDS among treatment-seeking perinatal women, even after adjusting for covariates. This may be due to the fact that BPD and perinatal depression share

greater similarity and have a more deeply linked relationship compared to BPD and perinatal generalized anxiety. Indeed, depression has been established as a common psychiatric comorbidity in BPD, and it has also been suggested that some BPD symptoms contribute to the persistence of depressive symptoms (Grant et al. 2008; Gunderson et al. 2004). This likely explains why improvements in BPD are followed by improvements in MDD (Gunderson et al. 2004), as well as why screening positive on the MSI-BPD was significantly associated with a greater likelihood for screening positive on the EPDS in our study. Moreover, perinatal depression and BPD have substantial symptomatic overlap; for instance, criteria for both conditions include affective disturbance and self-harm. This overlap may be responsible for the association between MSI-BPD and EPDS scores observed in our study.

Regarding generalized anxiety, the lack of a significant association between a positive screen on the MSI-BPD and the GAD-7 was surprising, as research has shown that both depression and anxiety are common comorbidities in BPD (Grant et al. 2008). Furthermore, a recent study found that among a sample of perinatal women with a primary diagnosis of an anxiety disorder, 53% scored above cut-off on the Difficulties in Emotion Regulation Scale, suggesting significant emotion dysregulation in this population (DERS; Agako et al. 2021). It is possible that the non-significant in our study result may be a product of the modest sample size or due to our focus on generalized anxiety specifically. Prior research has suggested that GAD has a lower prevalence rate in non-perinatal borderline patients compared to other anxiety disorders (Silverman et al. 2012). For instance, one MSAD study assessed the prevalence of six anxiety disorders among individuals with BPD and found that baseline prevalence rates were as follows: social phobia (49.7%), panic disorder (45.2%), simple phobia (35.2%), obsessive compulsive disorder (14.5%),

agoraphobia (12.1%), and lastly, GAD (11.0%; Silverman et al. 2012). At the tenth year of follow-up, GAD had one of the lowest prevalence rates, second only to agoraphobia (Silverman et al. 2012). Given that this MSAD study was conducted with participants that were initially inpatients, these prevalence rates represented severe cases of BPD. Thus, it may be expected that our sample of treatment-seeking perinatal outpatients would possibly display lower rates of comorbidity between BPD and GAD. Our findings may reflect that GAD in particular does not share as strong of a relationship with BPD as do other anxiety disorders. This would support a review by Friborg et al. (2013), which highlighted that Cluster B PDs were not common among individuals with anxiety disorders, and specifically, GAD (Friborg et al. 2013). For instance, they reported the comorbid proportion of GAD and BPD as only 0.09 (Friborg et al. 2013). Considering this in light of our findings, it may be that perinatal anxiety shares a more tightly linked relationship with PDs in other clusters, as opposed to BPD specifically. In summary, our results may be explained by research findings that suggest GAD is not the most common anxiety disorder in BPD and BPD is not the most common PD in GAD (Silverman et al. 2012; Friborg et al. 2013).

Finally, referring back to the logistic regression models, it can be observed that the positive MSI-BPD screen remained a significant predictor of depressive symptoms when accounting for other covariates, but was only a significant predictor of a GAD-7 positive screen when covariates were not included. The disappearance of this association may indicate that the similarities observed between perinatal generalized anxiety symptomatology and BPF may be better described by other transdiagnostic risk factors, such as childhood trauma. These transdiagnostic risk factors likely reflect a general risk profile across multiple psychiatric conditions, as opposed to a specific relatedness that exists between perinatal generalized anxiety and BPD. Conversely, in the case of

perinatal depression, it is possible that there are more unique factors shared with BPD, giving rise to a stronger relationship and comorbidity that persists even when covariates are considered.

As expected, our findings indicate that a positive screen on the EPDS was significantly associated with a positive screen on the GAD-7. This makes sense given that depression and generalized anxiety are highly comorbid among perinatal individuals (Caropreso et al. 2020). In fact, in Caropreso et al.'s (2020) study of more than 200 perinatal women referred for psychiatric care at the WHCC, 27.9% of individuals had comorbid MDD and GAD. This rate is higher than that observed in our study (14.9%), probably due to the fact that not all participants in the registry were seeking treatment at the time of questionnaire completion. Indeed, when the initial consultation diagnoses are considered, approximately 24% of our sample had comorbid MDD and GAD, similar to the rate found by Caropreso et al. (2020).

Overall, our results suggest that endorsement of BPF, as measured by a positive screen on the MSI-BPD, is associated with a greater likelihood of screening positive on the EPDS but not on the GAD-7. These findings suggest that BPD shares a closer relationship with depressive symptoms than with generalized anxiety symptoms among perinatal women seeking psychiatric treatment.

Clinical Implications

The findings of this study have some implications for clinical practice. Primarily, our work strongly suggests that BPF should be screened for in perinatal care settings, especially among women who report depressive symptoms. Given that prior non-perinatal research has not only

shown that BPD affects MDD, but has also suggested that it should be treated before MDD, appropriate management and treatment of perinatal depression should involve professional cognizance of borderline personality pathology (Gunderson et al. 2004). While screening for perinatal depression and anxiety is relatively well-implemented, screening for BPD is yet to be incorporated into most healthcare programs. The first step to screening is better understanding the nature of BPF and BPD as they present during the perinatal period. As in the case of perinatal depression and generalized anxiety, it is possible that pregnant and postpartum women with BPF or BPD experience symptoms related to their infant or motherhood. Once the typical presentation of perinatal BPD has been elucidated, a brief and effective screening measure should be implemented into perinatal mental health clinics, so that further assessment and intervention can be arranged.

With regards to anxiety, the findings of this study indicate that perinatal BPF and perinatal generalized anxiety may not share a close relationship. However, given that this work primarily relied on self-report measures, there is great room for future research to further explore this connection through the use of standardized semi-structured interviews. Our results may hold true only for GAD, leaving open the possibility that other perinatal anxiety disorders may be more significantly affected by borderline personality pathology (Silverman et al. 2012). Overall, our preliminary findings shed light on multiple avenues for future research that could help uncover the relationships that BPF and BPD share with other psychopathologies in both clinical and non-clinical perinatal samples.

Limitations and Strengths

The results of this study should be interpreted with the following limitations in mind. First, the research was conducted with a clinical sample of perinatal women. As research has consistently shown that the prevalence of BPD is markedly higher among psychiatric outpatients, the number of participants screening positive on the MSI-BPD in this study is unlikely to be representative of all perinatal groups. Second, this study was also limited by its sample size, which led to lowered statistical power. Third, though all participants had been seeking treatment at the clinic at some point, they were not all seeking treatment at the time of questionnaire completion. This may have led to a heterogeneous sample of perinatal women, as the diagnoses provided during initial consultation may not have still been present. Additional limitations arose from the design of the WHCC Registry, as this study was both cross-sectional and online. The lack of longitudinal data hindered our ability to draw causal relationships between BPF and perinatal depressive or generalized anxiety symptoms. Moreover, as the WHCC Registry study was fully virtual and participants could complete questionnaires at their own convenience, researchers' ability to ensure participants completed questionnaires on specific dates was limited. This led to the possibility that questionnaire responses were sent a few weeks after the designated time point. Also, the decision to include baseline data from all participants regardless of perinatal status precluded analysis of a homogenous pregnant or postpartum sample, though it did enable generalizability of the results across the perinatal period.

A major limitation of this study was the use of self-report questionnaires, which may have led to an overestimation of the number of participants that had clinically significant borderline, depressive, or generalized anxiety symptomatology. Furthermore, the MSI-BPD includes only

yes/no items, which leaves little room for nuanced responses, and has also not been previously validated in a perinatal sample. The implementation of semi-structured interviews as part of the WHCC Registry would have been highly useful in confirming the current presence of mental health diagnoses, especially for the participants who were not still seeking treatment at the clinic. However, it should be noted that for all participants, clinical diagnoses that were provided during the initial consultation were available. These diagnoses were considered in interpreting the results and were not overlooked, as they offered a more complete clinical picture of the participants' psychiatric history.

Another limitation arose from the dichotomization of the outcome variables (EPDS and GAD-7 scores) as well as the main predictor variable (MSI-BPD scores). Though this technique is common in clinical research and lends itself to clear interpretation, it reduces statistical power (Altman & Royston, 2006). Finally, the WHCC Registry did not collect data regarding participant race or ethnicity. The interaction of cultural factors with social norms shapes the presentation of personality pathology (Choudhary et al. 2020), and thus, knowledge of participants racial and ethnic background would have enabled a better understanding of how relationships between BPF and other mental health conditions present across different perinatal groups.

Despite these limitations, our study has important strengths. First, the design enabled participants to take part in mental health research from the comfort of their own homes. Especially during the COVID-19 crisis, the online design provided the opportunity to research perinatal mental health without compromising the health of or causing stress to perinatal participants. Second, all screening measures were brief and both the EPDS and GAD-7 were validated for

completion during pregnancy and postpartum. Most importantly, to our knowledge, this study is one of the first to investigate the relationship between BPF and anxiety symptomatology during the perinatal period. Our study also targeted gaps present in current BPD literature, as detail was provided regarding which BPFs were endorsed in our sample and how frequently they were reported. Altogether, this research contributes a timely look into BPF and their associations with depressive and generalized anxiety symptoms in a sample of treatment-seeking perinatal women.

Conclusion

The findings of this study form an important steppingstone in perinatal BPD research, as they showcase that BPF are common among treatment-seeking perinatal women and that they share a significant relationship with perinatal depressive symptomatology. Specifically, our results suggest that individuals who screen positive on the MSI-BPD are more than eighteen times as likely to report clinically significant perinatal depressive symptomatology. Our work emphasizes the importance of investigating perinatal BPF and BPD, as well as their associations with other psychopathologies, in order to improve current perinatal mental healthcare services.

Table 3: Sample Demographics Based on EPDS and GAD-7 Screening Outcome.

	Overall Sample	+EPDS Screen	-EPDS Screen	p-value	+ GAD-7 Screen	-GAD-7 Screen	p-value
Age	32.08	31.15	32.42	0.39	30.64	32.42	0.28
Currently Pregnant Yes No	 24 (32.4%) 50 (67.6%)	 5 (6.7%) 15 (20.3%)	 19 (25.7%) 35 (47.3%)	0.58	 6 (8.1%) 8 (10.8%)	 18 (24.3%) 42 (56.8%)	0.54
Education High School or Less Higher Education	 15 (20.3%) 59 (79.7%)	 5 (6.8%) 15 (20.3%)	 10 (13.5%) 44 (59.5%)	0.53	 3 (40.5%) 11 (14.9%)	 12 (16.2%) 48 (64.9%)	1.00
Marital Status Single or Divorced Current Relationship	 10 (13.5%) 64 (86.5%)	 2 (2.7%) 18 (24.3%)	 8 (10.8%) 46 (6.2%)	0.72	 3 (4.1%) 11 (14.9%)	 7 (9.5%) 53 71.6%)	0.39
Psychotropic Medication Use Yes No	 45 (60.8%) 29 (39.2%)	 13 (17.6%) 7 (9.5%)	 32 (43.2%) 22 (29.7%)	0.86	 7 (9.5%) 7 (9.5%)	 38 (51.3%) 22 (29.7%)	0.54
MSI-BPD Screen Positive Negative	 20 (27.0%) 54 (73.0%)	 11 (14.9%) 9 (12.2%)	 9 (12.2%) 45 (60.8%)	0.002**	 7 (9.5%) 7 (9.5%)	 13 (17.6%) 47 (63.5%)	0.07
Childhood Trauma	41.39 (SD:15.52)	48.85	38.63	0.02*	53.50	38.57	0.01*
Emotional Stability	4.74 (SD:0.94)	4.40	4.86	0.12	4.46	4.80	0.51
Diagnosis Received at Consultation Yes No	 72 (97.3%) 2 (2.7%)	 20 (27%) 0 (0%)	 52 (70.3%) 2 (2.7%)	1.00	 14 (18.9%) 0 (0%)	 58 (78.4%) 2 (2.7%)	1.00
EPDS Screen Yes No	 -	 -	 -	 -	 11 (14.9%) 3 (4.1%)	 9 (12.2%) 51 (68.9%)	 9.54e-06***
GAD-7 Screen Yes No	 -	 11 (14.9%) 9 (12.2%)	 3 (4.1%) 51 (68.9%)	 9.54e-06***	 -	 -	 -

Table 4: MSI-BPD Items and Number of Positive Responses.

Item Number	Description	Number of Positive Responses (Percent)
1	"Have any of your closest relationships been troubled by a lot of arguments or repeated breakups?"	33 (44.6%)
2	"Have you deliberately hurt yourself physically (e.g., punched yourself, cut yourself, burned yourself)? How about made a suicide attempt?"	24 (32.4%)
3	"Have you had at least two other problems with impulsivity (e.g., eating binges and spending sprees, drinking too much and verbal outbursts)?"	31 (41.9%)
4	"Have you been extremely moody?"	55 (74.3%)
5	"Have you felt very angry a lot of the time? How about often acted in an angry or sarcastic manner?"	40 (54.0%)
6	"Have you often been distrustful of other people?"	34 (45.9%)
7	"Have you frequently felt unreal or as if things around you were unreal?"	11 (14.9%)
8	"Have you chronically felt empty?"	30 (40.5%)
9	"Have you often felt that you had no idea of who you are or that you have no identity?"	26 (35.1%)
10	"Have you made desperate efforts to avoid feeling abandoned or being abandoned (e.g., repeatedly called someone to reassure yourself that he or she still cared, begged them not to leave you, clung to them physically)?"	28 (37.8%)

Figure 2: Endorsements of BPF Among Treatment-Seeking Perinatal Women.

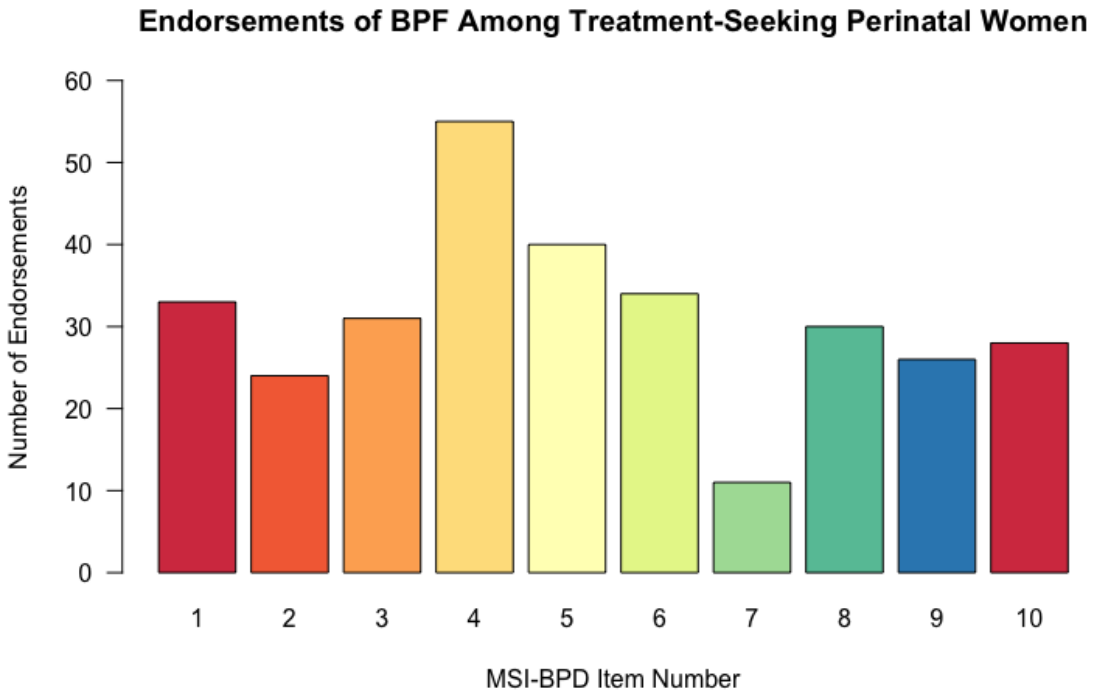

Table 5: Correlations Among Covariates and Mental Health Outcomes.

	Age	Currently Pregnant	Marital Status	Education	Emotional Stability (TIPI)	Childhood Trauma (CTQ)	MSI-BPD	EPDS	GAD-7
Age	1.000	-0.157	0.322	0.232	-0.061	-0.102	-0.456	-0.120	-0.126
Currently Pregnant	-0.157	1.000	-0.233	-0.082	-0.063	0.172	0.163	-0.097	0.108
Marital Status	0.322	-0.233	1.000	0.391	-0.021	-0.266	-0.293	0.063	-0.112
Education	0.232	-0.082	0.391	1.000	0.022	-0.431	-0.374	-0.072	-0.014
Emotional Stability (TIPI)	-0.061	-0.063	-0.021	0.022	1.000	-0.092	-0.090	-0.182	-0.077
Childhood Trauma (CTQ)	-0.102	0.172	-0.266	-0.431	-0.092	1.000	0.402	0.272	0.290
MSI-BPD	-0.456	0.163	-0.293	-0.374	-0.090	0.402	1.000	0.383	0.250
EPDS	-0.120	-0.097	0.063	-0.072	-0.182	0.272	0.383	1.000	0.561
GAD-7	-0.126	0.108	-0.112	-0.014	-0.077	0.290	0.250	0.561	1.000

Table 6: Results of Logistic Regression Models 1, 2, and 3 for EPDS Screening Outcome.

	Model 1					**Model 2**					**Model 3**				
	β	**SE**	**Wald X^2**	**OR**	**95% CI**	**β**	**SE**	**Wald X^2**	**OR**	**95% CI**	**β**	**SE**	**Wald X^2**	**OR**	**95% CI**
Intercept	-1.61***	0.36	-4.41	0.20	[0.09, 0.39]	-3.41	2.49	-1.36	0.03	[0.00, 3.63]	-2.69	4.14	-0.65	0.07	[1.49e-05, 263.96]
MSI-BPD Positive Screen	1.81**	0.58	3.16	6.11	[2.00, 19.79]	2.53**	0.81	3.13	12.59	[2.83, 71.66]	2.88*	1.15	2.51	17.83	[2.21, 218.80]
Age						0.02	0.07	0.24	1.02	[0.88, 1.18]	0.04	0.09	0.45	1.04	[0.86, 1.25]
Currently Pregnant						-0.92	0.71	-1.29	0.39	[0.09, 1.49]	-2.05	1.06	-1.93	0.13	[0.01, 0.83]
Marital Status						1.33	1.05	1.27	3.78	[0.54, 37.74]	2.22	1.41	1.57	9.24	[0.77, 236.17]
Education						0.13	0.79	0.17	1.14	[0.25, 5.93]	-0.07	1.00	-0.07	0.93	[0.13, 7.25]
GAD-7 Positive Screen											3.88**	1.19	3.24	48.30	[6.16, 769.36]
Emotional Stability											-0.67	0.48	-1.39	0.51	[0.17, 1.19]
Childhood Trauma											0.01	0.03	0.19	1.00	[0.95, 1.07]
AIC	80.19					83.47					65.56				

Table 7: Results of Logistic Regression Models 1, 2, and 3 for GAD-7 Screening Outcome.

	Model 1					Model 2					Model 3				
	β	**SE**	**Wald X^2**	**OR**	**95% CI**	**β**	**SE**	**Wald X^2**	**OR**	**95% CI**	**β**	**SE**	**Wald X^2**	**OR**	**95% CI**
Intercept	-1.90***	0.40	-4.7	0.15	[0.06, 0.31]	-1.52	2.56	-0.59	0.22	[0.001, 30.88]	-5.04	4.35	-1.15	0.01	[5.61e-07, 26.22]
MSI-BPD Positive Screen	1.28*	0.62	2.07	3.61	[1.06, 12.49]	1.29	0.75	1.71	3.63	[0.82, 16.61]	-0.74	1.07	-0.69	0.47	[0.05, 3.47]
Age						-0.02	0.08	-0.33	0.97	[0.83, 1.13]	-0.09	0.09	-1.01	0.91	[0.74, 1.08]
Currently Pregnant						0.36	0.65	0.56	1.44	[0.39, 5.09]	1.17	0.99	1.17	3.23	[0.48, 29.51]
Marital Status						-0.39	0.90	-0.44	0.67	[0.12, 4.36]	-1.46	1.36	-1.08	0.23	[0.02, 3.88]
Education						0.81	0.91	0.89	2.24	[0.43, 16.29]	1.90	1.28	1.49	6.72	[0.69, 122.79]
GAD-7 Positive Screen											3.86***	1.15	3.35	47.60	[6.62, 711.82]
Emotional Stability											0.34	0.51	0.65	1.40	[0.49, 4.00]
CTQ Total Score											0.06*	0.03	2.03	1.06	[1.01, 1.13]
AIC	71.55					78.27					58.47				

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Chapter 4: Overall Discussion

The present thesis contributes two works to the current research base on perinatal BPD. First, to our knowledge, the systematic review in Chapter 2 offers the only collective prevalence estimate of BPF and BPD during the perinatal period. Our results suggest that BPF and BPD may be common among treatment-seeking perinatal women. While existing BPD literature has largely overlooked the presentation and course of this disorder with respect to major life events, findings from our systematic review emphasize the importance of studying BPD during the perinatal period. Pregnancy and postpartum represent major stages of life where individuals are tasked with many challenges, from preparing for childbirth to parenting and raising an infant, which can be taxing even for psychologically healthy individuals. Given that BPD is a disorder marked by severe emotion dysregulation, impulsive behaviour, and interpersonal dysfunction (APA, 2013), individuals who suffer from borderline personality symptoms are likely to face substantial difficulties perinatally. News of pregnancy may be upsetting for an individual with BPD, as this event may have been the outcome of impulsive actions or an unhealthy, abusive relationship (Newman et al. 2005). Additionally, the arrival of a new infant could evoke traumatic feelings from past abuse or exacerbate interpersonal fears surrounding potential abandonment (Newman et al. 2005). As BPD involves an unstable sense of self which is often negative and devaluing (APA, 2013), parenthood may further lower self-esteem and make it difficult for someone with BPD to act as a positive role model for their infant. Moreover, mothers with BPD often fluctuate in how they view their mother-infant relationship, leading to inconsistencies in how they communicate, empathize, and interact with their infants (Newman et al. 2005). Indeed, Newman et al. (2005) describe mothers with BPD as "high-risk parents", who are vulnerable to developing an unhealthy maternal-infant bond (Newman et al. 2005). It is surprising that such little research has been

published on perinatal BPD, despite the fact that motherhood is perhaps one of the most important interpersonal undertakings in life.

Findings from our systematic review indicate that rates of perinatal BPF and BPD are substantial, warranting concern regarding maternal and infant well-being. During pregnancy and postpartum, BPD has been associated with several adverse outcomes, including maternal gestational diabetes and cesarean delivery, as well as infant preterm birth, lower Apgar scores, and special care nursery referral (Pare-Miron et al. 2016; Blankley et al. 2015). Our review emphasizes the importance of implementing BPD screening measures in regular perinatal care, as there may be a considerable proportion of women who are unaware that they suffer from BPD and could benefit from a more formal assessment and intervention, if necessary. The perinatal period offers a major opportunity to discover cases of BPD or clinically significant BPF, as individuals are more frequently in contact with the healthcare system at this time. Future research is required to surely determine whether the perinatal period is associated with new emergence of BPD cases; regardless, it is undeniable that this time is a critical period for clinical identification and intervention.

Extending the findings of the systematic review, Chapter 3 features our original research study using a subset of data from the WHCC Registry study. The objective of this study was to investigate the relationship between BPF and depressive and generalized anxiety symptoms in a sample of perinatal women seeking psychiatric treatment. Specifically, the study was devised to determine whether the endorsement of BPF (defined as a positive screen on the MSI-BPD) was associated with increased risk of reporting clinically significant perinatal depressive or generalized anxiety symptoms (defined as a positive screen on the EPDS or GAD-7, respectively) among treatment-seeking perinatal women. Our results revealed that screening positive on the MSI-BPD

was associated with an increased likelihood of screening positive on the EPDS, but not the GAD-7. Hence, our findings suggest that BPF is associated with clinically significant depressive, but not generalized anxiety symptoms during the perinatal period.

The finding of a relationship between perinatal depression and BPF is not surprising given the non-perinatal BPD literature base. First, non-perinatal depression and BPD are highly comorbid, with prevalence rates reported between 61% to 83% (Zanarini et al. 2019; Beatson & Rao, 2013). Second, there is overlap between multiple symptoms of BPD and depression, such as self-harm, depressed mood, and low self-esteem and feelings of worthlessness. There are also other similarities, as neuroticism has been implicated in both BPD and depression and has been linked with a functional polymorphism in the promoter region of the serotonin transporter gene (Sauer-Zavala & Barlow, 2014). When two short alleles are present, this functional polymorphism is associated with greater amygdala activity in response to emotional stimuli, lowered positive connectivity between the amygdala and the ventromedial prefrontal cortex, and symptoms of BPD and depression (Sauer-Zavala & Barlow, 2014; Pascual et al. 2007; Maurex et al. 2010). BPD and depression are also both associated with reduced volume in areas of a "cingulate network", composed of the anterior cingulate cortex and dorsolateral prefrontal regions of the brain (Depping et al. 2016). Psychological risk factors are also shared between the two conditions; for instance, BPD is associated with high levels of childhood abuse, with rates in clinical settings reaching up to 76% (Zanarini, 2000; Soloff et al., 2002). Similarly, a recent systematic review by Choi & Sikkema (2016) found that there was a strong linkage between childhood maltreatment and perinatal depression, such that childhood maltreatment predicted perinatal mood disorders even after other psychiatric and sociodemographic variables were accounted for (Choi & Sikkema, 2016). Last but not least, longitudinal work has shown BPD significantly impacts the course and

remission of non-perinatal depression (Gunderson et al. 2004). Altogether, these findings support the idea that BPD and depression share a relationship and may provide some context as to why we observed an association between BPF and perinatal depressive symptoms in our study.

While discussing the similarities between BPD and depression, it is important to recognize that research largely suggests that BPD is a unique disorder based on symptomatology, course, and heritability (Goodman et al. 2010). For instance, though depressive symptoms are part of BPD, the quality of these symptoms is markedly different than that of those observed in depression. In BPD, depressive symptoms manifest primarily as a product of interpersonal stress and may include loneliness, desperation due to the absence of or abandonment by another, or a sense of inner badness and self-directed attacks (Beatson & Rao, 2013). It has also been suggested that depression in BPD could be a way to express emotions that the individual cannot share in an adaptive, healthy manner, such as anger, hatred, or helplessness (Beatson & Rao, 2013). Research has also shown that in the case of depression in BPD where MDD is absent, depressive symptoms do not alleviate in response to antidepressants, but rather when patients are appropriately supported through the identification, understanding, and addressal of their underlying feelings (Beatson & Rao, 2013). Additionally, negative mood in BPD is less persistent and more prone to lability than in depression, further evincing that these two disorders share significant similarity but are ultimately distinct mental health conditions (Goodman et al. 2010). One specific vulnerability for BPD that has been proposed is a "childhood invalidating environment", which Linehan describes as a setting where emotional expression is not tolerated (Linehan, 1987; Sauer-Zavala & Barlow, 2014). This invalidating environment leads individuals to believe that sharing emotions is inappropriate, as these feelings should be dealt with privately and alone (Linehan, 1987; Sauer-Zavala & Barlow, 2014). Consequently, this upbringing solidifies the message that extreme emotions should be

rapidly shut down and that often, strong emotional displays are required to receive an environmental response (Linehan, 1987; Sauer-Zavala & Barlow, 2014). This may be one reason as to why individuals with BPD engage in a range of impulsive behaviours in the face of emotional distress, such as self-harm and substance abuse (Sauer-Zavala & Barlow, 2014). Importantly, this is not a key feature in the clinical presentation of depression (Linehan, 1987).

In this discussion, an important consideration that cannot be overlooked is that since depressive symptoms are a part of the clinical picture of BPD, separating between the two disorders may be difficult. Cross-sectional evaluations make it challenging to distinguish between the transient symptoms of depression in BPD and the sustained symptoms of depression, leading to confounding in clinical practice (Beatson & Rao, 2013). In our research, it is possible that our results reflect the fact that depressive symptoms are a component of both BPD and perinatal depression, leading to a positive screen on the MSI-BPD being associated with an increased likelihood of screening positive on the EPDS.

Regarding perinatal anxiety, the findings of our research study are surprising, particularly given comorbidity rates between 81 – 90% reported between BPD and anxiety disorders among clinical samples (Zanarini et al. 1998; Quenneville et al. 2020). Additionally, high rates of comorbidity between BPD and anxiety disorders have also been observed in community studies (Zanarini et al. 1998; Grant et al. 2008). For instance, in Grant et al.'s (2008) nationwide study, 74.2% of individuals with BPD met criteria for a lifetime anxiety disorder. These high rates of comorbidity are additionally supported by neurobiological research that shows BPD and anxiety disorders are both associated with heightened reactivity of the amygdala, altered activity in the

prefrontal cortex, and abnormalities in the HPA system (Bulbena-Cabré et al. 2017; Martin et al. 2009; Ruocco et al. 2013; Ruocco et al. 2016). Taken together, our finding that a positive screen on the MSI-BPD does not significantly increase the likelihood of screening positive on the GAD-7 is unexpected with respect to anxiety disorders as a whole. However, it seems more plausible when we consider that the GAD-7 was specifically developed to measure symptoms of GAD, and thus scores on this measure are more representative of perinatal GAD rather than perinatal anxiety more broadly (Spitzer et al. 2006).

Against the backdrop of anxiety disorder research in the context of BPD, the clinical picture of GAD and BPD tells a somewhat different story. Multiple research studies have found that the prevalence of GAD appears to be lower among individuals with BPD, in comparison to other anxiety disorders (Silverman et al. 2012; Zanarini et al. 1998). For instance, Silverman et al. (2012) reported that at baseline, comorbidity rates of anxiety disorders in their sample of BPD patients ranged widely from 11% for GAD to 49.7% for social phobia, and the relative place of GAD remained low even at the 10-year follow-up (Silverman et al. 2012). Research has also indicated that Cluster B PDs are less common among individuals with anxiety disorders, especially GAD (Friborg et al. 2013). One review reported a comorbidity rate of 14% for GAD and Cluster B PDs and a rate of 9% for GAD and BPD (Friborg et al. 2013). Thus, the relatively weaker relationship observed between GAD and BPD appears to be bidirectional. It is possible that since GAD remains a comparatively less comorbid anxiety disorder in BPD and BPD a less comorbid PD among anxiety disorders, our outcome shows that positive MSI-BPD screeners were not at increased risk for screening positive on the GAD-7.

However, despite this, other research findings are mixed and indicate that the prevalence of GAD is high among individuals with BPD, even in relation to other anxiety disorders (Grant et al. 2008). For instance, findings from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) showed that among women with BPD, GAD was the third most comorbid anxiety disorder, with a rate of 41.6% (Grant et al. 2008). On the other hand, among women with GAD, the comorbidity rate of BPD was 25.4% (Grant et al. 2008). The differences in comorbidity rates reported from the MSAD and the NESARC may be partly attributable to sample differences. While the MSAD included participants who were all initially inpatients and mostly White and female, the NESARC was intended to be a more representative sample of American adults. The latter study included civilians and oversampled Black and Hispanic populations (Grant et al. 2008). Thus, the higher comorbidity rates observed between GAD and BPD in the NESARC study may be reflective of their use of a more diverse sample and of the possibility that many individuals with BPD and GAD go unrecognized and/or choose not to seek treatment (Leichsenring et al. 2011). It appears that our results more closely parallel those of the MSAD, as we observed that 9.4% of our sample screened positive on both the GAD-7 and MSI-BPD. Further research with more robust methodology is required to truly determine whether or not perinatal GAD is strongly associated with BPD, as non-perinatal research clearly shows mixed findings.

Extending beyond the comorbidity aspect, the quality of anxiety may also be different in GAD than in BPD, though little research has been conducted in this area. While anxiety in GAD is persistent and present in a range of situational contexts, anxiety in BPD appears more transitory. Reisch et al. (2008) found that, in comparison to healthy controls, individuals with BPD reported more frequent shifts from anxiety to sadness, anxiety to anger, and sadness to anxiety. They also found that anxiety served as the predominant precursor to anger (Reisch et al. 2008), supporting

the idea that BPD is best characterized by oscillations between multiple negative affective states as opposed to one persistent emotion. Another likely phenomenon is that anxiety in BPD is specifically a product of interpersonal fears, such as abandonment and rejection. This interpersonal context to anxiety is plausible and would parallel findings on depressive symptoms in BPD (Beatson & Rao, 2013).

Deeper exploration into the differences between anxiety in BPD and GAD is required, as it is currently sparse even in non-perinatal populations, let alone perinatal groups. Existing work is inadequate to make conclusions regarding whether BPD and perinatal GAD are closely related or not. As observed in our research study, the relationship between a positive screen on the MSI-BPD and a positive screen on the GAD-7 showed significance in the first logistic regression model, however this association disappeared once covariates were accounted for. It is thus possible that transdiagnostic factors, such as childhood abuse, are responsible for the initial linkage observed in our study. In comparison with GAD, other anxiety disorders may share more unique developmental and genetic risk factors, explaining the higher comorbidity rates they show with BPD. It may also be that BPD and generalized anxiety do share a significant relationship that was not discovered through the present study, due to the small sample size and measures used. Importantly, there is also a possibility that our findings hold true for the perinatal population in particular.

Overall, the results obtained in our study may be a consequence of the specific instruments utilized or the relationships that exist between perinatal borderline, depressive, and generalized anxiety symptoms. It is likely that some combination of the two is reflected in our findings, as while these measurements do not provide the same level of accuracy as a structured clinical

interview or clinician judgement, they have been validated and show sound psychometric properties (Zanarini et al. 2003; Cox et al. 1987, Spitzer et al. 2006). Altogether, our research study serves primarily as a preliminary look into an under-investigated and highly pertinent area of perinatal psychiatry, highlighting the need for further investigation. This study also reinforces the findings of our systematic review, which suggest that BPF may be common among treatment-seeking perinatal women and contributes to the small literature base in this field. Notably, to our knowledge, this research represents the second-ever Canadian study to investigate borderline personality pathology during the perinatal period.

A common message that is echoed throughout all chapters of this work is that ultimately, perinatal BPD deserves more attention than it has previously received. Though the perinatal period brings joy and light to many, pregnancy and postpartum have no shortage of stressful circumstances and challenging experiences. It is important to recognize and provide support for expecting women and new mothers who are affected by not only mood and anxiety conditions, but also personality disturbance, in order to facilitate a smooth and healthy transition through the perinatal period.

As elaborated upon in Chapters 2 and 3, this thesis was limited by certain important factors. With regards to the systematic review, scant and heterogeneous literature on perinatal BPF and BPD hindered our ability to calculate precise prevalence estimates. The use of various instruments across studies hindered comparability, while the use of self-report measures in some studies may have led to overestimations of BPF and BPD rates compared to those that would have been obtained from clinical interviews. A lack of cross-cultural data also limited the generalizability of

the findings. With respect to the original research, similar limitations arose due to the reliance on self-report measures, though diagnoses made by experienced clinicians during initial consultations were available to provide a better sense of each participant's psychiatric history. The study was mainly limited by its small sample size and population of treatment-seeking participants, which impacted the generalizability of our results to community samples of perinatal women. However, as the prevalence of BPD is known to be markedly higher among clinical samples (Leichsenring et al. 2011), research with this subgroup is of great importance and thus, our study retains clinical relevance and meaningfulness.

Future Directions

As substantive research on perinatal BPD has only emerged in the last decade, there is a great deal to be understood prior to developing appropriate identification and treatment strategies. First and foremost, research efforts should be dedicated to thoroughly grasping the nature of perinatal BPD; for instance, at this time, are features of the disorder targeted toward the infant and are they exacerbated by concerns surrounding motherhood? If so, how do they manifest? Once a foundational knowledge of perinatal BPD has been solidified, accurate identification in clinical practice will become a possibility. This knowledge will also facilitate effective epidemiological studies of perinatal BPD with more precision.

Future research should ascertain the prevalence of BPD in perinatal women from both community and clinical samples. As highlighted in the systematic review, a significant proportion of current perinatal BPD research has been conducted with at-risk women or clinical populations (i.e., women screening positive on a depression measure, women admitted to an MBU, etc.). While

these populations deserve attention, especially given the high rates of BPD observed in psychiatric settings, general community samples should not be overlooked in perinatal BPD research.

To extend the findings of the original research, future investigations should delve deeper into the relationship between BPD and perinatal depression, as well as perinatal anxiety. Though many transdiagnostic factors confer risk across psychiatric disorders, unique factors that underlie the relationship between depressive symptomatology and BPF during the perinatal period should be elucidated. Furthermore, given that postpartum depression is associated with maternal suicide and BPD is a disorder characterized by high levels of suicidality, the risk of self-harm and suicide in perinatal women with both depression and BPD should certainly be looked into (Lindahl et al. 2005; APA, 2013).

To the best of our knowledge, this research is one of the first to explore associations between BPF and perinatal generalized anxiety. Future work should determine if our findings are reflective of a true lack of a relationship between perinatal BPF and GAD specifically or all anxiety disorders that occur at this time. As the second outcome is unlikely given high rates of comorbidity between other anxiety disorders and BPD in non-perinatal populations (Silverman et al. 2012), uncovering which disorders are likely to present with BPD during the perinatal period is of clinical importance. Moreover, examining the differences between perinatal generalized anxiety symptomatology and anxiety features of BPD are important in understanding the clinical overlap and distinctiveness between both conditions. Once the prevalence and nature of BPD alone, as well as that of comorbid BPD and perinatal depression and anxiety, are better understood, effective interventions and treatments be planned.

In summary, this thesis comprehensively synthesizes existing prevalence research on perinatal BPF and BPD and additionally contributes preliminary insight into the relationships between BPF, generalized anxiety, and depression in a treatment-seeking perinatal population. This body of work provides reasonable evidence that borderline personality pathology is relevant to the perinatal period and also highlights avenues for subsequent exploration. By promoting awareness in the research and clinical community, intentional investigation into perinatal BPD can positively impact not only immediate maternal and infant well-being, but perhaps even that of generations to come.

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