

**Temperament and Adversity: Predicting the Psychopathology of Borderline Personality
Disorder in Adolescents**

An Honors Thesis for the Department of Psychology

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Abstract

Borderline personality disorder (BPD) is a severe mental health disorder that results in high mortality rates and physical complications in addition to significant psychological distress. As many individuals develop BPD prior to adulthood, it is important to identify factors associated with BPD severity. The purpose of this study was to explore possible predictors of the severity of BPD psychopathology in adolescents. We hypothesized that the severity of both temperamental traits and childhood adversities would be predictive of the severity of overall BPD psychopathology. In this study, adolescent inpatients with BPD ($N = 104$) and psychiatrically healthy comparison adolescents ($N = 60$) completed a self-report questionnaire on temperaments and received a semi-structured interview assessing their childhood adversities including sexual abuse, other types of abuse, and neglect. Adolescents with BPD additionally completed the Revised Diagnostic Interview for Borderlines (DIB-R), which was used to assess severity of BPD psychopathology. The severity of neuroticism and other abuse were found to be significant predictors of DIB-R scores. Results suggest that it may be important to account for the severity of both temperament and experience when predicting individuals who are more likely to suffer from more severe BPD.

Keywords: BPD in adolescents, temperament, childhood adversity

Temperament and Adversity: Predicting the Psychopathology of Borderline Personality Disorder in Adolescents

Borderline personality disorder (BPD) is a psychiatric disorder characterized by a pervasive pattern of affective instability, impulsivity, turbulent interpersonal relationships, and unstable self-image (American Psychiatric Association, 2022; Fonagy & Luyten, 2016; Lieb et al., 2004). Epidemiological studies in the United States suggest that BPD is relatively common in nonclinical community populations, affecting around 0.5% to 5.9% of individuals (Grant et al., 2008; Lenzenweger et al., 2007; Trull et al., 2010). However, it has a substantially higher prevalence rate in clinical settings: patients with BPD constitute 10% to 12% of all patients in psychiatric outpatient clinics and around 20 to 22% in inpatient settings (Ellison et al., 2018).

The clinical importance of BPD is highlighted by its association with physical health complications, higher treatment utilization, and high mortality rates (Grant et al., 2008; Skodol et al., 2002). Results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) revealed associations between BPD and physical conditions including gastrointestinal, cardiovascular and hepatic diseases, hypertension, and arthritis (El-Gabalawy et al., 2010). Furthermore, the combined psychopathological and physiological conditions of individuals with BPD result in high treatment utilization. For instance, one study found that the rates of mental health treatment for patients with BPD was four times higher than the general population, and that the percentage with prior psychiatric hospitalization among BPD patients was three times higher than non-psychiatric controls (Gross et al., 2002).

In addition, individuals with BPD demonstrate higher mortality rates, from both suicidal and non-suicidal causes. A US-based longitudinal study following 290 adult inpatients with BPD found that 14% of patients with BPD died by non-suicide causes compared to 5.5% comparison

subjects with other personality disorders. For mortality from suicide, the rate for BPD adults was 5.9%, compared to 1.4% for comparison adults (Temes et al., 2019). A nationwide cohort study in Denmark following over 10,000 patients with a BPD diagnosis found that the all-cause mortality ratio among patients with BPD was 8.3 times higher than the general population (Kjær et al., 2020). The co-occurring physical complications and higher mortality of individuals with BPD highlight the continued need for clinical and research attention on BPD, as it is not only a psychological disorder but can be associated with significant adverse outcomes for both mental and physical well-being.

Etiology of BPD: a Biosocial Perspective

Understanding the etiology and development of BPD is central to the treatment and prevention of this severe personality disorder. The biosocial model—a widely recognized developmental theory of BPD—suggests that this disorder is the product of a combination of biological vulnerabilities and environmental factors (Linehan, 1993; Crowell et al., 2009; Hughes et al., 2012; Bozzatello et al., 2021). According to the model, individuals with BPD exhibit heightened emotional sensitivity and reactivity due to genetic and neurobiological factors. This heightened emotional vulnerability (stemming from genetic predispositions and temperamental features), combined with invalidating environments (where their emotions, experiences and behaviors are dismissed, trivialized, or invalidated), can lead to difficulties with emotional regulation, self-image, and interpersonal relationships, which are hallmark features of BPD. Invalidation environments can include childhood experiences of abuse, neglect, or inconsistent parenting, or ongoing experiences of being criticized or rejected by others. Over time, these invalidating environments can lead to individuals with BPD feeling like their

emotional experiences are abnormal or wrong, leading to difficulties in recognizing and expressing their emotions, as well as feeling understood and accepted by others (Linehan, 1993).

Empirical research has supported the theory that temperamental traits such as impulsivity and negative affectivity may increase vulnerability for the development of BPD (Belsky et al., 2012; Vaillancourt et al., 2014), but that these temperamental traits are not sufficient to predict this disorder alone in the absence of environmental factors (Bozzatello et al., 2021). Among various environmental factors, familial adverse experiences such as abuse and neglect frequently draw clinical attention (Battle et al., 2004; Lyons-Ruths et al., 2015; Vanwoerden et al., 2017). Both temperamental features and childhood adversities are believed to play a synergistic role to contribute to BPD development (Bornovalova et al., 2006; Bozzatello et al., 2021; Zanarini et al., 1998).

BPD in Adults

Temperamental Traits in BPD: the FFM of Personality

Temperament is defined as individual differences in reactivity and regulation that are observable in early life and has a strong biological basis (Derryberry & Rothbart, 1997; Goldsmith et al., 1987). Empirical evidence supports the Five-Factor Model (FFM) of Personality as a structural framework to understand personality and personality disorders (Widiger, 2017). This evidence includes research in multivariate behavior genetics, childhood antecedents of personality, stability in traits over time, support from cognitive neuroscience, and the consistent findings from cross-cultural replications. The FFM of personality disorder aligns with a dimensional view on personality, indicating that dysfunctional personality traits fall on a spectrum along with normal personality functioning (Costa & McCrae, 2010; Widiger & Trull, 2007).

Existing literature and theory have linked BPD to temperamental traits using the FFM of personality (Samuel & Widiger, 2008), which organizes personality traits in five dimensions: neuroticism, extraversion, openness, agreeableness, and conscientiousness. All five exhibit convergent and discriminant validity across instruments and observers (McCrae & Costa, 1990). The reliability and validity of using the NEO Five-Factor Inventory as trait-based assessment of BPD has been supported by Few et al. (2016), which designed a measure extracting FFI facets that were shown to have high correlations with BPD and found significant correlations between the FFI-based measure and standard BPD measures. According to Warner and colleagues (2005), changes in temperamental traits in the FFM were followed by changes in the psychopathology of BPD, but not vice versa, potentially alluding to BPD psychopathology as extreme variants of normal personality traits that remain stable over the course of BPD.

Cross-sectional studies have established the three FFM traits most pertinent to the temperamental features of BPD as neuroticism, agreeableness, and conscientiousness (Widiger & Trull, 1992; Saulsman & Page, 2004; Samuel & Widiger, 2008). The earliest studies examining the subject in clinical populations of BPD tended to establish that high neuroticism was most strongly associated with individuals with BPD (Clarkin et al., 1993; Perry & Cooper, 1985; Soldz et al., 1993; Trull, 1992). For instance, Trull (1992) studied a group of outpatients with personality disorders to find that high neuroticism and low agreeableness correlated with BPD symptoms. Low agreeableness and low conscientiousness were also common findings from clinical inpatients and outpatients with BPD (e.g., Bagby et al., 2005; Costa & McCrae, 1990; De Fruyt et al., 2006). Meta-analyses of 15 (Saulsman & Page, 2004) and 16 (Samuel & Widiger, 2008) independent samples consisting of both clinical and non-clinical populations estimated a

significant positive correlation between BPD and neuroticism, moderate negative correlations with agreeableness and conscientiousness, and a modest negative correlation with extraversion.

Childhood Adversity: Abuse and Neglect

Just as temperament is considered the main biological vulnerability in the development of BPD, adverse childhood experiences are considered the main environmental factor in BPD development (Johnson et al., 1999; Linehan, 1993; Wisdom et al., 2009; Stepp et al., 2016). Both the biosocial model and other psychoanalytic theories highlight the centrality of childhood adversities. Linehan (1993) proposes that emotional invalidation in all forms from caregivers during early childhood can hinder a child's ability to learn how to experience and navigate various emotional states. Moreover, psychoanalytic theories accentuate the role of early experiences and relationships with caregivers in the formation of emotion regulation and motivational processes (Bradley & Westen, 2005). Specifically, children who have suffered maltreatment (such as abuse and neglect) may conclude that they deserve such treatment by inferring negative characteristics about themselves and others (Fonagy et al., 2010). For instance, they may internalize the maltreatment they receive due to their own imperfection. These inferences may lead to children conceptualizing themselves as helpless and undeserving of love, while also conceptualizing others as dangerous, rejecting, or unavailable (Fonagy et al., 2010; Godbout et al., 2014). Some have hypothesized and found evidence for maltreatment and the resulting perception as leaving children vulnerable to the interpersonal difficulties of BPD and the later development of BPD characteristics (Godbout et al., 2014; Herzog & Schmahl, 2018).

Research has demonstrated higher prevalence of childhood adversity among adult patients with BPD, as well as more types and higher severity of adversities, compared to control subjects (eg: Zanarini et al., 1997; Pietrek, 2013). For instance, Zanarini et al. (1997) found that

among 358 adult inpatients with BPD, 91% of patients reported having ever been abused and 92% of patients reported experiences of neglect prior to the age of 18. In addition to higher prevalence of these experiences, findings also have suggested that persons with BPD tend to experience various types of abuse (Paris et al., 1994; Pietrek et al., 2013; Yen et al., 2002). For instance, Paris et al. (1994) found that outpatients with BPD reported higher rates of sexual and physical abuse compared to those with other PDs. Compared to inpatients with schizophrenia and major depressive disorder, inpatients with BPD reported more instances of childhood adversities (Pietrek, 2013). Lobbestael et al. (2010) compared childhood adversities across patients with different personality disorders and found that BPD was associated with sexual abuse, emotional abuse, and emotional neglect. Zanarini et al. (1997) found that individuals with BPD were significantly more likely to have experienced emotional, physical, and sexual abuse and all types of neglect studied than other personality-disordered comparison subjects. Specifically, parental neglect discriminating BPD patients from participants with other personality disorders all referred to the parental inability in meeting their child's emotional but not physical needs, highlighting the importance of emotional experiences for BPD in the familial context. A recent meta-analysis on childhood adversity of individuals with BPD using 97 studies concluded that individuals with BPD were 13.91 times and 3.15 times more likely to report childhood adversity compared to non-clinical controls and other psychiatric groups for all types of adversities, respectively (Porter et al., 2020).

In more recent years, there has been increased focus on the potential impact of negative social interactions in childhood and adolescence, especially among peers, on the later emergence of BPD symptoms (Erazo et al., 2022; Sansone et al., 2010). Studies have suggested that peer

victimization in childhood is associated with higher likelihood of developing BPD symptoms and diagnosis in adulthood (Erazo et al., 2022; Wolke et al., 2012).

In addition to the prevalence of abuse among individuals with BPD, the severity of overall BPD psychopathology in adults has been linked to the severity of adverse childhood experiences. Studies have found that individuals with less severe BPD symptoms report lower instances of childhood sexual abuse compared to those with severe symptoms (Salzman et al., 1993; Zanarini et al., 1997). Moreover, a series of early studies concluded that patients with milder cases of BPD tend to report less frequent and less severe forms of abuse as opposed to ongoing abuse reported by those with more severe BPD symptoms (Paris et al., 1994; Silk et al., 1995; Zanarini et al., 1997). Specifically, Zanarini et al. (2002) found severity of childhood sexual abuse and neglect to be predictive of the affective, cognitive, dissociative, interpersonal and the overall symptom severity of BPD. Recent studies corroborated past findings, linking together the severity of cumulative childhood adversity (van Dijke et al., 2013) or some subtypes of adversity (Chiesa et al., 2016) and BPD symptom severity among clinical populations. In summary, the adult literature recognizes various forms of abuse and neglect as common experiences contributing to BPD development for adult patients with BPD.

BPD in Adolescents

Early Onset of BPD in Adolescents

The relationship between temperament, adversity, and BPD in adults is well-established. However, research into these areas in adolescents only began to gain attention in more recent decades. Studying BPD in adolescent populations is important for several reasons. First, increasing evidence supports adolescence as a particularly sensitive and critical period for the emergence of BPD symptoms (Chaen & Kaess, 2012; Cohen et al., 2005; Kaess et al., 2014;

Sharp, 2016). Recent studies found that BPD symptoms in adolescence are often precursors to a later diagnosis of BPD in late adolescence or adulthood (Chaen & Kaess, 2012; Cohen et al., 2005; Kaess et al., 2014). Furthermore, BPD psychopathology before 19 years old was found to predict long-term deficits in functioning and other negative outcomes 20 years later (Lofgren et al., 1991; Wenning, 1990; Winograd et al., 2008). The emergence of BPD symptoms and its correspondence with negative psychiatric outcomes in adulthood signals the necessity to intervene in adolescence before the development of full-blown BPD.

Secondly, evidence suggests that adolescent BPD prevalence and symptoms can be comparable to adult symptom profiles (Guilé et al., 2018; Winsper et al., 2016; Zanarini et al., 2017). The prevalence of BPD in adolescents is similar to that in adults (0.5% to 5.9%), with around 1-3% in the general adolescent populations (Guilé et al., 2018; Leichsenring et al., 2011; Lenzenweger, 2008). The prevalence in clinical populations of adolescents was estimated to vary from 11% in outpatient clinics to 78% in suicidal adolescents in emergency rooms (Guilé et al., 2018). In terms of BPD symptomatology in adolescence, a study by Zanarini et al. (2017) comparing prevalence rates of BPD symptoms between BPD adolescents and adults reported statistically similar prevalence rates for 20 out of 24 symptoms, highlighting the validity of the adolescent diagnosis. The similarity in prevalence and symptomatology of adult and adolescent BPD illustrates the importance of examining BPD symptoms as well as providing BPD diagnoses as early as in adolescence.

Lastly, research has also pointed to the flexibility of BPD characteristics in adolescents (Lenzenweger & Desantis, 2005), making adolescence a key period for diagnosis and intervention. Evidence tends to suggest that impulsive-type symptoms are higher in adolescence and decrease over time (e.g: Meares et al., 2011). This set of BPD symptoms are often the first

target of therapeutic intervention and undergo good recovery progress (Linehan, 1993; Mungo et al., 2020). Research and early intervention in adolescence are thus important for alleviating impulse-related acute symptoms and associated psychosocial disruptions (Cohen et al., 2005; Chanen et al., 2008). Unfortunately, there is often a delay in diagnosing and treating BPD due to underestimation of symptoms and hesitation to diagnose younger individuals, which can result in a less favorable outcome (Bozzatello et al., 2019; Fonagy et al., 2015; Sharp, 2017). This is particularly the case for patients who develop BPD early on, as the period of time without diagnosis and subsequent therapeutic interventions for the disorder is even longer (Bozzatello et al., 2021). The development of BPD in adolescence, similarity in prevalence and symptoms, as well as potential changeability, highlight the importance of BPD research in adolescents as it advances understanding of BPD etiology and enables a close examination of proximal risk factors and provides insight on early intervention.

Temperament and BPD in Adolescents

Despite increased recognition of adolescence as a critical developmental phase for BPD, research on temperamental factors of BPD in adolescents remains limited. Literature has supported the continuity of temperamental traits from adolescence to adulthood (Beauchaine et al., 2009). Importantly, dispositional traits such as those in the FFM have been shown to be readily observable and able to be evaluated in pre-adolescent and adolescent children (McAdams & Olson, 2010; Sharp & Wall, 2017). Moreover, many studies have examined and corroborated the stability of temperamental traits prior to adulthood (McCrae et al., 2002; Allik et al., 2004; De Fruyt et al., 2006; Tackett et al., 2008; Pullman et al., 2006; Vaidya et al., 2002; Bornovalova et al., 2009). For instance, Tackett et al. (2008) conducted a longitudinal study of 1408 children to find that personality traits rated by parents at age 11 significantly predicted analogous self-

reported traits at age 17. Similarly, Pullman et al. (2006) surveyed school children and found that 82% of adolescents demonstrated no changes in FFM facet levels over two years, suggesting that temperamental traits remain consistent over time in adolescents. Thus, the continuity and stability of temperamental traits over time might denote FFM temperaments as capable of illustrating important individual differences underlying and contributing to BPD psychopathology across the developmental process.

While research on FFM facets specific to adolescents with BPD is less extensive compared to the adult literature, clinical studies available to date have generally confirmed similar relationships between temperamental traits and BPD psychopathology (Jennings et al., 2012; Hessels et al., 2014). Jennings et al. (2012) measured neuroticism and agreeableness in clinical samples of adolescents with full (met five criteria for BPD in DSM-IV, n=19) or sub-syndromal BPD (met three to four criteria for BPD in DSM-IV, n=11) and had findings congruent to adult research showing that BPD adolescents reported lower levels of agreeableness and higher scores on neuroticism. Hessels et al. (2014) also found that outpatient adolescents with a higher BPD severity scored lower on agreeableness compared to outpatients with other psychiatric disorders.

Additionally, community sample studies found comparable associations between FFM traits and BPD diagnosis in adolescents, suggesting that high neuroticism, low extroversion, low agreeableness, and low conscientiousness are predictive of BPD psychopathology in adolescents (De Clercq et al., 2004; Decuyper et al., 2009). Overall, the current available research seems to support a similar demonstration of temperamental traits in adolescents as adults, supporting high neuroticism and low agreeableness as central features to BPD psychopathology, with nuanced results with regards to conscientiousness and extraversion. Such similarities indicate the

possibility of substantial homotypic continuity in traits that comprise BPD in the course of development, from adolescence through adulthood. However, researchers in many studies (e.g.: De Clercq et al., 2004; Decuyper et al., 2009) adopted convenience samples of nonclinical adolescents such as undergraduate students. Diagnosis of BPD and measurement of constructs often relied solely on self-reports, and the number or percentage of participants that met criteria for BPD was not disclosed.

Childhood Adversity and BPD in Adolescents

Similar to the adult literature, research has shown abuse and neglect in childhood to be predictive of later BPD diagnosis and symptoms in adolescence and young adulthood in both community samples and clinical populations (Venta et al., 2012; Zanarini et al., 2020; Lyons-Ruth et al., 2013). Multiple studies concluded childhood adversities are significantly associated with BPD development in community populations. For example, Jovev et al. (2013) found that childhood abuse and neglect were significant predictors of an increase in BPD symptoms over two years. Findings from the Children in Community (CIC) Study, a longitudinal study tracking over 800 youth, showed childhood abuse and neglect to be associated with elevated levels of BPD symptoms in adolescence and young adulthood, after controlling for age, parental education, history of parental psychiatric disorders, and symptoms of other personality disorders (Cohen et al., 2005; Johnson et al., 2000). Specific facets of childhood neglect, such as role confusions and disoriented behaviors in parent-child relationships, were also associated with self-injury in adolescents from low-income families (Lyons-Ruth et al., 2015). Johnson et al. (2001) also found that children subjected to maternal verbal abuse were more than three times as likely to develop BPD during adolescence or early adulthood than those with verbal abuse.

More recently, research has started to examine the link between childhood adversity and BPD diagnosis or psychopathology in clinical adolescent populations. Turniansky et al. (2019) found that prolonged sexual abuse is associated with higher severity and frequency of BPD symptoms including suicide, self-injury, substance use, and impulsivity among female adolescent inpatients with BPD. Another study on female adolescents with BPD found that the presence of physical or sexual abuse in childhood was associated with higher rates of suicide attempts and non-suicidal self-injury (Kaplan et al., 2016). In addition to physical and sexual abuse, physical and emotional neglect were also commonly associated with adolescents with BPD (Zanarini et al., 2020). Zanarini et al. (2020) found that severity of abuse and neglect served as risk factors for BPD diagnoses among adolescent inpatients. Interestingly, other studies comparing adolescents with BPD and other psychiatric disorders discovered that neglect by as well as overprotection from caretakers were correlated with BPD (Bozzatello et al., 2021; Winsper et al., 2016). Systematic reviews available on the subject concluded that aspects of parenting in a familial environment — such as rejection, maternal inconsistent treatment, over-involvement, and role reversal — served as significant psychosocial risk factors for BPD development in adolescents (Bozzatello et al., 2021; Winsper et al., 2016). According to Schuppert et al. (2015), high maternal rejection is predictive of high severity of BPD symptoms among adolescents with BPD.

Overall, available adolescent research aligns with adult literature. Cross-sectional and longitudinal studies tend to suggest that adverse childhood experiences of abuse and neglect are predictive of BPD psychopathology and its severity among adolescents with BPD (Robin et al., 2021; Infurna et al., 2016; Reichl et al., 2019).

Gaps in Research

With a growing emphasis on early onset and detection of BPD, there has been emerging research exploring etiological factors, namely temperamental features and environmental influences of BPD in adolescence. However, in comparison with the adult literature, there ultimately remain several vital gaps in current research that warrant future attention.

First, there is insufficient research on FFM temperamental factors in adolescents with BPD, with existing research yielding inconsistent findings regarding conscientiousness and extraversion. Moreover, compared to the adult literature, existing adolescent studies are subject to various limitations including a lack of clinical samples (e.g., reliance on undergraduate student populations), heavy reliance on self-reports to diagnose BPD, and selective measurement of FFM constructs. Furthermore, although there is ample research to suggest childhood adversities as predictive of severity of psychopathology among adolescents with BPD, most research has focused on acute symptoms translatable to other personality disorders and psychiatric disorders, namely self-destructive tendencies such as suicide and self-injury. More research on the severity of psychopathology specific to BPD is necessary to reliably examine the relationship between environmental factors—specifically childhood adversity—and BPD.

Current Study: Aims & Hypothesis

Deriving from gaps in current adolescent research, the present study has two aims. First, this study aims to compare severity of childhood adversity (sexual abuse, other forms of abuse, and neglect) and levels of FFM temperament traits between BPD adolescents and psychiatrically healthy adolescent comparison subjects. This aim attempts to fill the first mentioned gap in research. Secondly, this study aims to predict severity of psychopathology in adolescents with BPD with these same factors. This aim attempts to fill the second mentioned gap in research.

It is hypothesized that (1) compared to psychiatrically healthy adolescent comparisons, adolescents with BPD will report higher levels of neuroticism and lower levels of extraversion, agreeableness, and conscientiousness; (2) adolescents with BPD will report higher instances of reported abuse (sexual and other) and neglect from childhood than psychiatrically healthy adolescents; (3) neuroticism will be positively associated with severity of BPD psychopathology among adolescents with BPD; and (4) severity of sexual abuse, other types of abuse, and neglect will all be positively associated with severity of BPD pathology among adolescents with BPD.

Method

Participants

Institutional review boards at the participating institutions (McLean Hospital and Icahn School of Medicine at Mount Sinai) approved all study procedures prior to the initiation of any recruitment and study procedures. Recruitment began in August 2007 and concluded in September 2012. During that time, 104 adolescents ages 13 to 17 years old with presumptive BPD were recruited from four psychiatric units at McLean Hospital (70 adolescents) and one unit at the Icahn School of Medicine at Mount Sinai (34 adolescents). During the same time, 60 psychiatrically healthy, community dwelling adolescents of the same age range were recruited through online advertisements. Thirty-five of these comparison subjects were recruited in the Boston area and 25 in the New York City area. Each site placed an advertisement on Craigslist (a free online advertising platform in the United States) that targeted parents, asking whether they had an emotionally healthy child between the ages of 13 and 17. Phone screens were administered when parents contacted research personnel, and eligible adolescents and their parents were invited to a comprehensive interview at McLean Hospital or Icahn School of Medicine at Mount Sinai.

For all adolescents, written consent from a parent was obtained and assent was obtained from the adolescent. Three semi-structured diagnostic interviews were administered to both adolescent groups, including (1) the Structured Clinical Interview for DSM-IV Childhood Diagnoses (KID- SCID; Matzner et al., 1997); (2) the Revised Diagnostic Interview for Borderlines (DIB-R; Zanarini et al., 1990); and (3) the Childhood Interview for DSM-IV Borderline Personality Disorder (CI-BPD; Sharp et al., 2012).

Inclusion criteria for all participants included having a known or estimated IQ of 71 or higher. For inclusion in the adolescent BPD group, subjects had to meet both DIB-R and DSM-IV criteria for BPD at the time of screening. Exclusion criteria for BPD adolescents were a prior or current diagnosis of schizophrenia, bipolar I disorder, or serious medical conditions that could result in psychiatric symptoms. Exclusion criteria for psychiatrically healthy adolescents was a history of any psychiatric disorder.

Materials

To assess adverse experiences before the age of 18, all participants were administered the Revised Childhood Experiences Questionnaire (CEQ-R), which has good psychometric properties (Zanarini et al., 1989). The CEQ-R is a semi-structured interview that assesses 4 forms of abuse (emotional, verbal, physical, sexual abuse by caretaker and sexual abuse by non-caretaker) and 7 forms of neglect (physical neglect, emotional withdrawal, inconsistent treatment, denial of patient's feelings, lack of real relationship with caretaker, assuming the role of caretaker, caretaker's failure to offer protection). For an item to receive a positive (present) rating, participants were required to provide detailed information about the event. In addition to dichotomous scores, this instrument yielded three continuous scores representing the severity of three major types of pathological childhood experience: sexual abuse, other forms of abuse and

neglect. These scores were derived by adding up the total number of positive ratings for each type of experience across each age period from 0-5 (early childhood), 6-12 (middle childhood) and 13-17 (adolescence). Separate ratings were given for each caretaker for two primary caretakers, typically a subject's mother and father.

To assess temperamental factors, participants completed the NEO Five-Factor Inventory-3 (NEO-FFI-3) (McCrae & Costa, 2007). The psychometric properties have been supported in adult and adolescent samples (McCrae & Costa, 2007), with retest reliability ranging from 0.86 to 0.90 for five scales (Robins et al., 2001) and internal consistency ranging from 0.68 to 0.86 (Costa & McCrae, 1992). The NEO-FFI is a 60 item self-report measure, assessing five different temperamental factors. Each of the five features (neuroticism, extraversion, conscientiousness, agreeableness, openness) was assessed with 12 items on a five-point Likert self-report rating scale from "strongly disagree" to "strongly agree", resulting in continuous scores for each temperament. The score range for each of the five temperaments was 0 to 4 for each item, with the overall range being 0 to 48 for all 12 items. Higher scores indicate higher levels of each temperament factor.

The severity of BPD psychopathology was indicated by the total score of the Revised Diagnostic Interview for Borderlines (DIB-R). The DIB-R is diagnostic instrument designed solely for the identification of individuals with borderline personality disorder in the form of a semi-structured interview. High test-retest reliability and inter-rater reliability were found for the instrument (Zanarini et al., 2002). Detailed constructs and measurements of the DIB-R were elaborated elsewhere (Zanarini et al., 1989). Briefly, the DIB-R consists of four sections that are clinically important to the diagnosis of BPD: affect, cognition, impulse action patterns, and interpersonal relationships. It has a total of 186 questions that are later used to rate 22 summary

statements that describe important features of BPD. The summary statements in each section are summed to yield a section score with different score ranges for each section: 0-10 in affect section, 0-6 in cognition section, 0-10 in impulse action session and 0-18 in interpersonal relationships section. The total score of four sections, ranging from 0-44, is used to indicate severity of overall BPD psychopathology. Higher scores correspond to greater levels of symptom severity.

Statistical Analyses

All analyses were run using Stata version 16.1. Between-group differences of demographic variables (age, sex, race) were calculated using *t*-tests for continuous variables and Pearson's chi-squared tests for binary variables. Mean NEO temperament scores and severity of childhood adversities for each study group were calculated using *t*-tests. Logistic regressions were then conducted to compare adversity and temperament scores between adolescents with BPD and psychiatrically healthy adolescents. Analyses pertaining to two groups of adolescents were conducted controlling for age and sex.

Eight univariate linear regressions were conducted to examine the predictive qualities of temperamental traits (5) and childhood adverse experiences (3) on the severity of BPD pathology in adolescents with BPD. All significant univariate predictors were then added to a multivariate regression model using backwards deletion to obtain significant multivariate predictors ($p < 0.01$).

Results

The demographic characteristics of these two study groups of adolescents are described in Zanarini et al. (2017). Briefly, the racial composition (about a third non-white) and socioeconomic status were similar across the two adolescent groups. However, adolescents with BPD were significantly more likely to be female than psychiatrically healthy adolescents (94.2%

vs. 83.3%). BPD adolescents were also significantly older than comparison group subjects by about one year ($M = 15.7$; $M = 14.8$). For adolescents with BPD, lifetime comorbidities were reported, with common comorbidities being major depression (75.0%), substance abuse disorder (35.6%), eating disorders (30.8%), dysthymia (26.0%), social phobia (26.0%), panic disorder (24.0) and posttraumatic stress disorder (22.1%; Zanarini et al., 2021).

Table 1 describes the mean scores and standard deviations of the eight variables of interest in this paper (5 temperament traits and 3 childhood adverse experiences) controlled for age and sex. There were significant differences in the mean values of all eight variables at the $p < .05$ level. Regarding NEO scores, compared to psychiatrically healthy subjects, adolescents with BPD had significantly higher scores on neuroticism while having significantly lower scores on extroversion, openness, agreeableness, and conscientiousness. For childhood adversity variables, adolescents with BPD scored significantly higher on severity of all three types of these experiences, including severity of sexual abuse ($p < 0.05$), severity of other abuse ($p < 0.001$), and severity of neglect ($p < 0.001$), compared to psychiatrically healthy adolescents.

Table 1

NEO Personality Traits and Childhood Adversity of Adolescents with BPD and Psychiatrically Healthy Comparison Adolescents

	Adolescent BPD		Psychiatrically Healthy Adolescents		Adolescent BPD vs. Psychiatrically Healthy Adolescents	
	Mean	SD	Mean	SD	Coefficient	p
Neo Five Factors						
Neuroticism	33.79	7.49	16.98	6.66	0.79	<0.001
Extroversion	25.19	7.29	31.6	5.68	-0.28	<0.001
Openness	26.8	6.19	29.59	6.62	0.11	0.042
Agreeableness	26.38	7.5	33.45	5.79	-0.4	<0.001
Conscientiousness	23.3	8.34	31.73	6.65	-0.43	<0.001
Childhood Adversity						
Severity of Sexual Abuse	0.32	0.73	0	0	0.01	0.003
Severity of Other Abuse	2.09	3.06	0.2	0.78	0.09	<0.001
Severity of Neglect	5.58	6.74	0.42	1.29	0.23	<0.001

Logistic regression controlled for age and sex for comparison between adolescents with BPD and psychiatrically healthy adolescents.

In univariate linear regression analyses, three variables significantly predicted DIB-R scores in adolescents (see Table 2). These variables were neuroticism, severity of other abuse and severity of neglect, all of which positively predicted the severity of BPD psychopathology in adolescents with BPD.

Table 2

Univariate Predictors of the Severity of BPD Psychopathology in Adolescents

	Coef.	SE	t	p	95% CI
Neo Five Factors					
Neuroticism	1.83	0.52	3.5	0.001	0.79, 2.87
Extroversion	0.69	0.56	1.23	0.222	-0.43, 1.81
Openness	0.86	0.62	1.38	0.171	-0.38, 2.09
Agreeableness	-0.37	0.59	-0.64	0.526	-1.54, 0.79
Consciousness	-0.21	0.5	-0.43	0.667	-1.20, 0.77
Childhood Adversity					
Severity of Sexual Abuse	3.73	5.69	0.66	0.513	-7.55, 15.02
Severity of Other Abuse	3.41	1.31	2.6	0.011	0.80, 6.02
Severity of Neglect	1.37	0.6	2.28	0.024	0.18, 2.56

However, in multivariate regression modeling in which all variables were entered simultaneously (Table 3), only neuroticism and severity of other abuse remained significant predictors of DIB-R scores in BPD adolescents.

Table 3

Significant Multivariate Predictors of the Severity of BPD Psychopathology in Adolescents

	Coef.	SE	t	p	95% CI
DIB-R Total Score					
Neuroticism	2.01	0.50	4.00	<0.001	1.01, 3.01
Severity of Other Abuse	3.97	1.24	3.21	0.002	1.52, 6.42

Discussion

Findings

The present study yielded two main findings regarding the role of temperament and childhood adversity in the severity of psychopathology of BPD in adolescents. The first main finding was that the temperamental trait of neuroticism was a significant predictor of the severity of BPD psychopathology in adolescents, such that higher neuroticism scores were related to higher DIB-R scores. This finding was consistent with our hypotheses and may be explained by the clinical overlap between the construct of neuroticism and the DIB-R criteria of BPD including affective instability, feelings of emptiness and intense or inappropriate anger. This also aligns with past literature that has demonstrated the relationship between negative affectivity and the BPD diagnosis and symptoms in adolescence (Stokes et al., 2019) and adulthood (Laporte et al., 2011; Martín-Blanco et al., 2014; Stepp et al., 2016). This finding expands past research to suggest that adolescents with higher levels of neuroticism are more likely to suffer from more severe presentations of BPD.

The second main finding of this study was that severity of other abuse (emotional, verbal, and physical abuse) was a significant predictor of DIB-R scores in adolescents. Similar to neuroticism, this finding aligns with previous literature relating severity of abuse and severity of BPD symptoms in adults (e.g., Chiesa et al., 2016; Zanarini et al., 2002). This finding also aligns with the limited available data on this relationship among adolescents with BPD, though most studies to date focused on acute impairing symptoms such as non-suicidal self-injury (NSSI) and suicidality (eg: Kaplan et al., 2016), rather than the full profile of BPD symptoms. Moreover, while the current study found severity of other abuse to be a significant predictor of BPD severity, a previous study using the same sample as the current study found severity of neglect to

be a predictor of BPD diagnosis (Zanarini et al., 2020). This raises an interesting question on the differential predictors of the presence versus the severity of BPD. In addition, the severity of abuse and neglect, but not their presence, was significantly different across adolescents with BPD and psychiatrically healthy adolescents (Temes et al., 2017). Taken together, potential interpretations are 1) the severity, rather than the mere presence, of adversities is a key factor for BPD in adolescence; and 2) while both abuse and neglect remain important risk factors to consider, the severity of emotional, physical and verbal abuse appear to be a better predictor of clinical severity in adolescent inpatients with BPD above and beyond other factors.

Contrary to the hypotheses and past research emphasis on the centrality of sexual abuse to BPD etiology, the current study did not identify a significant association between the severity of sexual abuse and the severity of BPD among adolescents. While past research generally identified childhood sexual abuse as a risk factor for BPD diagnosis in adults (Bandelow et al., 2005; Huang et al., 2012) and adolescents (Infurna et al., 2016; Venta et al., 2012), and for BPD severity in adults (Menon et al., 2016; Turniansky et al., 2019; Zanarini et al., 2002), the present finding points out the possibility that sexual abuse is not a predictor of BPD severity among adolescents diagnosed with the disorder. This finding supports the framework that sexual abuse is neither necessary nor sufficient for the development of BPD (Zanarini, 1997; Fossati et al., 1999). Prevalence studies also found that only 1.8% to 29.3% of victims of childhood sexual abuse developed BPD in adulthood (Cutajar et al., 2010; Katerndahl et al., 2005; Widom et al., 2009).

The absence of effect of severity of sexual abuse in the current study might be explained by the relatively lower prevalence and severity of sexual abuse (23.1%) compared to other abuse (emotional: 26.9%; verbal: 41.3%; physical: 26.0%) and neglect (74.0%) in our sample (Temes

et al., 2017; Temes et al., 2020). Compared to adult samples, the prevalence and duration of sexual abuse were significantly lower in adolescents (Temes et al., 2017). The lower prevalence of sexual abuse in the current sample might be explained by the salient nature of sexual abuse compared to other types of adversities and higher awareness of its consequences, resulting in more protective caretaker attitudes and fewer recurrences of sexual abuse. In addition, the current study examined the severity of sexual abuse as a single construct while there could have been more nuanced aspects of sexual abuse that are associated with clinical severity, such as its duration, frequency, and relationship with abuse perpetrator. For instance, a study focusing on prolonged sexual abuse found that female inpatients with BPD who had a history of prolonged sexual abuse experienced more severe clinical presentations of BPD (Turniansky et al., 2019). Another possibility is that the experience of sexual abuse is more closely related to some but not all BPD psychopathology. Past research in adults and adolescents alike found childhood sexual abuse to be predictive of the severity of suicidality (Ferraz et al., 2013; Kaplan et al., 2016; Menon et al., 2016; Zanarini et al., 2002), NSSI (Kaplan et al., 2016; Zanarini et al., 2002), and incoherences in identity such as dissociative experiences and identity disturbance (Menon et al., 2016; Wilkinson-Ryan & Westen, 2000). It is possible that the severity of childhood sexual abuse is a better predictor of specific and acute BPD symptoms rather than overall BPD psychopathology. This finding is otherwise consistent with a study that did not find an association between sexual abuse and overall BPD severity in adults (Martín-Blanco et al., 2014).

Overall, the two main findings that neuroticism and severity of other abuse were unique predictors of BPD severity in adolescents support the biosocial model of BPD (Linehan, 1993) and other major theories on the etiology of BPD (Bozzatello et al., 2021; Crowell et al., 2009;

Fruzzetti et al., 2005) that highlight the complex nature of BPD development as an interaction between inheritable individual traits and environmental factors. They also align with evidence for temperament and adversities as mutually influential and interactive throughout the course of BPD development (Stepp et al., 2014; Franssens et al., 2021).

Limitations

Several potential limitations should be considered regarding the study findings. First, the sample consisted of adolescent inpatients with BPD; therefore, findings might not be generalizable to patients with less severe BPD. Studies on outpatients with BPD might be more indicative of the relationship between severity of constructs and BPD for adolescents with less severe BPD. Moreover, the study did not take into account the adolescents who never received treatment for BPD. Community-dwelling individuals who have BPD but did not enter any form of treatment programs for financial hardship, familial resistance or lack of awareness might have a different background and accordingly different predictors of psychopathology. While retrospective assessment of childhood adversities might induce inaccuracy through memory bias, we used standardized semi-structured interviews and asked for detailed descriptions of events to reduce such bias. Still, our study utilizes a cross-sectional design in nature and cannot lead to conclusions on BPD psychopathology over time.

Conclusions and Future Directions

The study findings add to existing literature by looking at continuous predictors of the severity of BPD psychopathology using a clinical sample of adolescents. More specifically, the results extend beyond adult samples to show that the severity of temperamental traits and childhood adversities might predict the clinical severity of BPD in adolescents.

This study also has important clinical implications for the treatment of BPD. First, it might be beneficial for clinicians to take into consideration not only the presence of adverse childhood experiences, but also the severity of these experiences, when making clinical evaluations. Secondly, the severity of abusive experiences not only refers to intense and traumatic experiences, but also less prominent forms of abuse (emotional and verbal) that may be more chronic and recurring over time. It could be helpful to target various forms of abusive experiences instead of focusing solely on prominent adversities (such as sexual abuse, that has previously been highlighted) when treating adolescents with BPD.

Additionally, it becomes important for clinicians to acknowledge that the severity of both temperament features and adversity serves as predictors for the severity of BPD symptoms. For adolescents that demonstrate less severe clinical presentations of BPD but report high levels of neuroticism and/or abusive experiences, preventative interventions could be considered to avert an increase in severity of symptoms over time. While arbitrary categorization of patients is not recommended, it might be effective to note patients with BPD who report more adversities and patients with more temperamental difficulties pertaining to neuroticism; as the former might benefit initially from trauma-specific treatment that directly address their experiences, whereas the latter might warrant interventions geared towards acceptance and understanding of their affectivity, interpersonal relationships and lifestyle as natural products of their temperament (Hopwood et al., 2012).

Future research should examine risk factors of BPD severity using outpatient populations or community-dwelling adolescents with BPD to compare if these findings are generalizable to a broader population. The present study adopted a linear model when studying the relationship between severity of constructs and BPD, but it remains unknown the effect of potential

moderators in these relationships. For instance, future studies can look at if neuroticism moderates the relationship between adversities and BPD severity. It might also be informative to examine the severity of diverse types of abuse as risk factors of severity of different BPD symptoms to determine the respective role of adversity to BPD prognosis. In addition, the current study explored different types of adversities as isolated constructs when there have been theories (Chiesa & Fonagy, 2014), evidence in BPD research (Kaplan et al., 2016), and general clinical research (Green et al., 2000; Warmingham et al., 2019) pointing to the co-occurrence of different adversities as contributing to psychopathology and its severity. More studies can potentially probe into the co-occurrence of various adversities to see if cumulative adverse experiences (eg.: the number of adversities) contribute to the severity and prognosis of BPD in adolescents.

Taken together, results from the current study suggest that heightened neuroticism and severe childhood adversity focusing on other abuse experiences are uniquely predictive of more severe BPD scores in adolescents. These findings generally converge with past research on adults and expand the adolescent literature to suggest the centrality of both temperament and adversity for the clinical severity of BPD in adolescents.

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