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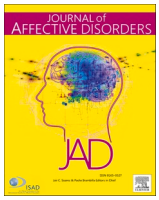

Research paper

An evidence-based integrated process framework of borderline personality disorder clinical features: Insights from the general population

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ABSTRACT

Background: Empirical and clinical models of borderline personality disorder (BPD) have hypothesized different core dimensions that should explain its phenotypic variability. Nevertheless, no previous studies have directly explored how these dimensions might interplay in capturing BPD features. The current study investigated the role of emotional dysregulation (ED), behavioral dysregulation (BD), dissociative processes reflecting altered self functioning (ASF) and interpersonal sensitivity (IS) in predicting a probable diagnosis of BPD and its clinical features.

Methods: A sample of 694 adults from the general population was recruited. An online self-report assessment battery composed of SCID-5-BPD, DERS, UPPS-P, DES-II and RSQ-A was administered. The analyses were based on the application of logistic regression, structural equation modeling (SEM) and path analysis.

Results: ED had the largest predictive power for BPD diagnosis and each BPD criterion compared to the other dimensions, followed by DOS and BD. IS had an incremental predictive power for BPD diagnosis and affective BPD criteria above and beyond the effects of ED, ASF and BD. SEM and path analysis showed that these dimensions were organized around internalizing (ED, ASF, IS) and externalizing (BD) factors significantly correlated to each other. The internalizing factor had the most influential impacts in predicting BPD psychopathology.

Conclusion: These findings provisionally supported an integration of the most influential clinical models of BPD considering how ED, ASF, BD and IS interplay to each other in capturing the clinical variability of this condition. Future clinical and longitudinal studies are needed to corroborate the current insights from the general population.

1. Introduction

Borderline Personality Disorder (BPD) is a severe mental disorder characterized by a pervasive pattern of instability in affect regulation, impulse control, interpersonal relationships, and self-image (APA, 2013, 2022). The validity and reliability of BPD diagnostic criteria have been robustly supported through a huge amount of empirical data (Carcone et al., 2015; Leichsenring et al., 2024; Zimmerman and Balling, 2021), and they remain substantially unaltered from the DSM-III-R (APA, 1987) to the most recent DSM-5-TR (APA, 2022).

However, the heterogeneity of BPD clinical manifestations, especially referring to DSM conceptualization, represents a historical problem. For instance, Skodol et al. (2002) showed that 251 different combinations of criteria can lead to a BPD diagnosis. Similarly, Johansen et al. (2004) reported that among 252 patients diagnosed with BPD, 136 unique combinations of diagnostic criteria emerged, and only six patients met an identical configuration of criteria. Subsequent to this evidence, several studies were conducted in order to capture latent factors that could explain such phenotypic heterogeneity. Two main approaches have been used to reach this goal: i) a factor analytic one that explores the structure of BPD criteria; ii) a cluster analytic one that identifies different BPD subtypes.

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Recently, two systematic reviews were conducted to summarize empirical findings on this topic. Triantafyllou et al. (2025a) discussed results of 27 factorial analytic studies evaluating the structure of BPD criteria. Their results showed that 13 studies based on exploratory factorial analysis and 5 studies using confirmatory factorial analysis supported a multidimensional model of BPD criteria. Only 9 studies highlighted an unidimensional model of BPD diagnosis. Looking at the multi-factorial models, the most replicated (12 studies) factorial structure is represented by a 3-factor model. Specifically, several studies are consistent in replicating a model composed of the following symptomatologic factors: i) "*disordered self*" symptoms (identity disturbance and emptiness); ii) "*affective symptoms*" (affective instability and anger); iii) *behavioral symptoms* (impulsivity and self-harming behaviors). However, results were heterogeneous when considering the factor loading of BPD symptoms capturing interpersonal dysfunctions (i.e., fear of abandonment, unstable relationships) and stress-related dissociation. When considering studies that supported a 2-factor model ($N = 5$), interpersonal criteria were grouped with behavioral dysregulation (BD) manifestations (e.g., impulsivity, self-mutilating behaviors) and the other factor was composed of affective symptoms (e.g., affective instability and inappropriate anger). The review by Triantafyllou et al.' (2025a) found that only one study (Selby and Joiner Jr, 2008) supported a 4-factor model identifying the following domains: *affective dysregulation* (anger, affective instability), *cognitive disturbance* (dissociation under stress, abandonment avoidance), *disturbed relatedness* (chaotic relationships), and *behavioral dysregulation* (suicide and self-injury behaviors). However, the organization of BPD psychopathology into these four components was proposed in other factorial analytic studies (Becker et al., 2006; De Moor et al., 2009; Gunderson et al., 2011) not included in the previously mentioned review.

Focusing on cluster analytic studies, Triantafyllou et al. (2025b) identified 29 studies that examined the existence of BPD subtypes by investigating how groups of patients share specific patterns of BPD diagnostic criteria and psychiatric comorbidities. They concluded that empirical research seems to be consistent in identifying three main BPD subtypes based on internalizing-externalizing poles and a gradient of severity: i) prevalently internalizing (e.g., high emotional distress, mood instability, depression, anxiety, and self-harm); ii) prevalently externalizing (e.g., impulsivity, anger, substance use, and interpersonal aggression); iii) combined expression of both domains (Krueger et al., 2021). These subgroups might be further categorized based on severity of psychosocial maladjustment (e.g., general psychopathology, social functioning, quality of life).

Taken together, findings from factor analytic and cluster analytic studies suggest that three main factors are involved in explaining the heterogeneity of BPD manifestations. At the opposite extremes of the psychopathological spectrum, an internalizing dimension emerges, primarily associated with emotional dysregulation (ED), while an externalizing factor evident as behavioral dysregulation (BD). This structural organization of BPD psychopathology is also in line with longitudinal data on developmental trajectories of this condition, which highlighted overlapping impacts of internalizing and externalizing developmental psychopathology on the emergence of BPD (Cavicchioli et al., 2024). The third factor captures an altered self functioning (ASF) (e.g., sense of continuity and coherence of the self and of identity) (Kerr et al., 2015), which is considered one of the most relevant factors positively associated to levels of BPD severity and maladjustment (Sharp and Wall, 2021). Consistent with this view together with well-recognized BPD clinical features and related key psychopathological mechanisms, meta-analytic evidence shows that levels of dissociation — frequently measured via instruments such as the Dissociative Experiences Scale (DES; Bernstein and Putnam, 1986; Carlson and Putnam, 1993) — are significantly elevated in BPD populations and reflect structural disruptions in self-identity and identity continuity (Scalabrini et al., 2017). Moreover, recent works (Cavicchioli et al., 2023a, 2023b, 2023c; Krause-Utz, 2022) indicate that dissociative dimensions mediate the relationship between emotion regulation deficits and BPD symptoms, supporting the role of dissociation not merely as epiphenomenon but as a proxy for ASF.

Ultimately, some studies also identified a fourth independent domain concerning interpersonal problems, although this evidence seems to be partially corroborated by empirical research.

1.1. Latent factors of BPD and related clinical theories

The DSM conceptualization of BPD and related studies exploring latent factors organizing its phenotypic characteristics have assumed an atheoretical perspective toward the disorder. Nevertheless, it is possible that the aforementioned dimensions proposed to explain the variability of the clinical manifestation of BPD may in fact overlap with competing clinical theories that assume distinct core psychopathological mechanisms form the basis of BPD psychopathology (Gunderson et al., 2018).

Linehan's biosocial model (Linehan, 1993, 2015) hypothesizes that the core internalizing feature of BPD is represented by ED, which emerges from repetitive transactions between a biological emotional vulnerability and effects of invalidating environments. Consistent with this theoretical framework, BPD affective symptoms (e.g., affective instability, anger outbursts, emptiness) reflect biological vulnerabilities of emotional systems; whereas, the other key behavioral (e.g., impulsive, self-harm, suicidal behaviors) and interpersonal (e.g., unstable relationships due to clinging or hostile attitudes) problems are viewed as maladaptive attempts to regulate distressing emotions elicited by internal and external situations.

With respect to the proposed externalizing factor and related to BD, several previous studies (e.g., Depue and Lenzenweger, 2001; Paris, 2005; Siever and Davis, 1991) have posited trait-based models of BPD, proposing that the emergence of the clinical features of BPD should be viewed as a result of complex interactions among basic temperamental inabilities to modulate impulses and behaviors (Depue and Collins, 1999; Gray, 1987), internalizing affective symptoms (e.g., dysphoria and emotional instability) and negative environmental feedback loops from childhood to early adulthood (Crowell et al., 2009; Paris, 2003). This hypothesis is in line with results of an extensive meta-analysis conducted by Ringwald et al. (2023) departing from the HiTOP model of psychopathology (Kotov et al., 2017). Particularly, the synergistic effects between externalizing and internalizing dimensions in understanding BPD psychopathology might be captured by meta-analytic findings that showed how this condition equally and moderately loaded within both internalizing and externalizing HiTOP spectra.

Looking at the ASF, two main clinical theories have considered it as a core feature of BPD. First, Kernberg's (1967, 1984, 1985) theory of BPD has postulated that its clinical manifestations should be viewed as consequences of non-integrated self-other representations (identity diffusion) that are sustained by a coordination of two basic defence mechanisms, namely splitting and dissociation. The splitting serves to separate contradictory self- and object-representations to protect the fragile, unintegrated identity structure from being overwhelmed by ambivalence and anxiety. Whereas, dissociation is considered a secondary, state-dependent defensive phenomenon that involves a temporary breakdown in the continuity of consciousness, memory, perception, or sense of self in response to overwhelming affective reactions. Therefore, dissociation accentuates the lack of integration of self representation. On the contrary, other clinical perspectives (e.g., Liotti, 2004, 2013; Meares, 2012; Mucci, 2018; Farina and Meares, 2022) have posited that the core feature of BPD is represented by a fundamentally fragmented self, stemming from structural dissociation, which undermines regulatory systems of emotions, behaviors and interpersonal functioning through profound disconnection among these domains.

Lastly, the interpersonal factor, which was provisionally found as an independent dimension from the other domains of BPD psychopathology, should be connected to the Interpersonal Hypersensitivity theory (Gunderson and Lyons-Ruth, 2008). According to this clinical model, the

temperament of people with BPD is characterized by anxious and/or depressed mood. However, well-recognized BPD mental states (e.g., anger reactions) and maladaptive behaviors (e.g., self-harm, suicide attempts, substance use or promiscuity) representing their diagnostic criteria are triggered by a genetic predisposition to hypersensitivity and excessive reactivity to interpersonal cues, especially those linked to social rejection, abandonment or separation.

Therefore, each theory of BPD emphasizes the centrality of a specific latent factor as a core psychopathological mechanism explaining the phenotypic variability of this condition. The previously mentioned meta-analytic reviews of factor and cluster analytic studies (Triantafyllou et al., 2025a, 2025b) have empirically shown how these latent psychopathological dimensions are associated with BPD manifestations. Nevertheless, there are no studies that have directly investigated the ways in which these mechanisms interact to better explain BPD features.

1.2. The present study

Building on empirical evidence and clinical theories of BPD outlined above, the aims of the current study are:

i) Testing the predictive power of ED and BD together with ASF and interpersonal dysfunctions, for both probable BPD diagnosis and each specific clinical manifestation of BPD as conceptualized by the DSM;
ii) Comparing the goodness of fit of different structures of the previous core dimensions and their predictive role on BPD psychopathology;
iii) identifying the best-fitting model capturing how the core psychopathological dimensions are related to each other to explain the variability of BPD features, with the aim of provisionally outlining a process model of BPD clinical manifestations.

According to available empirical evidence on BPD, the externalizing/BD dimension was explored in the present study according to the construct of emotional urgency (Lynam et al., 2007), which reflects the tendency to engage BD in the context of negative and positive affectivity (Bøen et al., 2015; Fossati et al., 2014; Linhartová et al., 2020; Peters et al., 2013; Sylvia et al., 2025). Considering the domain of ASF, dissociation was chosen as the most representative dimension based on clinical models and neurobiological evidence suggesting its crucial maladaptive effects on self-development and organization (Carlson et al., 2009; Şar and Öztürk, 2007; Scalabrini et al., 2020) together with empirical research that found relevant implications of dissociative processes for BPD (Cavicchioli et al., 2023a, 2023b, 2024; Scalabrini et al., 2017). Ultimately, the psychological dimension determined to underpin interpersonal problems in BPD was measured according to the construct of rejection sensitivity — the cognitive–affective processing disposition to anxiously expect, readily perceive, and intensely react (emotionally or behaviorally) to signals of interpersonal rejection (Downey and Feldman, 1996; Feldman and Downey, 1994). This was chosen according to clinical theory (Gunderson and Lyons-Ruth, 2008) and empirical data that have respectively posited and demonstrated robust associations between different features of this construct and BPD (Cavicchioli and Maffei, 2020).

Extending results of factorial analytic studies (Triantafyllou et al., 2025a), we explored the goodness of fit of several competing models capturing the structure of core psychopathological dimensions and their relationship with BPD:

i) a one-factor model for which observed ED and BD together with manifestations of ASF and interpersonal sensitivity (IS) load on a single latent dimension predicting BPD psychopathology;
ii) two-factor models where IS is loaded on the same latent dimension of BD (i.e., externalizing) and, ED and dissociative processes linked to ASF (Triantafyllou et al., 2025a) are grouped in a distinct factor (internalizing). On the other hand, we proposed an alternative model for which ED, ASF and IS are organized around the same latent factor (i.e., internalizing) and BD represents a distinct externalizing dimension;
iii) distinct three-factor model in which IS is included in each latent factor capturing ED, BD and ASF.

Similarly, we tested different combinations (see supplementary materials) of relationships among the core psychopathological dimensions of BPD to find how they might influence each other in predicting the phenomenology of the disorder.

2. Methods

2.1. Procedures

All participants were recruited from the general population using a snowball-like system procedure through an online survey via social networks (e.g., Facebook, Instagram, web forums). The survey was administered using Google Forms. People received an invitation that included a brief description of the study and an anonymous electronic link to the online survey. The participants took part in the study voluntarily and did not receive any compensation. The web survey was disseminated across social media platforms such as Facebook, Instagram, X, and Reddit, with particular attention to forums focused on mental health. Information on sociodemographic variables — sex, age, years of education, and job — together with general information regarding life-time and current psychological/psychiatric treatments was collected. No one of these variables was considered as an exclusion criterion. Inclusion criteria were: (1) age equal or higher than 18 years and (2) native or fluent Italian language speaker. The study was approved by the ethics committee of Sigmund Freud University (number of protocol: EDCRJ36DCBQI2591508).

2.2. Participants

A total sample of 694 adults (70.3 % female; mean age = 32.16 [SD = 16.60]) was recruited. The summary of descriptive statistics of sociodemographic variables is reported in Table 1. The mean number of self-report distinct BPD criteria was 3.86 (SD = 2.41) and, 42.8 % of participants met a self-report probable BPD diagnosis (i.e., ≥5 distinct criteria). Clinical characteristics linked to BPD are summarized in Table 1.

2.3. Measures

2.3.1. Structured Clinical Interview for DSM-5 Personality Disorders Self-Report Personality Questionnaire – BPD items (SCID-5-BPD) (First et al., 2016)

The SCID-5-BPD includes 15 true/false questions assessing BPD criteria according to DSM-5. The number of specific BPD criteria was computed by assigning a score of 1 to each affirmative response corresponding to a given criterion; these scores were then aggregated across all criteria (min: 0 – max: 9) to identify a probable BPD diagnosis (≥ 5 distinct criteria). These measures were used to conduct logistic regression and structural equation modeling analyses. Furthermore, questions to which participants responded 'true' were summed (min: 0 – max: 15) in order to provide a total score of BPD features. This measure was used to conduct path analysis.

2.3.2. Difficulties in Emotion Regulation Scale (DERS) (Gratz and Roemer, 2004)

The DERS contains items that reflect difficulties with the following aspects of emotional regulation: (a) awareness (*awareness* subscale) and understanding (*clarity* subscale) of emotions, (b) acceptance of emotions

Table 1
Descriptive statistics ($N = 694$).

	Mean (SD) [skewness; kurtosis]	N	%
Age	32.16 (16.60) [1.29; 0.53]		
Years of education	14.63 (2.89) [−0.44; 0.74]		
Females		488	70.3
Males		199	28.7
Not binary		7	1.00
Lifetime psychological and/or psychiatric treatments		306	44.10
University students		286	41.2
Unspecified freelancer		209	30.1
Office worker		48	6.9
Housewife		43	6.2
Unemployed		31	4.5
Teacher		26	3.8
Unspecialized worker		22	3.1
Health worker		8	1.2
Manager		7	1.0
Lawyer		9	1.3
Pensioner		5	0.70
No. true answers SCID-5-BPD	4.66 (3.55) [0.70; −0.05]		
No. specific BPD criteria	3.86 (2.41) [0.20; −0.89]		
Probable BPD diagnosis: ≥ 5 specific criteria		297	42.8
Frantic efforts to avoid real or imagined abandonment		527	75.9
A pattern of unstable and intense interpersonal relationships characterized by alternating between extremes of idealization and devaluation		220	31.7
Identity disturbance: markedly and persistently unstable self-image or sense of self		334	48.1
Impulsivity in at least two areas that are potentially self-damaging		330	47.6
Recurrent suicidal behavior, gestures, or threats, or self-mutilating behavior		67	9.7
Affective instability due to a marked reactivity of mood		374	53.9
Chronic feelings of emptiness		298	42.9
Inappropriate, intense anger, or difficulty controlling anger		49	7.1
Transient, stress-related paranoid ideation, or severe dissociative symptoms		142	20.5
DERS total score	105.32 (21.99) [0.18; −0.41]		
DES-II total score	28.4 (29.4) [2.36; 7.42]		
UPPS-P Negative Urgency	26.70 (6.19) [0.31; −0.33]		
UPPS-P Positive Urgency	27.04 (6.66) [1.01; 1.03]		
RSQ-A total score	9.89 (4.32) [0.53; 0.33]		

DERS = Difficulties in Emotion Scale; DES-II = Dissociative Experiences Scale-II; NU = Negative Urgency; PU = Positive Urgency; RSQ-A = Rejection Sensitivity Questionnaire for Adults; UPPS-P = Impulsive Behavior Scale.

(*nonacceptance* subscale), (c) ability to engage in goal-directed behavior (goals subscale) and refrain from impulsive behavior (*impulse* subscale) when experiencing negative emotions, and (d) access to emotional regulation strategies perceived as effective (*strategies* subscale). The higher the total score is, the greater the difficulties with emotional regulation. The Italian version of the DERS was administered (Giromini et al., 2012), which showed good internal consistency indexes for all subscales ($0.77 \leq \alpha \leq 0.89$). According to the hypotheses, the DERS total score was used and, the scale highlighted a good overall internal consistency ($\alpha = 0.91$) in the current study.

2.3.3. UPPS-P Impulsive Behavior Scale (UPPS-P) (Lynam et al., 2007)

The UPPS-P is a self-report questionnaire composed of 59 items on a 4-point Likert scale (min: 1; max: 4) designed to assess five impulsive traits: (1) negative urgency (NU) (12 items), (2) lack of premeditation (11 items), (3) lack of perseverance (10 items), (4) sensation seeking (12 items), and (5) positive urgency (PU) (14 items). The UPPS-P showed an excellent internal consistency in the original validation study. The Italian version of UPPS-P was administered (Fossati et al., 2016). The Italian version of UPPS-P highlighted high levels of internal consistency for all scales ($0.84 \leq \alpha \leq 0.92$). Consistently with purposes of the study, NU and PU were administered. These subscales highlighted good values of internal consistency (NU: $\alpha = 0.80$; PU: $\alpha = 0.81$) in the current study,.

2.3.4. Dissociative Experiences Scale-II (DES-II) (Carlson and Putnam, 1993)

The DES-II is a 28-item self-report measure of dissociative experiences. Items assess the percentage of time that individuals experience several dissociative symptoms. The overall score of the DES-II can range from 0 % to 100 % (i.e., 11-point Likert scale), and the average score is obtained by adding up the 28 item scores and dividing that total by 28. The DES-II has demonstrated excellent internal consistency, good test-retest reliability, and good convergent validity (e.g., Carlson and Putnam, 1993; Van IJzendoorn and Schuengel, 1996). The Italian version of DES-II was administered (Schimmenti, 2016). In the current study, the DES-II total score was used and it showed an excellent internal consistency ($\alpha = 0.94$).

2.3.5. Rejection Sensitivity Questionnaire for Adults (RSQ-A) (Downey and Feldman, 1996)

The RSQ-A assesses anxious expectations for rejection by significant others. Participants read 18 hypothetical interpersonal interactions where rejection by a significant other is possible (e.g. asking a friend for help, requesting emotional support). They rated levels of anxiety they felt about the outcome of each situation, as well as the perceived likelihood that others in each situation will respond with rejection. Scores were calculated by first multiplying the expected likelihood of rejection for each situation by the degree of anxiety, and then averaging these weighted scores across the 18 situations. The scale showed an adequate internal consistency in the original study ($\alpha = 0.86$; Downey and Feldman, 1996). An Italian translation of the RSQ-A was administered in the current study, which replicated the original psychometric properties ($\alpha = 0.80$).

2.4. Statistical analyses

All analyses were conducted using SPSS 22.0 (IBM Corp., Armonk, NY, USA) and Jamovi 2.6.44 (Jamovi project, Sydney, Australia). A step wise logistic regression was computed using the forward selection approach. In line with the hypotheses of the study, the independent variables were the DERS total score, UPPS-P NU and PU scores, the DES-II total score, and the RSQ-A total score. The dependent variables were the probable diagnosis of BPD (i.e., ≥ 5 criteria) and each BPD criterion. Accordingly, 10 models were tested. In line with factorial analytic findings, emotional (DERS) and behavioral (UPPS-P NU and PU) dysregulation together with ASF (DES-II) were introduced in the first step of logistic regression as the most fundamental dimensions underlying BPD clinical features. The IS (RSQ-A) was included in the second step of logistic regression in order to test its incremental predictive power for BPD psychopathology. This was chosen considering miscellaneous factor analytic evidence demonstrating the existence of a fourth independent cluster of BPD symptoms organized around relational problems. Odds ratio with 95 % confidence interval (CI) were also estimated as an effect size measure.

Correlation and partial correlation analyses were conducted to investigate the extent of associations among variables measured in the current study. Considering partial correlations, the association between two variables were controlled for the effects of the other measures. Structural Equation Modeling (SEM) and Path Analysis were conducted through the {SEMLj} Jamovi package developed from the {lavaan} R package (Rosseel, 2012). Specifically, according to empirical data, 3

competing models were contrasted (i.e., one-factor, 2-factor, 3-factor models). These analytic approaches allow to examine direct, indirect, and total effects among observed variables. Specifically, they test a system of relationships simultaneously, enabling a deeper investigation of different hypotheses and mediation mechanisms across variables. In the current study, the estimation of model parameters was based on the application of Maximum Likelihood algorithm. Furthermore, these statistical approaches have the advantage to allow to estimate a pool of goodness of fit indexes that support the identification of the best model predicting observed data. Particularly, we referred to the following indexes: i) Root Mean Square Error of Approximation (RMSEA) (≤ 0.05 = good fit; 0.05–0.08 = acceptable fit) (Browne and Cudeck, 1993) and its 95 % CI; ii) Standardized Root Mean Square Residual (SRMR) (≤ 0.08 = good fit) (Hu and Bentler, 1999); iii) Comparative Fit Index (CFI) (≥ 0.95 = good fit; 0.90–0.95 = acceptable fit) (Hu and Bentler, 1999); iv) Tucker-Lewis Index (TLI) ($\geq$0.95 = good fit; 0.90–0.95 = acceptable fit) (Hu and Bentler, 1999). Consistently with the hypothesis of study, several SEM and path analysis models were tested (see results section and supplementary materials).

3. Results

Looking at descriptive statistics reported in Table 1, the DES-II total scores violated the normal distribution. Accordingly, the square root transformation was applied to conduct the main analyses. Consistently, the mean of transformed DES-II total scores was 1.50 (SD = 0.76) with values of skewness and kurtosis equal to 0.89 and 1.05, respectively.

3.1. Prediction of BPD diagnosis and its clinical features

Table 2 provides a detailed description of results of logistic regression models. The analysis showed that ED (*Cox* $R^2 = 0.18$*; Nagelkerke* $R^2 = 0.23$), ASF (*Cox* $R^2 = 0.14$*; Nagelkerke* $R^2 = 0.19$) and NU (*Cox* $R^2 = 0.05$*; Nagelkerke* $R^2 = 0.08$) were positive and significant predictors of the probable BPD diagnosis. Findings also showed that IS had a significant incremental predictive power for the probable BPD diagnosis, above and beyond the other dimensions, even though its effect was small (*Cox* $R^2 = 0.01$*; Nagelkerke* $R^2 = 0.01$).

Looking at each specific clinical features of BPD, ED and BD, especially NU, were substantially involved in all BPD criteria. The dissociative dimension linked to ASF was a significant predictor of 4 BPD criteria, namely: i) identity disturbance, ii) impulsivity, iii) suicidal and self-mutilating behaviors; iv) stress-related paranoid ideation/severe dissociation. Considering IS, it had a significant incremental predictive power for 3 additional BPD criteria, above and beyond the role of ED and BD together with ASF, including: i) fear of abandonment; ii) affective instability; iii) feelings of emptiness. However, the impact of IS on these BPD features was small. Behavioral dysregulation in presence of positive emotions (PU) was not a significant predictor of BPD clinical features, except for stress-related paranoid ideation/dissociation for which its predictive power was small (*Cox* $R^2 = 0.01$*; Nagelkerke* $R^2 = 0.01$).

3.2. The process model of BPD

Table 3 shows correlations and partial correlations among the core psychopathological dimensions relevant for BPD psychopathology and its clinical manifestations according to DSM-5 criteria.

According to the aims of study and results of logistic regression analysis, SEM and path analysis models only included NU as an observed variable reflecting the domain of BD. A total of 6 SEM models reflecting the structure of core psychopathological dimensions and their implications for BPD were explored (see supplementary materials). The model with the best fit to data ($\chi^2_{(63)} = 203.00$; $p < .001$; RMSEA: 0.05 [0.04–0.06]; SRMR = 0.04; CFI = 0.92; TLI = 0.91) is a 2-factor structure graphically represented in Fig. 1.

Consistently, the latent dimension of BPD psychopathology expressed through DSM criteria was significantly predicted ($R^2 = 0.83$) by an internalizing factor composed of ED, ASF and IS (parameter: 0.006 [0.004–0.008]; $p < .001$) together with an externalizing one represented by NU (parameter: 0.003 [0.0001–0.006]; $p < .05$). which were significantly correlated to each other ($\beta = 0.66$ [0.60–0.72]; $p < .001$).

Looking at how these core dimensions are related to each other in predicting BPD criteria, Fig. 2 graphically reports the best fit path analysis model and related parameters ($\chi^2_{(1)} = 4.32$; $p = .04$; RMSEA: 0.06 [0.01–0.13]; SRMR = 0.01; CFI = 0.99; TLI = 0.97).

According to prior factor analytic studies and current results of logistic regression analyses together with SEM findings, the model with the highest goodness of fit indexes was composed of a first-order level of dimensions significantly related to each other (i.e., moderate to large associations) including ED and NU together with ASF. These dimensions significantly and directly predicted BPD criteria. Furthermore, IS represented a second-order pathway to BPD criteria, which was significantly predicted by ED and ASF ($R^2 = 0.17$). Overall, these patterns of associations among first- and second-order dimensions explained the 50 % of BPD features variability. Results also highlighted two significant indirect effects of IS for the associations between ED (parameter: 0.004; 95 % CI [0.001–0.006]; Z = 3.10; $p = .002$) and ASF (parameter: 0.04; 95 % CI [0.006–0.07]; Z = 2.35; $p = .02$) with BPD criteria.

4. Discussion

The current study sought to empirically explore how specific core psychopathological dimensions, derived from distinct clinical theories of BPD, contribute to explaining its clinical features as conceptualized in the DSM in a sample recruited from the general population. In doing so, the study aimed to foster an evidence-based integration of different clinical perspectives on BPD and to provisionally propose a process model of the disorder that could explain its clinical heterogeneity.

The results from the logistic regression analysis showed that ED was the dimension that explained the largest portion of rates of probable BPD diagnoses detected in the current sample. This finding is not surprising and confirm the huge amount of empirical data (for reviews see: Bud et al., 2023; Daros and Williams, 2019) that have supported the central role of ED as core feature of BPD. This is also consistent with the Linehan's biosocial model of BPD (Linehan, 1993, 201) that has posited how the emergence and maintenance of the disorder should be viewed in light of widespread alterations of emotional systems and related regulatory mechanisms (Niedtfeld and Bohus, 2018; Salavati and Selby, 2025). Results of logistic regression analysis also showed that ED was a significant predictor of each BPD diagnostic criterion, with exception of the criterion 4 (i.e., impulsivity), generally explaining the largest portion of rates of these clinical phenomena compared to ASF, BD and IS. This further supports the BPD biosocial model (Linehan, 1993, 2015) for which clinical manifestations of the disorder should be viewed as a consequence of poor adaptive emotion regulation abilities and the frequent use of maladaptive strategies to regulate emotions (Carpenter and Trull, 2013; Chapman, 2019).

Interestingly, the analysis also showed that dissociation and related ASF emerged as the second predictive factor of the probable BPD diagnosis in terms of variance explained. On the one hand, dissociation and related ASF are considered relevant, albeit secondary, clinical features of BPD (Scalabrini et al., 2017). On the other hand, evidence indicates that the pervasiveness of dissociation and ASF plays a key role in explaining more severe forms of BPD (Al-Shamali et al., 2022). This evidence was corroborated by current results that highlighted how the dissociative dimension was a significant predictor of core BPD problematic behaviors (i.e., impulsive potentially self-damaging behaviors, suicidal and self-mutilating behaviors) together with identity disturbance and transient quasi-psychotic symptoms that have been robustly associated to suicidal ideation and attempts (Sekowski et al., 2022). The relevance of dissociation and related ASF for the diagnosis of BPD is consistent with what other authors have proposed concerning the need

Table 2
Prediction of BPD clinical features.

	Step 1				Step 2	
	Hosmer–Lemeshow test χ^2 (*df*) Omnibus test χ^2 (*df*) Cox R^2 Nagelkerke R^2	Altered self functioning and dissociation DES-II Wald OR (95 % CI) Cox R^2 Nagelkerke R^2	Emotion dysregulation DERS Wald OR (95 % CI) Cox R^2 Nagelkerke R^2	Behavioral dysregulation UPPS-P Wald OR (95 % CI) Cox R^2 Nagelkerke R^2	Hosmer–Lemeshow test χ^2 (*df*) Omnibus test χ^2 (1) Cox R^2 Nagelkerke R^2	Interpersonal Sensitivity RSQ-A Wald OR (95 % CI) Cox R^2 Nagelkerke R^2
BPD diagnosis: ≥ 5 different criteria	8.85 (8) 322.58 (4)***0 .370 .50	27.06*** 2.38 (1.65–3.03)0 .140 .19	45.62*** 1.04 (1.03–1.05)0 .180 .23	NU 40.44*** 1.17 (1.12–1.23) 0 .050 .08	5.78 (8) 5.83 (1)*0 .380 .51	5.74* 1.06 (1.01–1.12) 0 .010 .01
Frantic efforts to avoid real or imagined abandonment	15,84 (8)* 47.88 (4)***0 .070 .10		15,16*** 1.02 (1.01–1.03)0 .060 .09		14.04 (8) 4.20 (4)*0 .070 .11	4,12* 1.05 (1.01–1.10) 0 .010 .02
Unstable and intense interpersonal relationships	6.83 (8) 112.09 (4)***0 .150 .21		18.00 *** 1.02 (1.01–1.03)0 .080 .11	NU 17,47*** 1.09 (1.05–1.13) 0 .070 .10	4,39 (8)0 .730 .150 .21	
Identity disturbance	7.76 (8) 174.11 (4)***0 .220 .30	24.44 *** 1.94 (1.49–2.59)0 .120 .16	24.08 *** 1.02 (1.01–1.03)0 .070 .12	NU 16.12*** 1.09 (1.04–1.13) 0 .030 .02	3.74 (8)0 .96 . 0.220 .30	
Impulsivity in at least two areas that are potentially self-damaging	14.05 (8) 162.48 (4)***0 .220 .29	28.49 *** 2.00 (1.55–2.59)0 .080 .11		NU 65.09*** 1.20 (1.15–1.25) 0 .140 .18	12.62 (8) 2.960 .210 .28	
Recurrent suicidal and self-mutilating behaviors	12.88 (8) 62.96 (4)***0 .090 .19	10.71 ** 1.72 (1.24–2.39)0 .040 .09	9.77 ** 1.02 (1.01–1.04)0 .040 .08	NU 4.71* 1.07 (1.01–1.14) 0 .010 .02	8.04 (8) 3.40 (4)0 .090 .18	
Affective instability	6.97 (8) 156.17 (4)***0 .200		41.28 *** 1.03 (1.02–1.05)0 .150	NU 10.83** 1.07 (1.03–1.11)	3.37 (8) 6.55 (4)***0 .210	6.44* 1.06 (1.01–1.11) 010

(*continued on next page*)

Table 2 (*continued*)

	Step 1				Step 2	
	Hosmer–Lemeshow test χ^2 (*df*)	Altered self functioning and dissociation	Emotion dysregulation	Behavioral dysregulation	Hosmer–Lemeshow test χ^2 (*df*)	Interpersonal Sensitivity
	Omnibus test χ^2 (*df*)	DES-II	DERS	UPPS-P	Omnibus test χ^2 (1)	RSQ-A
	Cox R^2	Wald	Wald	Wald	Cox R^2	Wald
	Nagelkerke R^2	OR (95 % CI)	OR (95 % CI)	OR (95 % CI)	Nagelkerke R^2	OR (95 % CI)
		Cox R^2	Cox R^2	Cox R^2		Cox R^2
		Nagelkerke R^2	Nagelkerke R^2	Nagelkerke R^2		Nagelkerke R^2
	.27		.19	0 .020 .05	.28	.02
Chronic feelings of emptiness	5.20 (8)		50.41 ***	NU	2.80 (8)	12.98***
	190.31 (4)***0		1.04 (1.03–1.05)0	9.57**	13.39 (4)***0	1.09 (1.04–1.14)
	.240		.180	1.07 (1.02–1.11) 0	.250	010
	.32		.24	.030 .03	.34	.02
Intense anger or difficulty controlling anger	7.07 (8)		4.06 *	NU	9.07 (8)	
	81.85 (4)***0		1.02 (1.00–1.03)0	22.38 ***	1.11 (4)0	
	.110		.040	1.20 (1.11–1.29) 0	.110	
	.28		.11	.070 .14	.28	
Transient, stress-related paranoid ideation or severe dissociative symptoms	12.57 (8)	8.60 **	40.41 ***	NU	7.54 (8)	
	146.53 (4)***0	1.52 (1.15–2.00)0	1.04 (1.03–1.05)0	5.19*	1.56 (4)0	
	.200	.050	.110	1.06 (1.01–1.11) 0	.190	
	.31	.08	.18	.020 .03 PU	.30	
				4.84* 1.04 (1.01–1.08) 0		
				.010 .01		

DERS = Difficulties in Emotion Scale; DES-II = Dissociative Experiences Scale-II; NU = Negative Urgency; PU = Positive Urgency; RSQ-A = Rejection Sensitivity Questionnaire for Adults; UPPS-P = Impulsive Behavior Scale.

* $p < .05$.
** $p < .01$.
*** $p < .001$.

to modify the Linehan's biosocial theory of BPD, emphasizing the concept of self and related mechanisms (e.g., sense of agency, autobiographical memory, self-direction and personal goals setting) that go beyond the effects of ED (Bohus and Neacsiu, 2014; Livingston and Stanton, 2024). Importantly, the centrality of self functioning and sense of self relatedness highlighted in the present findings is consistent with long-standing psychodynamic traditions, particularly the object relations model of Otto Kernberg, which emphasizes identity diffusion and disturbances in the integration of self- and other-representations as a core feature of borderline personality organization (Scalabrini et al., 2018; Wilkinson-Ryan and Westen, 2000). More recently, contemporary frameworks such as the DSM-5 Alternative Model for Personality Disorders (AMPD) have similarly placed impairments in self- and interpersonal functioning at the center of personality pathology. Criterion A of the AMPD conceptualizes severity in terms of disruptions in identity, self-direction, empathy, and intimacy, underscoring the role of self-

Table 3
Correlation analyses.

	Correlations						Partial correlations					
	1	2	3	4	5	6	1	2	3	4	5	6
1.DERS	–						–					
2.DES-II	0.38***	–					0.14***	–				
3.NU	0.53***	0.33***	–				0.24***	ns	–			
4.PU	0.28***	0.26***	0.62***	–			ns	0.11**	0.55***	–		
5.RSQ-A	0.39***	0.25***	0.28***	0.13***	–		0.19***	0.09*	ns	ns	–	
6.BPD criteria	0.61***	0.41***	0.59***	0.35***	0.36***	–	0.35***	0.18***	0.32***	ns	0.12**	–

DERS = Difficulties in Emotion Scale; DES-II = Dissociative Experiences Scale-II; NU = Negative Urgency; PU = Positive Urgency; RSQ-A = Rejection Sensitivity Questionnaire for Adults.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

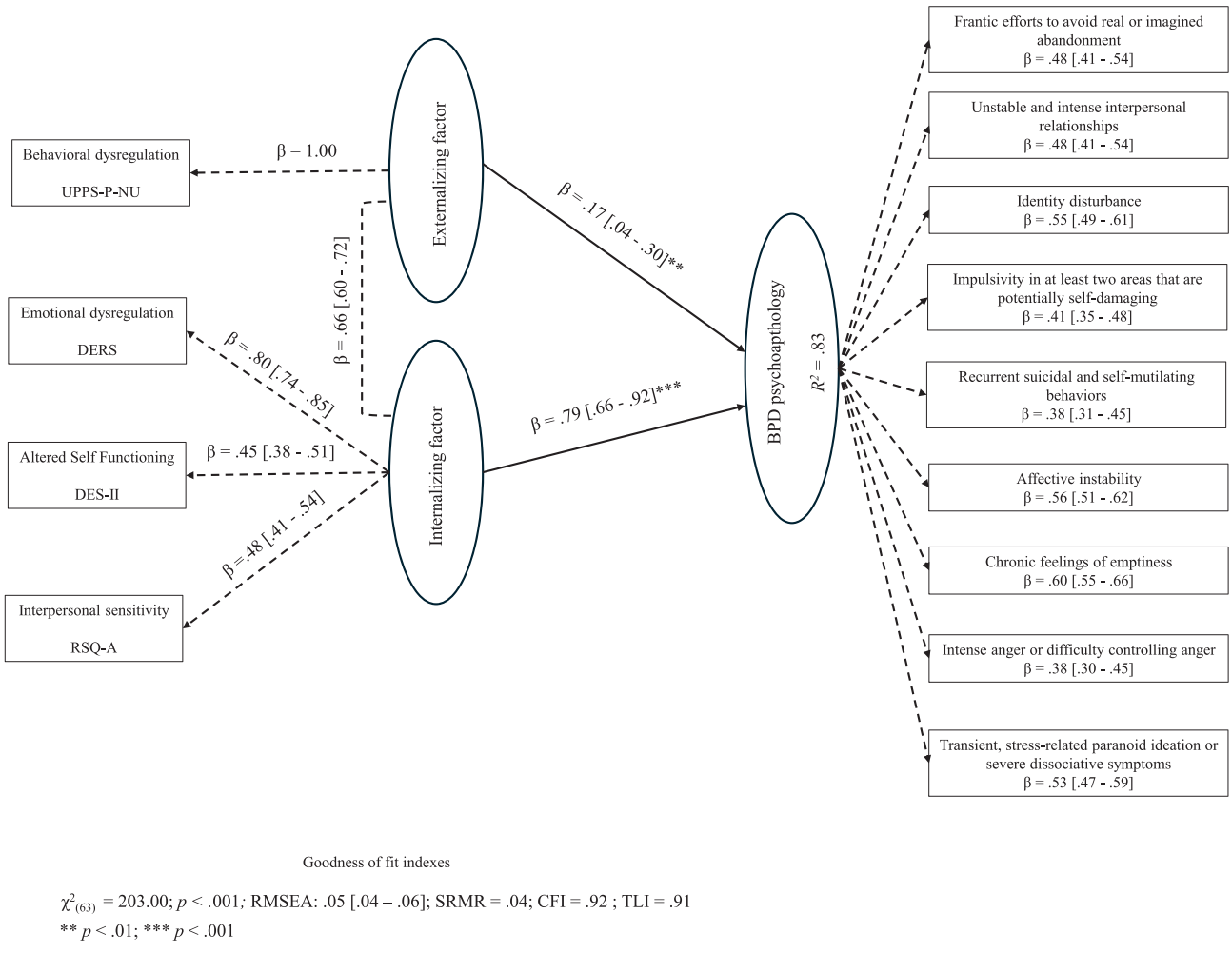

Fig. 1. The structure of core psychological dimensions and implications for BPD psychopathology.

related processes in distinguishing levels of impairment across disorders (Bender et al., 2014; Morey et al., 2022). Accordingly, emerging neuropsychodynamic models propose that the self and its organization constitute a core domain of psychopathology, and that traumatic experiences, highly prevalent among individuals with BPD (Korzekwa et al., 2009), can destabilize the multilayered structure of the self, resulting in dissociative manifestations (Scalabrini et al., 2022). Supporting this view, recent neuroimaging findings demonstrated that relational versus non-relational trauma differentially impacts neural activation across self-related layers (Scalabrini et al., 2024). These results can be meaningfully extended to BPD, enriching current models of its psychopathology and underscoring the need to include self-organization processes as fundamental mechanisms in the emergence and maintenance of ED.

Looking at BD, NU played a role in predicting the probable BPD diagnosis. The NU was also involved in predicting each BPD diagnostic criterion, with exception of the criterion 1 (i.e., fear of abandonment). However, its predictive power was generally small and lower than ED and dissociative dimension, excluding the criterion 4 (i.e., impulsivity), despite the suggestion that impulsivity could be one of the most

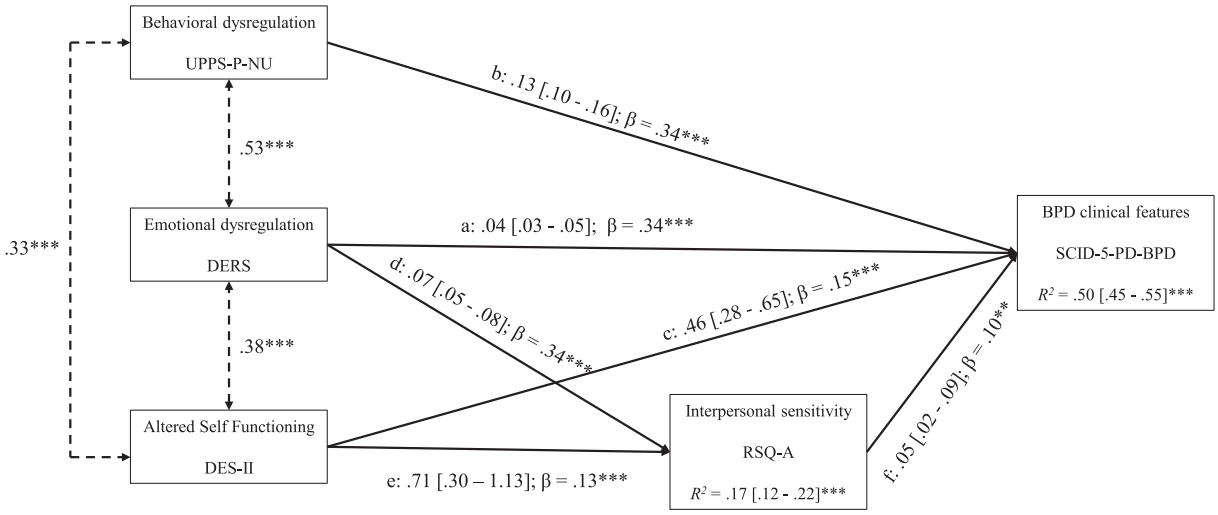

Fig. 2. Process model of BPD clinical features.

important early precursors of BPD development (Crowell et al., 2009, 2014). Empirical data also highlighted that clinical implications of this dimension for BPD psychopathology might be more marginal compared to other clinical conditions, such as attention deficit and hyperactivity disorder and substance use disorders (Coffey et al., 2011; Ditrich et al., 2021). This consideration might be further sustained by current results detecting no significant relationships between PU with the probable BPD diagnosis and specific diagnostic criterion, which represents a core feature of substance-use and other addictive disorders (Coskunpinar et al., 2013; VanderVeen et al., 2016; Vintró-Alcaraz et al., 2022). Therefore, BD in presence of negative affective states could be viewed as a relevant dimension, albeit secondary compared to ED and ASF, involved in BPD and its specific clinical characteristics. More precisely, we might conclude that BD might amplify the effects ED and ASF, which seems to represent more central dimensions for BPD psychopathology. These findings are in line with trait-based (Depue and Lenzenweger, 2001; Paris, 2003, 2005) and developmental psychopathological (Crowell et al., 2009, 2014) models of BPD that have assumed synergic effects between emotional vulnerabilities, considered as internalizing problems, with inabilities to control impulses and behaviors reflecting an externalizing psychopathological functioning.

Ultimately, our results showed that IS had a significant predictive power for the probable BPD diagnosis and specific diagnostic criteria — the criterion 1 (i.e., fear of abandonment), the criterion 6 (i.e., affect instability) and the criterion 7 (i.e., feelings of emptiness) — above and beyond the effects of ED, ASF and BD. Nevertheless, its effects were very small and, they were the lowest compared to the other domains. On the one hand, this evidence might partially corroborate Linehan's hypothesis concerning that interpersonal problems are not the primary phenomena in BPD. On the other hand, the fact that IS had a significant incremental predictive power for the BPD diagnosis and helped to better understand specific BPD symptoms linked to affective functioning suggest that this dimension might be considered a basic vulnerability factor that reinforces central problems with emotion regulation and ASF. Therefore, these findings are in line with the need for extending the Linehan's biosocial model of BPD giving more attention to interpersonal dynamics (Cavicchioli and Maffei, 2020), which might reflect the impacts of invalidating relational transactions involved in the development of BPD (Fruzzetti et al., 2005).

In sum, our findings show that factors associated with ED and consistent with Linehan's biosocial theory of BPD (Linehan, 1993, 2015) are the most representative for BPD psychopathology. Nevertheless, this perspective risks being incomplete, and should be extended considering additional psychopathological processes. Our data suggests that a more comprehensive account should also consider that ED might be reinforced by difficulties with behavioral regulation, especially in presence of negative affective states, as postulated by trait-based and developmental psychopathological models of BPD (Crowell et al., 2009; Depue and Lenzenweger, 2001; Paris, 2003, 2005). Moreover, the severity of BPD clinical condition might be viewed in light of the central role of dissociation and related ASF, consistent with clinical perspectives that emphasized the importance of self-organization in clarifying the dynamics underlying the emergence and maintenance of BPD (Kerr et al., 2015; Liotti, 2004, 2013; Livingston and Stanton, 2024; Meares, 2012; Mucci, 2018). Finally, the IS might be an ancillary dimension involved in BPD diagnosis with a function of reinforcement of ED effects on clinical manifestations of the disorder linked to altered affective states (i.e., fear of abandonment, affective instability, feelings of emptiness).

The SEM results further clarified the conclusions previously discussed, especially considering how the core psychopathological dimensions and related latent factors are organized in predicting BPD psychopathology. Specifically, the analysis showed that a 2-factor model had the best fit to data. According to prior cluster analytic studies of comorbid conditions with BPD (Triantafyllou et al., 2025b) and longitudinal studies assessing developmental trajectories of BPD (Cavicchioli et al., 2024), we found a factor prevalently capturing an internalizing organization of mental functioning composed of ED, dissociative mechanisms and IS (Cavicchioli et al., 2023c; Gao et al., 2017; Hankin et al., 2016). The second factor represented by NU should be linked to an externalizing mental organization (Beauchaine et al., 2017). Furthermore, these latent dimensions showed a robust correlation to each other, even though the internalizing factor had a larger impact in predicting BPD psychopathology. This evidence provides support for the trait-based model of BPD proposed by Paris (2003, 2005) and HiTOP

framework (Ringwald et al., 2023) that have sustained a co-existence of internalizing and externalizing dimensions in explaining BPD psychopathology. Nevertheless, these frameworks based on the study of patterns of comorbid conditions with BPD seem to emphasize the role of externalizing mechanisms as the core underlying dimension to BPD psychopathology. However, our approach based on the study of psychopathological mechanisms showed that the internalizing factor should be considered as the most central for understanding BPD psychopathology and its phenotypic variability.

Looking at ways in which these core psychopathological dimensions are interrelated in prediction of BPD features, path analysis highlighted that the first-order of psychopathological dimensions (i.e., ED, dissociation, NU) were significantly correlated to each other and, each of them was directly associated to BPD criteria. Furthermore, the dimensions ascribed to the internalizing factor created a network wherein ED and dissociative processes were significantly involved in IS; although IS had a partial mediating effect in explaining associations found between ED and dissociation/ASF with BPD clinical features. These findings provide further empirical support for considerations previously discussed and developmental psychopathological models of BPD (Crowell et al., 2009, 2014) that assume reciprocal reinforcing effects between internalizing emotional vulnerabilities and externalizing BD in the emergence of the disorder. Specifically, the highly correlated latent internalizing and externalizing dimensions identified in the current study may reflect a general genetic predisposition to the development of psychopathology, commonly referred to as the well-established p-factor (Smith et al., 2020). This general liability has been widely linked to the emergence of BPD (e.g., Choate et al., 2021; Gluschkoff et al., 2021; Watts et al., 2020) and is consistent with the mutualism theory of BPD (Choate et al., 2023), which posits dynamic and reciprocal transactions among antecedent psychopathological symptoms that precede the manifestation of BPD (Sharp and Wall, 2018). Within a transactional model of BPD, in which invalidating environmental experiences—particularly relational ones—play a crucial role in amplifying a basic genetic liability to psychopathology (Cavicchioli et al., 2024), core psychopathological mechanisms such as ED, dissociation, impulsivity/BD, and rejection sensitivity/IS should be conceptualized as the outcomes of these transactions. Indeed, empirical evidence consistently demonstrates that ED (Crowell et al., 2009; Fruzzetti et al., 2005), dissociation (Mucci and Scalabrini, 2021; Rajkumar, 2022), impulsivity/BD (Beauchaine et al., 2017), and rejection sensitivity/IS (Auer et al., 2015; Gao et al., 2024; Woods et al., 2018) emerge from the interplay between biological

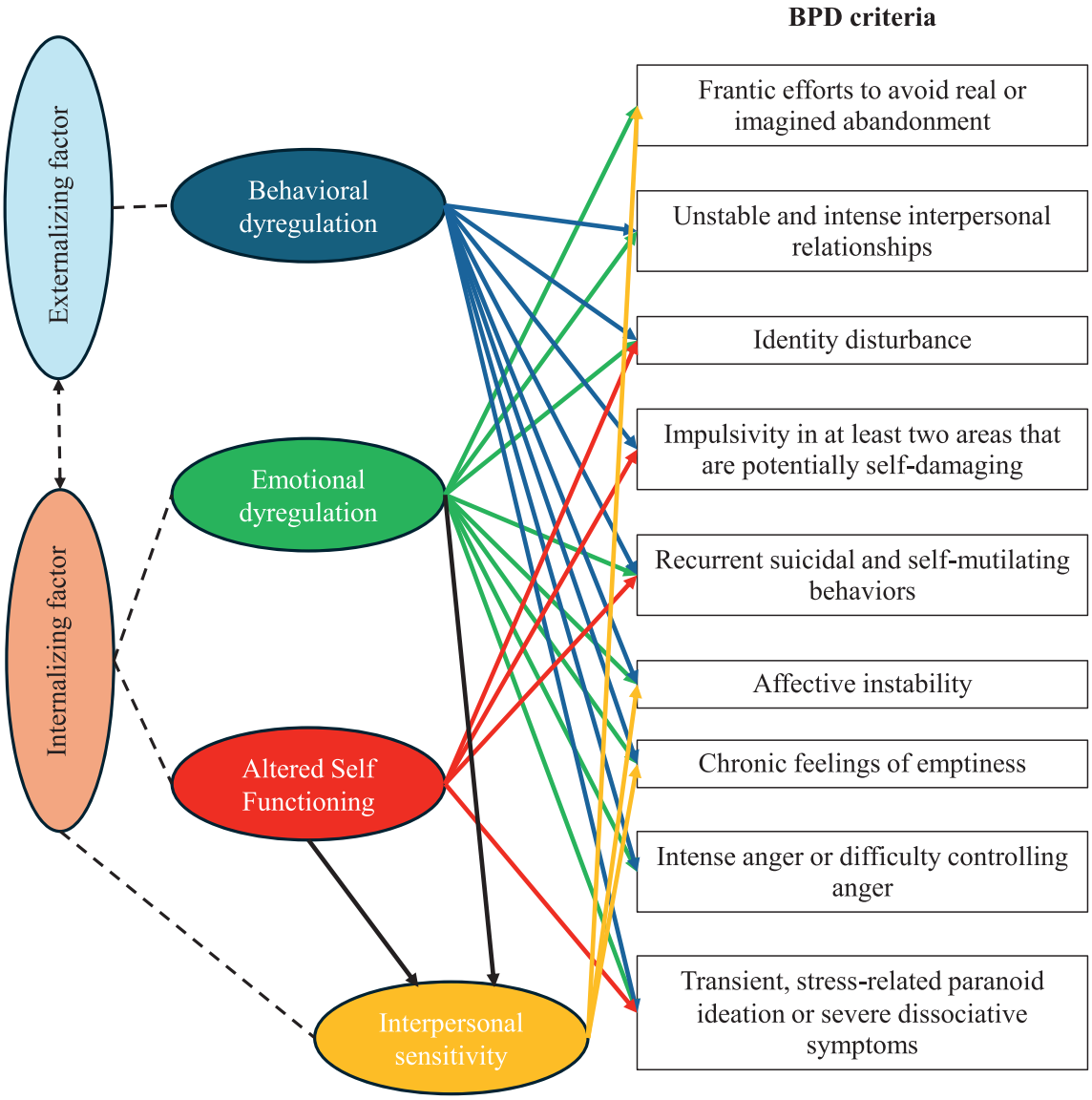

Fig. 3. Graphical summary of main findings.

vulnerabilities and the reinforcing effects of maladaptive relational experiences across the lifespan, particularly from infancy to early adulthood. Fig. 3 provides a graphical summary of main findings of the current study

Despite evidence previously mentioned, some limitations must be discussed. First of all, the use of self-report measures to assess BPD features and probable BPD diagnosis represents the main limitation of the present study. Empirical evidence indicates that individuals who self-report BPD criteria—particularly in non-clinical samples and in the general population — may experience difficulties in accurately recognizing their own personality characteristics or maladaptive behaviors associated with this condition (Balsis et al., 2018), or may overestimate the endorsement of BPD criteria (Fossati et al., 1998; Hopwood et al., 2008). Accordingly, future studies should incorporate semi-structured clinical interviews for the assessment of BPD features (e.g., the SCID-5-PD), thereby allowing for the validation and replication of the present findings.

Second, this study relied on the recruitment of participants from the general population. When considered alongside the limitations previously discussed regarding the self-report assessment of BPD features, this aspect substantially limits the generalizability of the present findings to clinical populations of individuals with BPD. Therefore, future research should validate the proposed process model for understanding clinical variability in BPD within clinical samples composed of treatment-seeking patients affected by this condition.

Third, the correlational nature of the study limits inferences regarding the causal effects of each core psychopathological dimension on the emergence and maintenance of BPD. Specifically, the cross-sectional design allows only for the identification of patterns of association among emotion dysregulation (ED), dissociation/ASF, BD, and IS in relation to BPD features. Accordingly, future longitudinal studies are needed to empirically test and confirm the predictive validity of the proposed process model for the development of BPD, particularly within clinical populations.

Further limitations refer to the use of self-report assessment instruments administered to evaluate the core psychopathological dimensions involved in BPD features. Indeed, future studies might benefit from the inclusion of semi-structured clinical interviews for an effective evaluation of dissociative phenomena (e.g., SCID for DSM Dissociative Disorders) and levels of ASF (e.g., SCID alternative model for personality disorders, Structured Interview of Personality Organization). Similarly, performance-based neuropsychological tasks (e.g., Go-No/Go task, Stroop test, Stop signal task, Iowa Gambling task, delay discounting) might improve the assessment of the role of BD in BPD, especially considering the complexity of impulsivity construct. Particularly, the lack of a comprehensive neuro-cognitive evaluation of impulsive dimensions could partially explain the small associations found between BD/NU and BPD clinical features found in the current study. Ultimately, the evaluation of the impacts of maladaptive interpersonal dynamics for BPD psychopathology could benefit from the inclusion of other relevant mechanisms considered as the core feature of the disorder from an attachment perspective (Bateman and Fonagy, 2004a, 2004b), namely deficits in mentalization (i.e., inability to identify mental states in oneself or in other and to recognize how these mental states are mutually influenced).

Despite these limitations, this is the first study that has suggested an empirically-supported framework for understanding the heterogeneity of BPD manifestations based on psychopathological mechanisms that integrate the most influential clinical models of disorder developed from different theoretical perspectives. Furthermore, current process model of BPD might be broadened to include a development perspective of the condition hypothesizing how key underlying psychopathological mechanisms explain the well-documented heterogeneity of developmental pathways involved in the emergence of BPD. This model could also provide the basis for understanding the mechanisms explaining the clinical complexity of BPD, especially considering the large heterogeneity of comorbid conditions. Nevertheless, future longitudinal research and studies conducted within clinical settings are needed to corroborate the current provisional evidence.

CRediT authorship contribution statement

Marco Cavicchioli: Writing – review & editing, Writing – original draft, Software, Methodology, Formal analysis, Data curation, Conceptualization. **Sara Masoumi:** Writing – review & editing. **Cesare Maffei:** Writing – review & editing. **Federica Galli:** Writing – review & editing. **Simona Scaini:** Writing – review & editing. **Andrea Scalabrini:** Writing – review & editing, Writing – original draft, Supervision, Conceptualization.

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Declaration of competing interest

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Appendix A. Supplementary data

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