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Chapter 8

Efficient screening and outcome assessment for borderline personality disorder: A psychometric evaluation of the uBPDc

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ABSTRACT

Background: There is a need for a brief and psychometrically sound questionnaire to assess borderline personality disorder (BPD) symptomatology that can serve both as a screening tool and outcome measure.

Methods: We conducted a comprehensive psychometric evaluation of a shortened version of the validated BPD Checklist, the Ultrashort BPD Checklist (uBPDc). Data from 204 individuals diagnosed with BPD, 57 individuals diagnosed with Cluster-C personality disorder, and 103 non-clinical controls were analyzed. As an initial step, we determined the final item composition, with separate items to index the presence or absence of intense anger or difficulty controlling anger (DSM-5 BPD criterion 8), and of paranoid ideation or dissociation (DSM-5 BPD criterion 9).

Results: The final 11-item version demonstrated strong internal consistency, and our findings provide consistent support for its concurrent and known-group validity. The uBPDc also showed satisfactory diagnostic accuracy and sensitivity to change. The one-factor structure of the uBPDc was confirmed by factor analysis. Measurement invariance was subsequently assessed across individuals with BPD and non-clinical controls, revealing support for partial measurement invariance.

Conclusions: The uBPDc demonstrated strong psychometric properties and thus makes for an efficient tool for screening and outcome assessment in BPD.

INTRODUCTION

Borderline personality disorder (BPD) is an important public health issue, with a prevalence of 1% to 3% in the general population and between 10% and 22% in psychiatric outpatient and inpatient settings (Ellison et al., 2018; Leichsenring et al., 2024; ten Have et al., 2016). This severe mental disorder is characterized by instability in interpersonal relationships, self-image, impulse control, and affect regulation (American Psychiatric Association, 2013). BPD is associated with high rates of comorbid mental disorders, severe functional impairment, low quality of life, high risk of suicide, and serious physical conditions (Dixon & Linardon, 2020; El-Gabalawy et al., 2010; Laurenssen et al., 2016; Paris, 2019; Tomko et al., 2014; Wibbelink et al., 2025). Moreover, individuals with BPD are among the highest utilizers of psychiatric and nonpsychiatric treatment services (Ansell et al., 2007; Bode et al., 2017; Gregory et al., 2021). Considering the detrimental effects of BPD on both the individual and society, it is important to enhance our understanding of BPD and improve treatment effectiveness. As instruments form the basis for diagnosis, prognosis, and treatment evaluation (de Vet et al., 2011), having reliable and user-friendly tools to accurately identify the presence and severity of BPD psychopathology is therefore essential for both clinical and research purposes.

Research has shown that BPD is often misdiagnosed or underdiagnosed (Comtois & Carmel, 2016; Gregory et al., 2021; Zimmerman et al., 2010; Zimmerman & Mattia, 1999). The misdiagnosis of BPD might be related to the high comorbidity rates and heterogeneity of BPD (Culina et al., 2023). These factors, along with the stigma associated with BPD and the resulting hesitation among clinicians to diagnose it, may also contribute to the underdiagnosis of BPD (Zimmerman & Balling, 2021). Moreover, there is limited agreement between structured interviews and personal judgments of clinicians (Aronen et al., 1993; Lewczyk et al., 2003). Research shows that without information from a semi-structured diagnostic interview, clinicians rarely give the BPD diagnosis during a routine intake evaluation (Magnavita et al., 2010; Zimmerman & Mattia, 1999). Using semi-structured diagnostic interviews to identify BPD (e.g., Structured Clinical Interview for Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition [DSM-5] Personality Disorders [SCID-5-PD]; First et al., 2015, Revised Diagnostic Interview for Borderline [DIB-R]; Zanarini et al., 1989) is therefore crucial in clinical and research practice. However, diagnostic interviews are time-consuming and therefore costly, and substantial clinical expertise is needed to perform such interviews (Bloo et al., 2017).

To save time, several authors (Siefert, 2009; Widiger et al., 2024) recommended a two-step diagnostic procedure, starting with a screening instrument, followed by a semi-structured interview for patients scoring above the clinical threshold. One of the most commonly studied screening instruments for BPD is the McLean Screening Instrument for Borderline Personality Disorder (MSI-BPD; Zanarini et al., 2003). However, the suggested threshold of 7 (Zanarini et al., 2003) resulted in a sensitivity below the recommended 90% (Zimmerman

& Balling, 2021). Lowering the threshold to 6 yielded a nearly satisfactory sensitivity (89%), but resulted in considerably lower specificity (66%) (Zanarini et al., 2003). Another drawback of the MSI-BPD is its use of a categorical approach to BPD (yes-no questions), assuming a clear distinction between the presence or absence of a BPD symptom. This contradicts findings from studies suggesting BPD exhibits a dimensional nature (Arntz et al., 2009; Rothschild et al., 2003). Moreover, it is also assumed that the dichotomous structure may result in a decreased ability to detect subtle changes when repeatedly used, due to the loss of information when transforming a dimensional variable into a dichotomy (Zimmerman et al., 2013). In addition, dimensional scoring seems especially important for subthreshold levels of BPD pathology (Zimmerman et al., 2013), rendering the MSI-BPD less suitable for assessing treatment outcomes. However, longer instruments are related to increased perceived burden (Rolstad et al., 2011), making them less suitable to evaluate changes during treatment. To illustrate, Hoerger (2010) found an association between the number of survey items and study dropout. Moreover, aside from an increased burden and lower compliance, longer questionnaires are related to careless responding (Eisele et al., 2022). To conclude, there is a need for a brief questionnaire assessing BPD symptomatology, which can serve as both a screening tool and as a (repeated) outcome measure.

In the context of a multicenter randomized clinical trial (RCT) into the effectiveness of Dialectical Behavior Therapy (DBT) and Schema Therapy (ST) (Wibbelink et al., 2022), a brief questionnaire for measuring BPD symptoms was developed: the Ultrashort BPD Checklist (uBPDc). This questionnaire is a shortened version of the validated BPD Checklist by Bloo et al. (2017), which measures the self-reported burden of BPD symptoms during the last month using 47 items. Although an initial evaluation of a preliminary version of the uBPDc showed promising psychometric properties, its final composition has not been established due to the lack of a comprehensive psychometric evaluation. The aims of the current study were therefore to (i) determine the final item composition, and (ii) evaluate the suitability of the uBPDc as a screening tool and outcome instrument. Specifically, using data from individuals with BPD, individuals with Cluster-C personality disorder (PD), and non-clinical controls, we aimed to (1) explore the optimal selection of items (i.e., 9, 10, or 11 items) of the uBPDc, (2) assess the psychometric properties, including reliability (internal consistency and item-rest correlations) and validity (concurrent and known-group validity), (3) examine the sensitivity to change, (4) derive clinical norms, and (5) evaluate the factor structure as well as measurement invariance across the BPD and non-clinical control samples. It was hypothesized that the uBPDc would exhibit similar psychometric properties to those of the BPD Checklist (Bloo et al., 2017), including adequate reliability across all three samples and sufficient known-group validity demonstrated by higher total scores on the uBPDc for individuals with BPD compared to individuals with Cluster-C PD, and non-clinical controls. For concurrent validity, it was hypothesized that the uBPDc would correlate positively with the severity of BPD symptoms in the BPD sample (measured with the Borderline Personality

Disorder Severity Index version 5 [BPDSI-5]; Arntz et al., 2003; Giesen-Bloo et al., 2010) and with the number of BPD symptoms across all three samples (measured with the screener or interview version of the SCID-5-PD Borderline Personality Disorder section [SCID-5-PD-BPD]; First et al., 2015, 2016). In addition, based on the findings by Bloo et al. (2017), we hypothesized that the uBPDc would be sensitive to change, as indicated by significant reductions in uBPDc scores of individuals with BPD who received an evidence-based treatment (DBT or ST; Wibbelink et al., 2022). Finally, we expected to find support for a one-factor structure of the uBPDc (Bloo et al., 2017).

METHODS

Participants

The total sample comprised participants with BPD (N = 204, of whom 90 completed treatment), participants with Cluster-C PD (N = 57), and non-clinical controls (N = 103). All participants were at least 18 years old and had adequate proficiency in the Dutch language. Participants with BPD were included if they: (1) had BPD as their primary diagnosis, with a severity score above 20 on the BPDSI-5, (2) were motivated and available for treatment and assessments, (3) did not meet criteria for a psychotic disorder or bipolar I disorder with at least one manic episode in the previous year, (4) were not diagnosed with antisocial personality disorder combined with violent interpersonal behavior in the previous 2 years, (5) had an IQ above 80, (6) lived within a travel distance of 45 minutes from the mental healthcare center, (7) had a permanent home address, and (8) had not received ST or DBT in the previous year (Wibbelink et al., 2022). Participants with Cluster-C PD were included if they met the following criteria: (1) a primary Cluster-C PD diagnosis, (2) motivated and available for treatment, (3) no acute suicidal risk, (4) had not received ST in the previous year, and (5) no BPD diagnosis (Groot et al., 2022). Finally, non-clinical controls were included if they: (1) had no psychiatric diagnosis or severe psychological complaints, (2) did not abuse alcohol or drugs, (3) had not consumed alcohol or drugs in the past 24 hours, (4) had no history of brain injury, and (5) did not have an intellectual disability.

Procedure

The clinical participants were enrolled in two RCTs evaluating the effectiveness of treatment for BPD (Wibbelink et al., 2022) and Cluster-C PD (QUEST-CLC study; Groot et al., 2022) and were recruited in various mental healthcare centers in the Netherlands. The non-clinical participants were recruited using convenience sampling, via online advertisements (e.g., Facebook, LinkedIn) or face-to-face (friends, family, or relatives of students). The BOOTS study received approval from the Medical Ethics Committee of the Academic Medical Center Amsterdam (NL66731.018.18). The QUEST-CLC study and the study involving the non-

clinical controls were approved by the Ethics Review Board of the Faculty of Social and Behavioural Sciences, University of Amsterdam (2020-CP-12948 and FMG-5576_2023, respectively). All participants provided informed consent. Diagnoses of clinical participants were assessed with the SCID-5-PD and SCID-5 for syndrome disorders (SCID-5-S; First et al., 2018). Data from the BPD sample were collected between December 2019 and January 2024 through interviews and self-report questionnaires at multiple timepoints: before treatment (screening and baseline assessment) and four reassessments every 6 months until the end of the 2-year treatment. Patients were randomized to either DBT or ST, but only patients who completed treatment and all assessments were included in the sensitivity to change analysis. Data from the Cluster-C PD sample were collected between September and December 2021 during the screening and baseline assessments, consisting of interviews and self-report questionnaires. The data from the non-clinical controls were collected in December 2022 and between December 2023 and January 2024 using online self-report questionnaires.

Materials

uBPDc

The Ultrashort BPD Checklist (uBPDc) (see Supplement 1) is a shortened version of the BPD Checklist (Bloo et al., 2017) and assesses patients' experienced burden of BPD symptoms during the last month. The test version of the uBPDc consists of 11 five-point Likert scale items (1 = *not at all* to 5 = *extremely*) related to the nine DSM-5 criteria. These items were selected based on their item-rest correlations in the study by Bloo et al. (2017). The first seven DSM-5 criteria are measured with one item each, whereas the last two criteria (anger and paranoid ideation or dissociation) are, potentially, measured with two items each. The initial version of the uBPDc included only one item for each of criteria 8 and 9 ("hating yourself, everybody and the world" and "distrusting other people", respectively). However, it was suggested that adding two items measuring anger outbursts and dissociation could provide a more comprehensive coverage of the DSM-5 criteria 8 and 9, as both criteria encompass two aspects (criterion 8: intense anger or difficulty controlling anger, criterion 9: paranoid ideation or dissociation; American Psychiatric Association, 2013). When criteria 8 and 9 were measured with two items each, the scores of the two items were either averaged or the highest score was selected. Consequently, seven different versions of the uBPDc were examined to determine the optimal composition of items (see Supplement 1). The total score ranges from 9 to 45, where a higher score indicates a higher experienced burden of BPD symptoms.

SCID-5 BPD

The number of DSM-5 BPD symptoms was assessed in clinical participants using the interview version of the BPD section of the SCID-5-PD (SCID-5-PD-BPD; First et al., 2015), while the self-report screening version (SCID-5-SPQ-BPD; First et al., 2016) was utilized for

non-clinical controls. In the SCID-5-PD-BPD, the nine BPD criteria are rated on a 3-point Likert scale (0 = *absent*, 1 = *subthreshold*, 2 = *present*), yielding a total score ranging from 0 to 18. The SCID-5-SPQ-BPD includes 15 yes/no items assessing the nine BPD criteria. Each criterion is represented by a single item, except for criteria 3 (four questions), 5 (two questions), and 8 (three questions). To prevent overrepresentation of criteria, items belonging to the same criterion were merged into one item and assigned a score of 1 if at least one "yes" response was present. Subsequently, a sum score was calculated ranging from 0 to 9. Previous studies found adequate psychometric properties for both the SCID-5-PD and SCID-5-SPQ (Bayad et al., 2021; Ekselius et al., 1994; Gharraee et al., 2022; Jacobsberg et al., 1995; Somma et al., 2017).

BPDSI-5

The Borderline Personality Disorder Severity Index version 5 (BPDSI-5; Arntz et al., 2003; Giesen-Bloo et al., 2010) is a semi-structured interview comprising 70 items that assesses the severity of the nine DSM-5 BPD criteria within the prior three months. Each item is rated on an 11-point Likert scale (0 = *never* to 10 = *daily*), except for the items measuring criterion 3 (Identity disturbance), which are rated on a 5-point Likert scale (0 = *absent* to 4 = *dominant, clear, and well-defined*) and then multiplied by 2.5. The total score is calculated as the sum of the nine criteria scores (range: 0–90). The BPDSI-5 is a revised version of the BPDSI-IV (Arntz et al., 2003; Giesen-Bloo et al., 2010); modifications include a slight rephrasing of a few items and the addition of exact frequency scores. The BPDSI-IV showed good psychometric properties among (BPD) patients and non-patients (Giesen-Bloo et al., 2010).

Statistical analysis

First, the optimal item composition was examined by evaluating the psychometric properties (reliability and validity) of seven different versions (see Supplement 1) as well as the discriminative capacity of the items that were subject to discussion (items 8 to 11). Moreover, the content coverage of the items was also taken into consideration, with the inclusion of two items for both criterion 8 and criterion 9 most closely resembling the DSM-5 (American Psychiatric Association, 2013). Reliability was evaluated by assessing the internal consistency with Cronbach's α, McDonald's omega (ω), and their ordinal coefficients to account for the Likert response format (Gadermann et al., 2012; Zumbo et al., 2007). Alpha values > .70 and omega values > .75 were considered acceptable (Watkins, 2017). In addition, item-rest correlations (r_{ir}) were calculated, with $r_{ir} > .30$ deemed satisfactory (Zijlmans et al., 2019). Pearson or Spearman correlations were calculated to assess concurrent validity. Known-group validity was examined with independent-samples *t*-tests as well as ANCOVAs that included relevant covariates to account for group differences in demographics. In addition, effect sizes (Cohen's *d*) were calculated and interpreted according to Cohen's (1992) guidelines (0.20 = small, 0.50 = medium, and ≥ 0.80 = large).

Second, sensitivity to change was assessed using four paired-samples *t*-tests combined with effect size coefficients (Cohen's *d*), comparing scores before treatment with scores on the reassessments. Next, receiver operating characteristic (ROC) analysis was conducted to extract the area under the ROC curve (AUC), sensitivity, and specificity. Swets' (1988) guidelines were applied to interpret the AUC (≥ .70 = moderate and ≥ .90 = high). Moreover, the ROC analysis was used to determine the optimal cutoff value based on Youden (*J*) index (Youden, 1950), Euclidean distance (Perkins & Schisterman, 2006), and Liu's method (Liu, 2012), as well as the recommended minimal sensitivity of .90 (Zimmerman & Mattia, 2001).

Finally, factor analyses were conducted to evaluate the dimensional structure of the uBPDc and its measurement invariance. A one-factor model was examined using confirmatory factor analysis (CFA) with robust weighted least squares mean and variance adjustment (WLSMV) and theta parameterization (Wells, 2021), including all participants. Several fit indices were used to evaluate model fit, including the Comparative Fit Index (CFI; Bentler, 1990), Tucker-Lewis Index (TLI; Tucker & Lewis, 1973), and Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1989). For CFI and TLI, values larger than .90 or .95 indicate an acceptable or good fit, respectively. For the RMSEA, values below .08 are considered acceptable and values below .06 as good (Kline, 2016). Subsequently, measurement invariance of the factor structure of the uBPDc was assessed across individuals with BPD and non-clinical controls using multiple-group confirmatory factor analysis (MG-CFA). The Cluster-C PD sample was excluded due to the low sample size (Kline, 2016; Wang & Wang, 2019). MG-CFA was initially planned to be conducted with WLSMV as the estimation method. However, due to an unequal number of item categories between the groups, Maximum Likelihood was utilized (Robitzsch, 2020). This was considered justified given the number of item categories (five; Rhemtulla et al., 2012) and under the prerequisite that the CFA fit indices did not differ considerably between the one-factor model estimated using WLSMV versus ML (Sass et al., 2014).

Three levels of invariance were consecutively tested, including configural invariance, metric invariance, and scalar invariance. A fourth level, strict invariance, was omitted from the invariance tests, as testing residual invariance is not a prerequisite for examining mean differences across groups (Meredith, 1993; Putnick & Bornstein, 2016). The comparative fit of the models was assessed by evaluating the magnitude of change in the CFI, TLI, and RMSEA. For the CFI and TLI, a change greater than -.010 was considered a significant decrease in model fit, whereas a change larger than .015 for the RMSEA indicated a significant decrease in fit (Chen, 2007). Chi-square statistics were not compared as this statistic appears overly sensitive with large sample sizes (Putnick & Bornstein, 2016). Modification indices were used to identify potential sources of model misspecification.

The analyses were performed using Mplus (factor analyses; version 8.8; Muthén & Muthén, 2017), R software (version 4.2.2; R Core Team, 2022) with the psych package (internal consistency; Revelle, 2017), and IBM SPSS (all other statistical analyses; version 28.0.1.0; IBM Corp., 2021), with a two-sided *p*-value of < .05.

RESULTS

Descriptive statistics

Demographic data of the three groups are shown in Table 1, including tests (ANOVAs and chi-square tests) for between-group differences. The groups differed significantly with respect to age, gender, Dutch ethnicity, and employment status, while no significant difference was observed for education level. Therefore, between-group analyses (known-group validity) were repeated while controlling for these variables, except for employment status which was considered a common contextual factor in individuals diagnosed with BPD (Miller & Chapman, 2001).

Table 1. *Demographic Data of the Three Groups*

	BPD		Cluster-C PD		Non-clinical		Analysis	
	(*N* = 204)		(*N* = 57)		(*N* = 103)			
Characteristic	***M***	***SD***	***M***	***SD***	***M***	***SD***	***F***	***p***
Age	32.2[a]	9.6	36.7[b]	10.5	33.0[a/b]	13.9	3.61	.028[1]
Education[2]	4.2	1.7	4.5	1.7	4.4	1.5	1.32	.268
	n	**%**	***n***	**%**	***n***	**%**	χ^2	***p***
Women	172[a]	84.3	36[b]	63.2	81[a]	78.6	12.24	.002
Dutch ethnicity	150[a]	73.5	52[b]	91.2	91[b]	88.3	14.53	<.001
Employed	57[a]	27.9	24[b]	42.1	57[b]	55.3	22.33	<.001

Note. Follow-up analyses without correction were conducted when the main effect was significant. Demographics with different superscript letters (a, b) were significantly different from each other. BPD = borderline personality disorder; PD = personality disorder.

[1] Welch's ANOVA was also conducted due to the violation of the homogeneity of variances assumption and indicated a significant main effect (p = .017).

[2] Based on the International Standard Classification of Education, 2011 version.

Optimal composition of items

The psychometric properties of the seven versions and the between-group comparisons for the items under debate (items 8 to 11) can be found in Supplement 2, Table S1. Minimal differences were observed in psychometric properties between the alternative versions of the uBPDc. Therefore, the optimal version was selected based on content coverage and the differentiating capacity of the items. Including 11 items with two items to index the presence or absence of intense anger or difficulty controlling anger (criterion 8), as well as paranoid ideation or dissociation (criterion 9), most closely resembles the DSM-5 BPD criteria. Moreover, selecting the highest score of the two items measuring the same criterion resulted in the largest differences in scores between participants with BPD and non-clinical controls (criteria 8: $t(302.99) = 19.92$, $d = 1.94$; criteria 9: $t(295.14) = 17.82$, $d = 1.85$; Supplement 2, Table S2). Accordingly, version 5 was deemed the optimal version, including all 11 items, whereby for criteria 8 and 9 the highest score was selected from the two items measuring the same criterion. Subsequent analyses were performed with this version.

Psychometric properties

Psychometric properties, including reliability and validity, are presented in Table 2. First, the internal consistency of the uBPDc proved to be good for both the total group and specific groups. Item-rest correlations in the total group were satisfactory and ranged from .50 to .79. Item-rest correlations were also adequate in the specific groups, except for items 4 (impulsivity; r = .25 and r = .29) and 5 (non-suicidal self-injury and suicidality; r = .19 and r = .11) in the Cluster-C PD and non-clinical control groups, respectively (see Supplement 3, Table S1). However, removal of these items did not result in substantial improvements in the internal consistencies. Second, moderate to large associations were observed between the uBPDc and two instruments measuring the severity and number of BPD symptoms. Finally, the average uBPDc total score of the BPD sample (M = 30.74) was significantly higher compared to the average uBPDc total scores of the Cluster-C PD sample (M = 21.67) and non-clinical control sample (M = 14.03), with large effect sizes.

Table 2. *Reliability and Validity of the uBPDc in the Total Group, BPD Group, Cluster-C PD Group, and Non-Clinical Control Group*

Psychometric property	Total group	BPD	Cluster-C PD	Non-clinical
Internal consistency (α/ordinal α)	.92/.93	.80/.83	.79/.70	.78/.80
Internal consistency (ω/ordinal ω)	.93/.95	.83/.86	.84/.75	.84/.89
Mean item-rest correlations (r_{ir})	.70	.49	.47	.46
Concurrent validity (r)				
Number of BPD symptoms (SCID-5-PD/SPQ)	.72***[1,2]	.29***	.33***[2]	.44***[2]
Severity of BPD symptoms (BPDSI-5)	NA	.48***	NA	NA
	BPD vs. Cluster-C PD		**BPD vs. Non-clinical**	
Known-group validity				
t-value/F-value	-9.37***/79.33***[3]		-27.43***/530.41***[4]	
Cohen's d/corrected Cohen's d	1.40/1.38[3]		2.83/2.81[4]	

Note. BPD = borderline personality disorder; BPDSI-5 = Borderline Personality Disorder Severity Index version 5; NA = not available; PD = personality disorder; SCID-5-PD = Structured Clinical Interview for DSM-5 Personality Disorders; SCID-5-SPQ = Structured Clinical Interview for DSM-5 Screening Personality Questionnaire.

[1] Since the range of the SCID-5-PD scores was twice as large as the range of the SCID-5-SPQ scores, the SCID-5-PD scores were first divided by two before being combined into one variable.

[2] Spearman correlation was calculated, due to a severe violation of the normality assumption.

[3] Based on ANCOVA, corrected for age, gender, and Dutch ethnicity.

[4] Based on ANCOVA, corrected for Dutch ethnicity.

***p < .001.

Sensitivity to change

The sensitivity to change analysis included 90 participants with BPD who completed 2 years of treatment (DBT or ST) as well as the respective assessments. The uBPDc was administered before treatment and 6-monthly during treatment. Table 3 presents the mean scores at each assessment and results of the paired-samples t-tests, comparing the baseline assessment with the reassessments. The results indicated significant improvements between the pre-treatment assessment and reassessments, with large effect sizes.

Table 3. *Descriptives and Paired Samples T-test Statistics for the Assessments Before and During Treatment (N = 90)*

	Descriptives		Analysis			
Assessment	***M***	***SD***	$\Delta_{\text{baseline-reassessment}}$	***SD*** $\Delta_{\text{baseline-reassessment}}$	***t*-value**	**Cohen's *d***
Pre-treatment	29.97	6.39				
6 months	23.57	6.27	6.40	6.43	9.45***	1.00
12 months	19.76	6.55	10.21	8.18	11.84***	1.25
18 months	18.07	5.98	11.90	7.17	15.75***	1.66
24 months	17.66	6.56	12.31	8.23	14.19***	1.50

***$p < .001$.

Clinical norms

The ROC analysis indicated that the uBPDc was highly effective as a screening tool (AUC = .93). Based on the Youden (*J*) index, Euclidean distance, and Liu's method, a cutoff value of 22.5 was proposed, resulting in a sensitivity of .89 (182 out of 204 individuals with BPD were correctly classified) and specificity of .84 (134 out of 160 individuals without BPD were correctly classified). In addition, a cutoff value of 21.5 exceeded the desired minimum sensitivity for a screening instrument of .90 (.92; 187 out of 204 individuals with BPD were correctly classified) with a specificity of .81 (129 out of 160 individuals without BPD were correctly classified).

Factor analyses

First, a one-factor model was fitted including all participants (N = 364) to evaluate the dimensional structure of the uBPDc. Results showed that model fit was good according to the CFI and TLI, but unacceptable according to the RMSEA ($\chi^2(27) = 94.31$, RMSEA = .083, 90% CI [.065, .101], CFI = .988, TLI = .984). Modification indices were therefore examined to identify measurement error correlations that penalized model fit. A respecified model was tested by adding an error correlation between item 3 ("Uncertainty about who you really are") and item 7 ("Feeling bored or empty inside"), which yielded an adequate fit ($\chi^2(26) = 81.98$, RMSEA = .077, 90% CI [.058, .096], CFI = .990, TLI = .986). Next, measurement invariance was tested across individuals with BPD and non-clinical controls using the one-factor model with an error correlation between items 3 and 7 as the baseline model. However, due to an unequal number of item categories between the samples, the analyses were conducted by treating the variables as continuous, using ML instead of WLSMV as the estimation method. The results of the one-factor model including all participants and using ML aligned with the results based on WLSMV (initial one-factor model: $\chi^2(27) = 92.49$, RMSEA = .082, 90% CI [.064, .100], CFI = .964, TLI = .953; respecified model: $\chi^2(26) = 71.74$, RMSEA = .069, 90% CI [.051, .089], CFI = .975, TLI = .966), justifying the use of ML to test for measurement invariance.

The results of the measurement invariance tests are presented in Table 4. First, for configural invariance, model fit was considered acceptable based on the RMSEA and CFI, but unsatisfactory according to the TLI. The modification indices indicated an error correlation between item 4 ("Impulsively doing unwise things") and recoded item 9 (highest score of items 9 "Distrusting other people" and 11 "Not feeling like yourself anymore, as if you are out of touch with reality or experiencing life like a movie or dream"). Including this error correlation improved the model fit to an adequate level. Second, factor loadings were constrained across groups to assess metric invariance. The metric invariance model provided a significantly worse fit than the configural invariance model, indicating that the factor loadings were not equal across groups. Using modification indices, three factor loading constraints (items 3, 5, and 7) were sequentially identified and released before a partial metric invariance model was identified that did not differ significantly in model fit from the configural invariance model. The factor loadings of items 3 ("Uncertainty about who you really are") and 7 ("Feeling bored or empty inside") were substantially lower in the BPD sample (item 3: $\lambda = .56$, item 7: $\lambda = .59$) compared to the non-clinical sample (item 3: $\lambda = .67$, item 7: $\lambda = .71$), whereas the factor loading of item 5 ("Injuring yourself on purpose (cutting, pricking, hitting, burning) or the urge to kill yourself") was substantially higher in the BPD sample ($\lambda = .31$) compared to the non-clinical sample ($\lambda = .12$). Finally, constraining item intercepts to assess scalar invariance yielded a fit that approximated the fit of the partial metric invariance model.

Table 4. *Results of Measurement Invariance Tests*

Model	χ^2 (df)	RMSEA (90% CI)	CFI	TLI	ΔRMSEA	ΔCFI	ΔTLI
Configural	94.27 (52)	.073 (.049; .096)	.927	.899			
Configural[1]	84.25 (50)	.067 (.041; .091)	.941	.915			
Metric[1]	130.53 (58)	.090 (.070; .111)	.875	.845	.023	-.066	-.070
Metric[1,2]	92.19 (55)	.066 (.042; .090)	.936	.916	-.001	-.005	.001
Scalar[1,2]	654.30 (63)	.065 (.042; .087)	.929	.919	-.001	-.007	.003

Note. [1] Including an error correlation between item 4 and recoded item 9.
[2] Factor loadings were allowed to vary for items 3, 5, and 7.

DISCUSSION

The aim of this study was to examine the suitability of the uBPDc, a shortened version of the validated BPD Checklist (Bloo et al., 2017), as a screening tool and outcome instrument. Using data from individuals with BPD, individuals with Cluster-C PD, and non-clinical controls, the optimal item composition of the uBPDc was determined. Emphasis was placed on the differentiating capacity of the items and content coverage. The preferred version was the 11-item version, including one item for each DSM-5 criterion, except for criteria 8 and

9, which were measured with two items each and followed by selecting the highest score among the two items measuring the same criterion. Including two items for both criterion 8 and criterion 9 most closely resembles the DSM-5, as each criterion encompasses two aspects (criterion 8: intense anger or difficulty controlling anger, criterion 9: paranoid ideation or dissociation; American Psychiatric Association, 2013). Using this version of the uBPDc, the results indicated that the questionnaire is both valid and reliable across the three samples, with satisfactory diagnostic accuracy. Moreover, the uBPDc proved to be sensitive to change, and support was found for a unidimensional construct with partial measurement invariance across individuals with BPD and non-clinical controls.

A close inspection of the psychometric properties of the uBPDc showed that the internal consistency was satisfactory in all samples, although slightly lower compared to the original questionnaire ($\alpha = .92$ versus $\alpha = .97$ in the total group, and $\alpha = .80$ versus $\alpha = .92$ in the BPD group; Bloo et al., 2017). This difference is probably related to the higher number of items in the original questionnaire, since more items can lead to improved internal consistency (Tavakol & Dennick, 2011). Additionally, adequate item-rest correlations were found, although two items (item 4: impulsivity and item 5: non-suicidal self-injury and suicidality) were suboptimal in the non-BPD samples. These behaviors are common in individuals with BPD but less common in those with Cluster-C PD or in the general population (Ansell et al., 2007; Fossati et al., 2007; Linhartová et al., 2021; Pompili et al., 2005; Yen et al., 2003); hence, restricted variance and skewed distributions likely limited the item-rest correlations. Second, there was support for the concurrent and known-group validity of the uBPDc. Moderate to large associations were observed between the uBPDc and two instruments measuring the severity and number of BPD symptoms. The moderate associations observed between the uBPDc and the number of BPD symptoms in the BPD and Cluster-C PD samples were likely due to the restricted score ranges (BPD sample: predominantly high scores, Cluster-C PD sample: predominantly low scores). Moreover, the BPD Checklist, along with its shortened version, was developed to complement the other two instruments, for example in format (self-report versus interview format) and focus (subjective burden versus frequency of BPD symptoms) (Bloo et al., 2017). Finally, large differences in scores were found between the BPD sample and non-BPD samples, indicating that the uBPDc can be used to discriminate between individuals diagnosed with and without BPD (Davidson, 2023).

The uBPDc was developed in the context of an RCT (Wibbelink et al., 2022) to enable the frequent assessment of BPD symptoms. The primary purpose of the uBPDc is therefore its utilization as an outcome instrument, rendering sensitivity to change a crucial aspect of this psychometric evaluation. Scores in a BPD sample receiving an evidence-based treatment (DBT or ST) decreased substantially between the pre-treatment assessment and reassessments during treatment, with effect sizes comparable to those of the original version (BPD Checklist; Bloo et al., 2017). This suggests that the uBPDc is sufficiently sensitive to measure change over time, thereby confirming its suitability as an outcome instrument.

Furthermore, the uBPDc showed promise as a screening tool for BPD. A high AUC (.93) was observed, with a cutoff value of 22.5 yielding a sensitivity of .89 and a specificity of .84. However, a sensitivity above .90 is recommended for screening tools in clinical practice, since a follow-up diagnostic assessment would only occur for those who screen positive (Zimmerman & Mattia, 2001). A cutoff value of 21.5 resulted in a sensitivity of .92, with a reasonable specificity of .81. Compared to other short screening instruments for BPD (e.g., MSI-BPD; Zanarini et al., 2003, screening instrument for borderline personality disorder [SI-Bord]; Lohanan et al., 2020, Personality Diagnostic Questionnaire-4 BPD [PDQ-4 BPD]; Hyler, 1994, International Personality Disorder Examination Screener [IPDE-S] BPD subscale; Loranger, 1999), the uBPDc demonstrated similar or even better properties (Chanen et al., 2008; Lohanan et al., 2020; van Alebeek et al., 2017; Zimmerman & Balling, 2021).

Finally, factor analyses confirmed the one-factor structure of the uBPDc, albeit with the inclusion of an error correlation between items 3 (identity problems) and 7 (emptiness). This is not surprising, as both theoretical and empirical research suggest that feelings of emptiness are closely linked to identity disturbance (Kernberg, 1984; Linehan, 1993; Martin & Levy, 2022; Meares et al., 2011; Miller et al., 2020). Moreover, in a qualitative study among individuals with BPD, feelings of emptiness were frequently described as a disconnection from themselves, including a lack of identity or an unstable identity (Miller et al., 2021). In addition, previous factor analytic and latent class analytic studies have shown that identity problems and emptiness load on the same component or class (Clarkin et al., 1993; Ramos et al., 2014; Sanislow et al., 2000, 2002). Next, measurement invariance analysis provided support for partial measurement invariance of the one-factor model across individuals with BPD and non-clinical controls. There were indications of unequal factor loadings of items 3 (identity problems), 5 (non-suicidal self-injury and suicidality), and 7 (emptiness), suggesting that these items contributed differently to the latent factor (i.e., partial metric invariance). Accepting some degree of measurement non-invariance is however common practice, although guidelines for partial invariance vary (Putnick & Bornstein, 2016). Some authors (e.g., Dimitrov, 2010; Steenkamp & Baumgartner, 1998; Vandenberg & Lance, 2000) suggested that partial invariance is acceptable if most of the items are invariant, which is the case for the uBPDc. Moreover, research has shown that valid comparisons between groups are possible even in cases of partial invariance (Byrne et al., 1989). Additionally, Steinmetz (2013) demonstrated that while scalar non-invariance resulted in significant misinterpretation of true mean differences, metric non-invariance had only minor effects.

There are several limitations of this study that should be noted. First, the BPD sample differed significantly from the non-BPD samples on several demographic characteristics. Therefore, between-group analyses were conducted twice by correcting for these demographics, except for employment status. The difference in employment status was considered related to BPD symptoms (Sansone & Wiederman, 2013), hindering the ability to control for it (Miller & Chapman, 2001). Second, the non-clinical sample was selected using convenience sampling,

which increased the risk of sampling bias and may limit the generalizability of the findings (Bryman, 2016). Finally, MG-CFA was conducted without the Cluster-C PD sample, because of the low sample size. The measurement invariance across BPD and other clinical samples remains to be investigated in future research. In addition, MG-CFA was conducted using ML rather than WLSMV as the estimation method, due to an unequal number of item categories across groups. This approach was deemed suboptimal given the ordinal format of the uBPDc items. However, using ML was considered justified based on the number of response categories and the comparable fit indices of the one-factor model estimated with ML versus WLSMV (Rhemtulla et al., 2012; Sass et al., 2014).

Overall, the uBPDc demonstrated satisfactory psychometric properties in our samples, including good reliability and validity as well as adequate diagnostic accuracy. Additionally, a unidimensional construct with partial measurement invariance across groups was supported. Moreover, the short nature of the uBPDc, in combination with its sensitivity to change, renders the uBPDc an appealing option for evaluating BPD symptoms in clinical and research practice, particularly when frequent assessments are required or time is limited. In conclusion, although replication studies are indicated, the uBPDc appears to be an efficient screening tool and outcome instrument for borderline symptomatology.

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SUPPLEMENTARY MATERIALS

Supplement 1

Items of the uBPDc

	During last month, to what extent were you troubled by:	Not at all	Slightly	Moderately	To a large degree	Extremely
1	Fear that others will leave you	1	2	3	4	5
2	Strong changes in feelings for other people	1	2	3	4	5
3	Uncertainty about who you really are	1	2	3	4	5
4	Impulsively doing unwise things (such as spending too much money that you cannot afford to spend, binge eating, drinking too much, being reckless (e.g., in traffic))	1	2	3	4	5
5	Injuring yourself on purpose (cutting, pricking, hitting, burning) or the urge to kill yourself	1	2	3	4	5
6	Quick changes of mood	1	2	3	4	5
7	Feeling bored or empty inside	1	2	3	4	5
8	Hating yourself, everybody and the world	1	2	3	4	5
9	Distrusting other people	1	2	3	4	5
10	Anger outbursts	1	2	3	4	5
11	Not feeling like yourself anymore, as if you are out of touch with reality or experiencing life like a movie or dream (not because of drugs)	1	2	3	4	5

Overview of different versions

Seven different versions of the uBPDc were examined to determine the optimal composition of items:

1. Version 1: comprises nine items with the exclusion of items 10 and 11.
2. Version 2: includes all 11 items, whereby for criteria 8 and 9 the average was calculated of the two items measuring the same criterion (criterion 8: items 8 and 10, criterion 9: items 9 and 11).
3. Version 3: comprises 10 items with the inclusion of item 8 and exclusion of item 10, and for criterion 9, the average was calculated of items 9 and 11.
4. Version 4: comprises 10 items with the inclusion of item 10 and exclusion of item 8, and for criterion 9, the average was calculated of items 9 and 11.
5. Version 5: includes all 11 items, whereby for criteria 8 and 9 the highest score of the two items measuring the same criterion was selected (criterion 8: items 8 and 10, criterion 9: items 9 and 11).
6. Version 6: comprises 10 items with the inclusion of item 8 and exclusion of item 10, and for criterion 9, the highest score of items 9 and 11 was selected.
7. Version 7: comprises 10 items with the inclusion of item 10 and exclusion of item 8, and for criterion 9, the highest score of items 9 and 11 was selected.

Supplement 2

Table S1. *Psychometric Properties of Seven Different Versions of the uBPDc*

Psychometric property	Version 1	Version 2	Version 3	Version 4	Version 5	Version 6	Version 7
Internal consistency (α/ordinal α)							
Total group	.91/.93	.91/.93	.91/.93	.91/.93	.92/.93	.91/.93	.91/.93
BPD	.79/.83	.80/.83	.80/.84	.78/.82	.80/.83	.79/.83	.78/.81
Cluster-C PD	.78/.71	.78/.71	.77/.69	.76/.63	.79/.70	.78/.70	.77/.68
Non-clinical	.75/.71	.76/.77	.76/.77	.76/.77	.78/.80	.76/.77	.76/.77
Internal consistency (ω/ordinal ω)							
Total group	.93/.95	.93/.95	.93/.95	.92/.94	.93/.95	.93/.95	.92/.94
BPD	.83/.86	.84/.89	.84/.87	.82/.86	.83/.86	.83/.86	.82/.85
Cluster-C PD	.85/.77	.84/.80	.83/.76	.82/.71	.85/.75	.85/.76	.83/.77
Non-clinical	.80/.84	.83/.79	.82/.88	.83/.76	.84/.89	.82/.87	.83/.87
Mean item-rest correlations							
Total group	.69	.70	.70	.68	.70	.70	.68
BPD	.48	.50	.49	.47	.49	.48	.46
Cluster-C PD	.46	.46	.45	.43	.46	.45	.43
Non-clinical	.42	.45	.43	.44	.46	.44	.44
Concurrent validity (*r*)							
Number of BPD symptoms (SCID-5-PD/SPQ)							
Total group[1,2]	.72***	.72***	.72***	.73***	.72***	.72***	.72***
BPD	.30***	.31***	.30***	.31***	.29***	.29***	.30***
Cluster-C PD[2]	.31***	.32***	.32***	.32***	.33***	.32***	.32***
Non-clinical[2]	.45***	.44***	.45***	.44***	.44***	.45***	.44***
Severity of BPD symptoms (BPDSI-5)							
BPD	.49***	.49***	.49***	.49***	.48***	.48***	.48***
Known-group validity							
BPD vs. Cluster-C PD							
t-value	-9.19***	-10.86***	-10.46***	-11.13***	-9.48***	-9.33***	-9.80***
Cohen's *d*	1.37	1.42	1.38	1.45	1.41	1.39	1.46
BPD vs. Cluster-C PD – corrected[3]							
F-value	75.99***	81.15***	76.98***	83.78***	81.37***	78.76***	85.87***
Cohen's *d*	1.36	1.41	1.37	1.43	1.42	1.39	1.45
BPD vs. Non-clinical							
t-value	-27.45***	-27.07***	-27.07***	-26.85***	-27.43***	-27.31***	-27.07***
Cohen's *d*	2.79	2.76	2.74	2.74	2.83	2.79	2.79
BPD vs. Non-clinical – corrected[3]							
F-value	526.22***	516.05***	514.46***	507.56***	544.66***	532.82***	526.08***
Cohen's *d*	2.78	2.75	2.74	2.73	2.83	2.80	2.78

Note. BPD = borderline personality disorder; BPDSI-5 = Borderline Personality Disorder Severity Index version 5; PD = personality disorder; SCID-5-PD = Structured Clinical Interview for DSM-5 Personality Disorders; SCID-5-SPQ = Structured Clinical Interview for DSM-5 Screening Personality Questionnaire.

[1] Since the range of the SCID-5-PD scores was twice as large as the range of the SCID-5-SPQ scores, the SCID-5-PD scores were first divided by two before being combined into one variable.

[2] Spearman correlations were calculated, due to a severe violation of the normality assumption.

[3] Based on ANCOVA, corrected for age, gender, and Dutch ethnicity.

***$p < .001$.

Table S2. *Discriminant Validity of the uBPDc Items Under Discussion*

Item	*M* BPD	*M* Cluster-C PD	*M* Non-clinical	*t*-value BPD vs. Cluster-C PD	*d* BPD vs. Cluster-C PD	*t*-value BPD vs. Non-clinical	*d* BPD vs. Non-clinical
Criterion 8							
Item 8 (hate)	2.94	2.03	1.17	-5.20***	0.72	-17.58***	1.64
Item 10 (anger outbursts)	2.37	1.40	1.16	-8.29***	0.91	-13.57***	1.25
Average items 8 and 10	2.65	1.72	1.16	-8.40***	0.99	-18.96***	1.75
Highest score items 8 and 10	3.22	2.21	1.26	-5.83***	0.87	-19.92***	1.94
Criterion 9							
Item 9 (paranoid)	3.38	2.55	1.53	-4.63***	0.67	-16.92***	1.70
Item 11 (dissociation)	2.26	1.57	1.20	-4.60***	0.57	-10.19***	0.96
Average items 9 and 11	2.82	2.06	1.37	-5.20***	0.77	-17.38***	1.68
Highest score items 9 and 11	3.56	2.64	1.63	-5.29***	0.79	-17.82***	1.85

Note. BPD = borderline personality disorder; PD = personality disorder.
***$p < .001$.

Supplement 3

Table S1. *Item-rest Correlations (r_{ip}) and Mean scores of the uBPDc Items*

	Total group		BPD		Cluster-C PD		Non-clinical	
Item	r_{ir}	***M***	r_{ir}	***M***	r_{ir}	***M***	r_{ir}	***M***
Item 1	.69	2.83	.43	3.52	.43	2.53	.55	1.61
Item 2	.73	2.75	.52	3.50	.59	2.03	.51	1.66
Item 3	.72	3.23	.47	3.90	.63	3.41	.58	1.82
Item 4	.65	2.68	.44	3.38	.25	2.09	.29	1.61
Item 5	.50	1.58	.33	1.98	.19	1.17	.11	1.02
Item 6	.79	2.93	.60	3.75	.39	2.36	.50	1.60
Item 7	.74	3.21	.46	3.92	.67	3.19	.61	1.82
Recoded item 8[1]	.78	2.50	.61	3.22	.48	2.21	.52	1.26
Recoded item 9[2]	.74	2.87	.53	3.56	.54	2.64	.44	1.63

Note. BPD = borderline personality disorder; PD = personality disorder.
[1] Highest score of items 8 and 10.
[2] Highest score of items 9 and 11.