Abstract

(Word count: 132)

Borderline personality disorder (BPD) often goes unrecognized, and therefore a short but accurate screening tool is desired. The present study investigated the psychometric properties of the 10-item McLean Screening Instrument for BPD (MSI-BPD) in n = 159 well-diagnosed female participants. The MSI-BPD showed excellent internal consistency (α = .90). When compared to BPD diagnoses based on a structured clinical interview (SCID-II), the MSI-BPD showed substantial congruent validity (ROC AUC = 0.96). The cut-off point proposed by the developers of the MSI-BPD (7 or more) showed high specificity (.96) and good sensitivity (.71). The optimal cut-off point in the present study (5 or more) showed somewhat lower specificity (.86), but importantly better sensitivity (.94). Taken together, the Dutch version of the MSI-BPD demonstrated good psychometric properties for a screening tool.

I. Introduction

Borderline personality disorder (BPD) is a life threatening mental disorder, which emerges during adolescence and is characterized by chronic emotional instability. Following the DSM-V (APA, 2013), BPD is manifested by a pervasive pattern of instable personal relationships, distorted self-image, self-harm, and dysregulated affect. BPD is associated with serious co-morbidity with other personality disorders (Axis II) and clinical syndromes (Axis I) such as eating disorders, substance use disorder, suicide attempts, depression, and anxiety disorder (Chanen, Jovev, & Jackson, 2007). Adolescents and young adults with BPD commonly seek help and make use of (mental) health resources, but due to the high comorbidity BPD often goes unrecognized (Zanarini Vujanovic, Parachini, Boulanger, Frankenburg, & Hennen, 2003).

Accurately identifying the presence of BPD in mental and medical health care would benefit patients and professionals. Patients would faster receive appropriate treatment, thereby

reducing global health care costs. In order for this to be feasible, it is essential that professionals routinely screen for BPD. Different authors (Widiger, & Samuel, 2005; Siefert, 2010) recommended a two-step diagnostic procedure for BPD. In the first step a short and economic screening instrument based on self-report should be implemented and in case of a positive result an extended and psychometric well-investigated structured interview should be administered, such as the Structural and Clinical Interview for DSM-IV, Axis II (SCID II: First, Spitzer, Gibbon, Williams & Benjamin, 1994). While structured clinical interviews are generally more valid than self-report scales (Widiger et al., 2005), the advantage of such a two-step procedure is that is less time- and work consuming.

A promising screening instrument, the *McLean Screening Instrument for Borderline Personality Disorder* (MSI-BPD: Zanarini et al., 2003), was developed to screen for BPD in an economic, yet reliable and valid way (for other screeners such as SCID-II-Q see Taylor, James, Bobadilla, & Reeves, 2008). The MSI-BPD is a true-false self-report questionnaire that consists of 10 items, based on the DSM-IV BPD-criteria. Each endorsed item is worth 1 point on a scale that ranges from 0 to 10. The initial validation with n = 200 gender-mixed subjects favored a cut-off point of 7 out of 10 items and yielded both good sensitivity (percentage of correctly identified BPD cases) and specificity (percentage of correctly identified non-BPD cases) (Zanarini et al., 2003). Various studies were conducted in different settings using the MSI-BPD: two inpatients studies (Zanarini et al., 2003; Kröger, Huget, & Roepke, 2011), three outpatient studies (Chanen, Jovev, Djaja, McDougall, Yuen, Rawlings et al., 2008; Kröger, Vonau, Kliem, Kosfelder, 2011; Melartin, Häkkinen, Koivisto, Suominen, & Isometsä, 2009), and one sample from an ethnically diverse community (Patel, Sharp, and Fonagy, 2011). Overall these studies showed moderate to high diagnostic efficiency of the BPD-MSI, except for the inpatient study from Kröger et al. (2011) that revealed a very low specificity among non-personality disordered patients. An important limitation of these

studies is that none examined the full array of Axis I and II disorders.

To address these limitations and inconsistencies, the current study investigated the psychometric and screening properties of the Dutch translation of the MSI-BPD in a diverse clinical and non-clinical control sample. This is an advantage compared to other studies that used only participants with psychiatric history (e.g., Zanarini et al., 2003) or only a community-based sample (e.g., Patel et al., 2001). A further strength of the current study was that compared to former studies, the researchers used a well-diagnosed sample, with Axis I and Axis II disorders assessed by means of validated structural clinical interviews (SCID I and II: First, Spitzer, Gibbon, & Williams, 1997; First, Spitzer, Gibbon, Williams, & Benjamin, 1994).

II. Method

2.1 Participants

The sample consisted of n = 159 women from clinical and community settings. Screening took place in three different clinical settings: A psychiatric center (14 inpatients), and two ambulatory mental health centers (82 outpatients). Sixty-three non-clinical participants were recruited from the general population via snowball sampling. Irrespective of where they were recruited, participants were assigned to the BPD group (n = 55; patients only) or the non-BPD group (n = 104; both clinical controls as well as non-clinical controls). Compared to participants without BPD, participants with BPD were younger, $t(157)$ = 2.85, p =.005, and less educated, χ^2 (3) = 9.01, p =.03, see Table 1. Furthermore, the BPD sample showed on average more Axis I pathology and Axis II pathology compared to the non-BPD participants (see Tables 2 and 3 for details). Exclusion criteria were psychotic disorders or being under the influence of alcohol or drugs at the time of testing. All participants signed informed consent forms.

2.2 Measures

2.2.1 MSI-BPD

The MSI-BPD consists of 10 true-false items, with the sum score providing an indication of BPD symptomatology. The developers of the MSI-BPD proposed to use scores of 7 or more as indicative of BPD (Zanarini et al., 2003). Preliminary data using non-patients only indicated that the Dutch version assesses a single construct, has adequate internal consistency (α = .76), and a high 4-month test-retest reliability (r = .80) (Verschuere & Tibboel, 2011).

2.2.2. Axis I and II Pathology

The Dutch versions of the Structured Clinical Interview for DSM-IV Axis I and Axis II disorders were used to assess axis I and II diagnoses (SCID I and II; First et al., 1997; First et al., 1994). The SCID I is organized by the main Axis I disorder categories of DSM-IV and revealed adequate inter-rater reliability, with Kappa values ranging from 0.61 to 0.83 (M = 0.71). The SCID II covers ten personality disorders and the Kappa values varied between 0.77 and 0.94, with a mean value of 0.84, indicating an overall excellent inter-rater reliability (Lobbestael, Leurgans, & Arntz, 2010).

2.3 Procedure

Participants were recruited in different Dutch health care settings. Patients on the waiting list for therapy received an information letter about the study, and patients in therapy were verbally informed by their therapist about the study. During the intake, SCID diagnoses were made either by the therapists of the health care settings or the researchers. The researchers interviewed the control group, and had been trained through a 2-days theoretical training, and the scoring of audiotapes of 10 SCID interviews under supervision before testing independently. This training previously showed raters to display excellent inter-rater agreement (Lobbestael, et al., 2010). Controls were recruited from the general population via

snowball sampling of the social network of the experimenter. Next to the administration of SCID I and II, participants filled in the MSI-BPD screening list (Zanarini et al., 2003). The experiments were approved by the ethics committee psychology (ECP) of Maastricht University, the Netherlands.

2.4 Statistical Analysis

First, a principal component analysis was conducted to investigate whether the MSI-BPD measures a single construct, and the internal consistency (Cronbach's alpha) of the MSI-BPD was calculated.

Second, the correspondence between the MSI-BPD and the SCID-II was examined using Spearman correlation coefficients between the MSI-BPD total score and the SCID-II-sections.

Third, accuracy in classifying participants as BPD versus non-BPD based upon the pre-established cutoff of the MSI-BPD was assessed in three ways: (a) Cohen's Kappa (b) specificity and sensitivity, and (c) The Receiver operating characteristic (ROC) because any cutoff point is in essence arbitrary, and the ROC provides a measure of diagnostic efficiency that is independent of any specific cutoff. The ROC plots the relation between sensitivity and the false positive rate (1 - specificity). The area under the ROC curve (AUC) can range from 0.50 (random performance) to 1.0 (perfect performance). According to Swets (1988), values of $0.50 < AUC \leq 0.70$ indicate a low, $0.70 < AUC \leq 0.90$ a moderate, and $0.90 < AUC \leq 1.0$ a high discriminatory ability of the measure.

III. Results

3.1. Factor Structure of MSI-BPD and Internal Consistency

The Kaiser-Meyer-Olkin measure (0.91) and the Bartlett's test of sphericity ($\chi^2(45) = 769.69$, $p < .001$) verified the sampling adequacy for this analysis. The PCA indicated one component

with an eigenvalue over Kaiser's criterion of 1 that explained 53.43% of the variance. The scree plot showed a clear bend between the first and second component and supported the choice of one component. The internal consistency for the MSI-BPD scale was excellent (α = 0.90).

3.2 Convergent Validity

The MSI-BPD scale was significantly correlated, $\tau_s = 0.85$, $p < .001$, with the SCID-II BPD-section. The MSI-BPD scale was less but significantly correlated with the following SCID-II-PDs: Depressive PD , $\tau_s = 0.68$, $p < .001$, Paranoid PD, $\tau_s = 0.64$, $p < .001$, Avoidant PD, $\tau_s = 0.53$, $p < .001$, Dependent PD, $\tau_s = 0.50$, $p < .001$, Passive-aggressive PD, $\tau_s = 0.49$, $p < .001$, Antisocial PD , $\tau_s = 0.43$, $p < .001$, Obsessive-compulsive PD, $\tau_s = 0.37$, $p < .001$, Schizotypal PD, $\tau_s = 0.29$, $p < .001$, Narcissistic PD, $\tau_s = 0.26$, $p = .001$, Histrionic PD, $\tau_s = 0.23$, $p = .003$, and Schizoid PD, $\tau_s = 0.16$, $p = .05$.

3.3 Criterion Validity

The ROC analysis demonstrated that the MSI-BPD had high effectiveness as a screening tool (AUC = 0.96, CI 95%: 0.92 < AUC < 0.99). This means that there is a 96% chance that a randomly chosen participant with BPD scores higher on the MSI-BPD than a randomly chosen participant without BPD.

Using the pre-established cut-off score of seven, Kappa (0.71) showed good correspondence between MSI and SCID diagnoses. Specificity (0.96) was better than sensitivity (0.71), see Table 4. In total, 139 participants were accurately identified, with 4 false-positives and 16 false-negatives.

For exploratory purposes, we examined whether 7 indeed proved to be the best possible cut-off point. Evaluating sensitivity, specificity, positive and negative likelihood ratios of all possible cutoff points, the ROC analysis showed that 5 proved to be the best

possible cutoff. Compared to the previously proposed cutoff point of 7, this cutoff had somewhat lower specificity, but importantly better sensitivity, which is an attractive feature for a screener, see Table 4. Kappa rose to 0.77.

A separate ROC analysis, comparing clinical controls versus BPD patients revealed an AUC of .92 with a sensitivity of .95 and a specificity of .74 for the favored cutoff 5. With the proposed cutoff point of 7, the sensitivity dropped (.71), but the specificity rose (.91). Comparing non-clinical controls versus patients with BPD, an AUC of .98. with a sensitivity of .95 and a specificity of .97 for the favored cutoff point 5 was obtained. With the proposed cutoff point of 7, the sensitivity dropped (.71), but the specificity rose (1.0).

IV. Discussion

This study investigated the diagnostic value of the Dutch MSI-BPD in a diverse clinical and non-patient control sample in order to resolve methodological limitations in previous studies. This was the first study to evaluate the MSI-BPD as a screening tool in a mixed sample that assessed all Axis I and II disorders. The one-factor structure of the MSI-BPD was replicated, and excellent internal reliability was found.

We found that the MSI-BPD demonstrated high diagnostic efficiency (ROC = 0.96), with the previously proposed cutoff point of seven showing good correspondence with the SCID (sensitivity = 0.71; specificity = 0.96; Kappa = 0.71). Overall the value of sensitivity is comparable to that of previous studies (0.69 - 0.91). The specificity in our study was higher than the range of previous studies (0.39 - 0.85) and indicates that the MSI-BPD may indeed be useful as a screening instrument. Notably, we found that a cut-off of 5 even increased the diagnostic efficiency of the MSI-BPD, with particularly better sensitivity. So it seems important for future studies to explore whether the cut-off value needs to be lowered when screening in heterogeneous samples. Specificity showed to be lower when restricting the

comparison to the clinical control group.

Several methodological limitations should be noted. First, we assessed women only. This choice was inspired by the fact that BPD is more common among women (Distel, de Moor, & Boomsmaa, 2009). However, it would be informative to assess the screening effectiveness of MSI-BPD in men as well, especially, because a recent study suggested that BPD might often go unrecognized in men too (Grant et al., 2008). Secondly, we used selective samples to assure enough BPD cases in our relatively small sample. Thus, it would be informative to assess the predictive value of the MSI-BPD in samples with lower - perhaps more realistic - base rates of BPD. Third, there was substantial variation in the time between MSI-BPD screening and the structured clinical assessment (from hours to weeks), which could not be statistical evaluated. Although this is typical for a naturalistic setting, it is possible that the criterion validity is higher in the more proximal measurement of the MSI-BPD and SCID-II-BPD than in the more distant measurements.

Notwithstanding these limitations, the current study adds to the growing number of studies suggesting that the MSI-BPD appears to be a feasible screening tool for BPD. Although screening does not replace the use of semi-structured interviews as a standard of clinical practice, the findings support the value of BPD screening using the MSI-BPD.

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Table 1

Demographic Characteristics of the Sample

	BPD (*n*=55)	**Non-BPD**[a] (*n*=104)	**Total** (*N*=159)	**p-value**
Mean age (*SD*)	31.50 (*9.89*)	37.79 (*14.68*)	34.81 (*13.14*)	*p* =.005
Education (%)				*p* =.03
Primary school	4 (7.3%)	5 (4.8%)	9 (5.7%)	
High school	26 (47.3%)	34 (32.7)	60 (37.7%)	
MBO/HBO	16 (29.1%)	24 (23.1%)	40 (25.2%)	
University	9 (16.4%)	41 (39.4%)	50 (31.4%)	

[a] This sample consists of both patients without BPD and non-clinical controls.

Table 2

Number of Axis I Diagnoses (SCID I) in Participants With and Without BPD

Axis I	**BPD** (*n*=55)	**Non-BPD**[a] (*n*=104)	**Total** (*N*=159)	**p-value**
Anxiety Disorders	31 (56.4%)	27 (26.0%)	58 (36.5%)	*p* < .001
Mood Disorders	37 (67.3%)	24 (23.1%)	61 (38.4%)	*p* < .001
Psychotic Disorders	0 (0%)	0 (0%)	0 (0%)	NA
Substance-Related Disorders	11 (20.0%)	1 (1.0%)	12 (7.5%)	*p* < .001
Eating Disorders	10 (18.2%)	3 (2.9%)	13 (8.2%)	*p* =.001
Somatoform Disorders	5 (9.1%)	10 (9.6%)	15 (9.4%)	*p* = .91

[a] This sample consists of both patients without BPD and non-clinical controls.

Table 3

Number of Axis II Diagnoses (SCID II) in Participants With and Without BPD

Axis II	**BPD** (*n*=55)	**Non-BPD**[a] (*n*=104)	**Total** (*N*=159)	**p-value**
Avoidant PD	24 (43.6%)	18 (17.3%)	42 (26.4%)	*p* < .001
Dependent PD	5 (9.1%)	7 (6.7%)	12 (7.5%)	*p* = .59
Obsessive-Compulsive PD	8 (14.5%)	6 (5.8%)	14 (8.8%)	*p* = .06
Passive-Aggressive PD	3 (5.5%)	0 (0%)	3 (1.9%)	*p* =.02
Depressive PD	21 (38.2%)	7 (6.7%)	28 (17.6%)	*p* < .001
Paranoid PD	10 (18.2%)	1 (1%)	11 (6.9%)	*p* < .001
Schizotypal PD	0 (0%)	0 (0%)	0 (0%)	NA
Schizoid PD	1 (1.8%)	0 (0%)	1 (0.6%)	*p* = .17
Histrionic PD	0 (0%)	0 (0%)	0 (0%)	NA
Narcissistic PD	0 (0%)	0 (0%)	0 (0%)	NA
Borderline PD	55 (100%)	0 (0%)	55 (34.6%)	*p* < .001
Antisocial PD	7 (12.7%)	0 (0%)	7 (4.4%)	*p* < .001

[a] This sample consists of both patients without BPD and non-clinical controls.

Table 4

Cut-off Points and diagnostic efficiency

Cut-off point	SENS	SPEC	PLR	NLR
≥5 (Optimal cut-off in present sample)	0.94	0.86	7.02	0.063
≥7 (Zanarini et al, 2003)	0.71	0.96	18.44	0.30

Note. SENS = sensitivity; SPEC = specificity;
PLR = pos. likelihood ratio; NLR = neg. likelihood ratio.