Differentiation of Self and Interpersonal Functioning with the Level of Personality Functioning Scale – Brief Form 2.0 (LPFS-BF 2.0)

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Abstract

Research on Criterion A of the Alternative Model for Personality Disorders is recently expanding and provides mixed results concerning the unidimensional operational definition of severity by the model, characterized by impaired self (identity and self-direction) and interpersonal (empathy and intimacy) functioning. Studies resulted in one, as well as two or more factor structures. The present study demonstrated the importance of the structural and relational differentiation of self and interpersonal dimensions of personality functioning. 1074 participants (community and clinical mixed sample) completed the Level of Personality Functioning Scale – Brief Form 2.0 (LPFS-BF 2.0), the Personality Inventory for DSM-5 Short Form and the Questionnaire for the World Health Organization Disability Assessment. An LPFS-BF 2.0 two-factor structure with self and interpersonal functioning factors was corroborated by confirmatory factor analyses and bifactor modeling. Joint Exploratory Factor Analysis of the LPFS-BF 2.0 domains with maladaptive personality domains clearly differentiated the personality functioning factors. While the self functioning factor was more closely linked to negative affect (and to disinhibition and psychoticism), the interpersonal functioning factor connected to detachment. Self functioning predicted functional impairment along and beyond personality domains. The LPFS-BF 2.0 appears a useful tool for clinical routine monitoring of both self and interpersonal functioning.

Background

Section III of the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5; (2013)) introduced the Alternative Model for Personality Disorders (AMPD) to respond to criticism on categorical approaches in the field of personality pathology (Widiger & Trull, 2007). AMPD is based on a two-step dimensional assessment of personality disorders (PDs): level of personality functioning (LPF) (Criterion A) and maladaptive traits (Criterion B) (APA, 2013). Criterion A assesses the overall severity of personality functioning, characterized by central components of personality impairment, self (identity and self-direction) and interpersonal (empathy and intimacy) functioning. Criterion B defines specific individual differences in the trait profile. Since the publication of DSM-5, much of the AMPD literature has focused on providing validity evidence for the 5 trait domains (negative affect, detachment, antagonism, disinhibition, and psychoticism) and its 25 facets defined in Criterion B (Al-Dajani et al., 2016; Somma et al., 2019; Watters & Bagby, 2018). More recently, scientific attention has shifted towards Criterion A, with a considerable set of mixed results both supporting and disagreeing with the unidimensional operational definition of severity by this model, as well as with its specific contribution to the diagnosis of PDs and prediction of related outcomes (Sharp & Wall, 2021; Sleep et al., 2021; Widiger et al., 2019; Zimmermann et al., 2019).

In order to assess DSM-5 Criterion A, the Level of Personality Functioning Scale (LPFS) was launched (APA, 2013; Bender et al., 2011). LPFS defines 12 elements by assessing three facets within identity, self-direction, intimacy, and empathy. Five distinct levels of impairment are defined in each element, from no impairment (Level 0) to extreme impairment (Level 4). This results in 60 descriptions of personality dysfunction (12 elements X 5 levels) in order to determine PD severity on

a general dimension. Level 2 (moderate severity) is the threshold for presence of a PD. Additionally to the original clinician-rated LPFS (Bender et al., 2011), other structured interviews (Bender, 2018; Hutsebaut et al., 2017) and self-report measures designed to assess LPF have been developed (Huprich et al., 2018; Morey, 2017; Siefert et al., 2020). One of those instruments is the Level of Personality Functioning Scale-Brief-Form (LPFS-BF) (Hutsebaut et al., 2016), a quick screener of personality functioning with 12 dichotomous (yes/no) items with each LPFS element represented by one item. Its most recent revision, the LPFS-BF 2.0 (Weekers et al., 2019) converted the dichotomous items into a 4-point Likert scale, to be more aligned with the dimensional approach of AMPD and to facilitate sensitivity for measuring change in personality functioning during treatment.

The unidimensional structure of personality functioning, capturing the core of personality pathology, as originally intended (Bender et al., 2011; Morey, 2019; Sharp & Wall, 2021) has been evidenced (Cruitt et al., 2019; Gamache et al., 2019; Hopwood et al., 2018; Morey, 2017). Although the four subdimensions defined in criterion A (identity, self-direction, empathy and intimacy) also have some support (McCabe et al., 2021; Sleep et al., 2019), and even a six-factor solution when personality functioning is evaluated in a disorder-specific manner (Anderson & Sellbom, 2016) has been reported. The instrument used to measure personality functioning may have influenced on the different results in terms of structure. Yet, empirical evidence most often endorsed the two-factor model (with two self and interpersonal factors strongly correlated) on different self- and other-report measures and expert ratings (Bliton et al., 2022; Hutsebaut et al., 2016; Roche et al., 2018; Spitzer et al., 2021; Stover et al., 2020; Weekers et al., 2019; Zimmermann et al., 2015). Studies in patients using structured interview measures also confirmed two factors (Heissler et al., 2021; Hummelen et al.,

2021; Ohse et al., 2022). The current study will focus on the LPFS-BF 2.0. The original validation study by Weekers et al. (2019) in patients required some modifications to reach adequate fit for a two-factor structure (i.e. a correlated error term and a cross-loading of item 11). However, confirmatory factor studies with LPFS-BF 2.0 in non-clinical samples also gathered more support for a two-factor (Lakuta, 2022; Le Corff et al., accepted 2022; Natoli et al., accepted, 2022) than for an unidimensional model (Weekers et al., 2022). Yet, further evidence on the LPFS-BF 2.0 structure, especially in clinical samples, is needed.

Although self and interpersonal factors are often strongly intercorrelated, we consider their differentiation of substantive interest, given the distinct association with personality traits. Correlational studies have reported greater association of self functioning subdomains with neuroticism and conscientiousness adaptive personality domains, while interpersonal functioning correlated in a greater extent with agreeableness (Berghuis et al., 2014). Similarly, self functioning (and its subdomains) related more strongly with maladaptive negative affect domains (with also associations with detachment and psychoticism) while interpersonal functioning was linked to antagonism and detachment (Few et al., 2013; Lakuta, 2022). Studies using exploratory structural equation (ESEM) models have also shown that the self impairment dimension of identity grouped with neuroticism and negative affect domains (McCabe et al., 2021; Oltmanns & Widiger, 2016). Clinician-rated based traits of depressivity and separation insecurity appear on the same factor than self functioning, while interpersonal functioning appeared to group with antagonistic traits such as grandiosity and callousness and with detachment traits such as intimacy avoidance or withdrawal (Lakuta, 2022; Zimmermann et al., 2015). These empirical results indicate the importance to further examine the distinctiveness of self and interpersonal subdomains

of personality functioning in their relation with personality domains (Roche & Jaweed, 2021).

Another important debate concerns the incremental predictive ability of Criterion A above Criterion B of AMPD and vice versa to explain or predict related outcome measures. Given the empirical overlap between both constructs (measures of Criterion A and B have been found to be highly correlated), some question if this conceptual differentiation can hold (Zimmermann et al., 2019). Other argue they are still distinct given their incremental validity for important outcomes. Most attention has focused on the incremental validity for predicting PD categories (Anderson & Sellbom, 2018; Few et al., 2015; Nysaeter et al., 2022; Sleep et al., 2019). A recent study (Hobbs et al., 2023) examining the relationship of personality traits with quality of life and impairment, indicated that it is the pathological pole of traits that is associated with lower quality of life and increased impairment. Also, there is strong evidence that personality pathology has a strong impact on basic social, occupation and global functioning, even in a greater extent than other psychopathology (Skodol, 2018), nevertheless scarce studies are available studying how each dimension of Criterion A contributes to the explanation of psychosocial functioning and disability. Two studies (including a clinical and a mixed clinical-community sample) suggested an increment for LPFS ratings in predicting psychosocial functioning compared with total number of DSM-IV criteria (Morey et al., 2013), with specifically a greater contribution of the self functioning factor in the study by Buer Christensen et al. (2020). Congruently, in a borderline PD study, identity (a subfactor of self functioning) has been found to be the strongest predictor for psychosocial impairment functioning (Esguevillas et al., 2018). Also, Weekers and colleagues (2019) found the self functioning domain to be more sensitive to change after 3 months of inpatient treatment than the interpersonal domain.

In non-clinical samples quality of life was also taken into consideration. Weekers and colleagues (2022) reported significant associations between LFPF-BF 2.0 global score and quality of life and social and occupational impairment. Similarly, Lakuta (2022) also pointed towards self functioning as a significant predictor of well-being, above and beyond maladaptive personality traits. Further evidence determining which elements of AMPD are most related with impairment in clinical samples can contribute to identify predictors and moderators of treatment outcomes (Zimmermann et al., 2019). In addition, as noted above, the studies conducted to date mostly involve specific patient or community samples. In this sense, the inclusion of mixed samples would allow a more adequate representation of the entire continuum under evaluation.

Considering the above mentioned, and since self and interpersonal functioning were recently defined as key general predictors of PD based on a summary of empirical studies (Zimmermann et al., 2022), the general objective of the present study is to provide additional evidence on the differentiation of self and interpersonal dimensions of personality functioning. More specifically using a quick screener, the LPFS-BF 2.0, in a mixed community and clinical sample we aim to: 1) provide structural evidence for a two factor model with self and interpersonal as related dimensions; 2) obtain evidence of differential associations of self and interpersonal functioning with maladaptive personality domains; 3) determine the contribution self and interpersonal functioning for explaining functional impairment, and their incremental validity above personality domains.

We expect to find a two-factor structure with a high correlation between the self and interpersonal factor (Lakuta, 2022; Le Corff et al., accepted 2022; Natoli et al., accepted, 2022). When jointly factor analyzing personality functioning with maladaptive personality domains, we hypothesize self functioning to be grouped with

negative affect (and possible also connect to detachment and psychoticism), while interpersonal functioning to be more related to the detachment and antagonism domains (Few et al., 2013; Sleep et al., 2019; Sleep et al., 2020; Zimmermann et al., 2015). We assume that degree of personality dysfunctioning will be related to level of functional impairment, given the earlier found associations with social and occupational impairment (Weekers et al., 2022). Finally, we expect self functioning to be more predictive for functional impairment than interpersonal functioning, given it was more strongly related to disability and psychosocial impairment (Buer Christensen et al., 2020; Esguevillas et al., 2018; Zimmermann et al., 2019).

Materials and methods

Participants and procedure

In order to well capture the personality continuum by a wide variability in the manifestation of maladaptive personality traits and personality functioning, the present study was conducted in a mixed sample (N = 1074) composed of community adults (n = 717) and patients (n = 357). Inclusion criteria for the community sample were being between 18 and 80 years old and not having a mental disorder. The study was approved by the Bioethics Committee of the Province of Huelva (Junta de Andalucía, Spain) (No. PI 040/18). All participants gave informed consent to anonymously and voluntary participate. Inclusion criteria for the clinical sample were being adult (≥ 18) and being under treatment in a mental health service during data collection. Exclusion criteria in both samples were: 1) having been diagnosed with a medical or psychological disorder, such as active psychosis or severe mental retardation, that disqualifies from taking the tests, or 2) not signing the informed consent form.

An online access panel provider recruited a sampling frame of community participants, comprising 155,000 adults representative of the overall Spanish population. This company, specialized in online data collection, is certified with the International Organization for Standardization (ISO) 26362 quality standards. For present research, they provided the community sample group of the current sample selecting them by a stratified random sampling approach with proportional allocation of panelists according to gender, age (range: 18 - 75 years), and geographical region of the Spanish territory. Questionnaires were administered online. Only participants who fully completed all measures were retained. Less than 3% of the invited participants provided incomplete answers. The sample composition of the current study thus mirrored the sociodemographical distribution of the Spanish population. Among community participants, 44.4% were women, with ages ranging from 18 to 75 years (M = 46.30; SD = 14.65). 61.6% were employed, and 3.3% had primary education, 49.8% had secondary education, and 46.9% had completed full bachelor.

The clinical sample was collected via clinicians from mental health services in the Spanish province of Huelva by using of a non-probabilistic procedure. Patients were diagnosed by clinicians according to DSM diagnostic criteria (at time of data collection, DSM-IV was used in clinical practice). These diagnoses were only used to determine whether patients were eligible for the clinical group, the specific diagnoses were not used in the analyses in present research. Clinical patients completed the tests in rooms set up in the centers where they were recruited. The most frequent diagnostic categories among patients were Depressive Disorders (35.87%), Anxiety Disorders (31.31%) and Trauma and Stressor-Related Disorders (23.40%). 9.5% of patients fulfilled criteria for a Personality Disorder. Participants in this sample consisted of 63.0% women and ranged in age from 18 to 80 years (M = 37.72; SD = 14.48); 35.0% were employed at

the time of the study, and 13.7% had primary education, 68.1% had secondary education, and 18.2% had completed higher education.

Instruments

Level of Personality Functioning Scale - Brief Form 2.0 (LPFS-BF 2.0; Weekers et al., 2019). The Spanish version of LPFS-BF 2.0 (available for Spain on the website of the original authors: LPFS-BF Scale - ggz de Viersprong), was used. This version showed adequate reliability and criterion validity (Le Corff et al., accepted 2022). The LPFS-BF 2.0 consists of two domains: Self functioning (6 items measuring subdomains of identity and self-direction) and Interpersonal functioning (6 items evaluating subdomains of empathy and intimacy), measured on a 4-point Likert scale ranging from 1 (completely untrue) to 4 (completely true). The LFPS-BF-2.0 total score ranges from 12 to 48 and the two domain scores can range from 6 to 24. The higher the score, the greater the deficits in self and interpersonal functioning. In the present sample, internal consistency values of total scale and domains were adequate: Total scale (α = .87; Ω = .88; MIC = .34); Self functioning (α = .88; Ω = .89; MIC = .54); Interpersonal functioning (α = .69; Ω = .70; MIC = .28)

Personality Inventory for DSM-5 Short Form (PID-5-SF; Maples et al., 2015). The Spanish version translated and validated by Diaz-Batanero et al. (2019) was used. The items of this instrument are grouped into the 25 facets as described in section III of the DSM-5 and the five major scales correspond to the DSM-5 trait domains: Negative affect, Detachment, Antagonism, Disinhibition, and Psychoticism. This inventory assesses pathological personality traits in adults. It is composed of 100 items with a Likert-type format with four options: strongly disagree, moderately disagree,

moderately agree, and strongly agree. In the present study, Cronbach's alpha internal consistency coefficients ranged from .86 (Negative affect) to .88 (Detachment and Antagonism) (Ω = .83-.88; MIC = .30-.48).

Questionnaire for the World Health Organization Disability Assessment (WHODAS 2.0) (Ustün et al., 2010). The 12-item Spanish brief version was used, measuring functional impairment in six domains of life: cognition, mobility, self-care, getting along with other people, life activities and participation in society. This short version provides a single global index of impairment in the past 30 days (e.g. "*In the past days, how much difficulty did you have in taking care of your household responsibilities*", "*In the past days, how much difficulty did you have in dealing with people you do not know*"). In the present study, internal consistency coefficients for the composite scores were α =.89; Ω = .88; MIC = .45.

Sociodemographic variables. Questions on sex, age, educational level, current employment status, marital status, etc. were included.

Data analysis

Less than 0.1% of item data was missing. Descriptive statistics (M and *SD*) for scores on all scales were computed. Reliability coefficients (McDonald´s omega, Cronbach's alpha and mean inter-item correlations (MIC)) were computed. T-tests were performed to assess mean differences across the clinical and non-clinical samples. Effect sizes were quantified using Cohen´s *d*. Values greater than |0.20|, |0.50|, and |0.80| represent respectively small, medium, and large effect sizes, (Cohen, 1992).

The structure of LPFS 2.0 was estimated with Confirmatory Factor Analyses. Two models were tested: *Model 1*, with all items loading on a general factor of personality functioning; *Model 2*, with two correlated factors representing self and interpersonal functioning. The CFA analyses were conducted using the WLSMV robust estimation method which does not assume normally distributed variables and provides the best option for modelling categorical or ordered data (Brown, 2015). To evaluate goodness of fit for both models, the following fit statistics were used: Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR). Values of CFI and TLI above .95, and values of RMSEA and SRMR below .08 and .05, respectively, were considered indicative of good fit (Hu & Bentler, 1999).

To examine the dimensionality of LPFS-BF 2.0, bifactor modeling was applied. The Bifactor model (Model 3) included a general factor explaining covariance across all items and two orthogonal specific factors (self functioning and interpersonal functioning) explaining excess shared variance among item clusters. Despite the critique that bifactor might result in biased fit estimates (Eid et al., 2017; Heinrich et al., 2021), they are recommended to evaluate dimensionality and in this way complement correlated factors analysis (Rodriguez et al., 2016a). Information of the bifactor model was used to calculate omega, omega hierarchical (omegaH), and explained common variance (ECV) (Rodriguez et al., 2016b). ECV characterizes the proportion of common variance across items that is explained by each factor. For the general factor, a value greater than .70 indicates that the majority of common variance is explained by the general factor (Reise et al., 2013). Omega reflects the proportion of total score variance that can be attributed to common factors. For the general factor, all items are considered; for specific factors, only items loading on that factor are included. OmegaH

is the proportion of the total score variance that can be attributed to the general factor after accounting for all other specific factors. An omegaH > .80 indicates that the total score can be interpreted as unidimensional (Reise et al., 2013; Rodriguez et al., 2016a).

Next, the joint structure of LPFS-BF 2.0 and PID-5-SF was explored. Parallel analysis (PA) for principal axis factoring using permutations of the raw data (Horn, 1965; O'Connor, 2000) was performed to determine the number of factors to retain. PA tends to indicate more factors, especially when factors are highly correlated (Buja & Eyuboglu, 1992), therefore Auerswald and Moshagen (2019) recommend using multiple criteria. Empirical Kaiser Criterion (Braeken & van Assen, 2017), Comparison Data (CD) (Ruscio & Roche, 2012) and fit statistic differences (Finch, 2020) were estimated as additional procedure to determine the number of factors to retain. An EFA with three factors was estimated using a maximum likelihood extraction and oblimin rotation. Factor loadings ≥ .30 were considered meaningful. A factor loading is basically the correlation coefficient for the variable and factor, and according to Cohen (1992) .30 is a medium effect size.

In order to determine if functional impairment differs according to level of personality functioning, cutoffs provided by Weekers et al. (2022) for the LPFS-BF 2.0 total score were used to classify participants into impairment levels: no indication of impairment (total score LPFS-BF 2.0 < 26), subclinical impairment (26 ≤ total score LPFS-BF 2.0 ≤ 36), and clinical impairment (total score LPFS-BF 2.0 >36). Groups generated this way were compared on functional impairment measured by WHODAS 2.0 with an ANOVA.

Then, to evaluate the predictive validity of each LPFS-BF 2.0 scale in explaining functional impairment as measured by the WHODAS 2.0., and their incremental validity above PID-5 scales, a structural equation modelling (SEM) approach was

considered, as suggested by Wang & Eastwick (2020). Prior to conducting the SEM, a power analysis was performed. Using an expected effect size of the increment of LPFS-BF 2.0 beyond PID-5 scales of .05 (Lakuta et al., 2022), an alpha level of .05 and a sample size of 1074, the statistical power showed a value of .26 for Self functioning and .27 for Interpersonal functioning (Wang & Rhemtulla, 2021) (see supplement, table S1).

These values did not reach the suggested power of e.g. 80% (or more), so with the available sample size the analysis cannot be done using a SEM approach (Wang & Eastwick, 2020). Therefore, multiple linear regressions, controlling for age and sex, were employed. A Bonferroni correction for multiple testing was applied by only interpreting results at p-level of $p < .0027$ (result of dividing alpha level .05 by the maximum number of parameters estimated in the regression model).

CFA was completed in Mplus (Version 8; Muthén & Muthén, 2019), joint EFA was computed in JASP and number of factors to be extracted were decided using EFA.dimensions and EFA.tools R (Steiner & Grieder, 2020) packages. Other analyses were performed with SPSS 27 (IBM, 2021).

Results

Descriptive statistics

Table 1 shows the descriptive statistics (*M* and *SD*) of the scores on all measured scales in each subsample and the total sample.

*** INSERT TABLE 1 HERE ****

The clinical sample obtained significantly higher LPFS-BF 2.0 total, Self functioning and Interpersonal functioning scores, with effect sizes being moderate to high ($d = 0.44$ to 1.08). For the other measures (PID-SF and WHODAS 2.0), t-tests showed mean differences across the clinical and non-clinical samples for all scales except for PID-5

attention Seeking, Callousness, Deceitfulness, Grandiosity, Manipulativeness, and Antagonism domain. Cohen´s *d* ranged from 0.03 (PID-Callousness) to 1.17 (WHODAS 2.0) (with large effect sizes for most scales). These differences observed between the two samples show that the general mixed sample indeed allows a broader representation of the whole continuum of personality functioning and therefore subsequent results are presented for the mixed total sample.

Confirmatory factor analyses of the LPFS-BF 2.0

The two correlated-factor model provided best fit (Table 2).

*** INSERT TABLE 2 HERE ****

Dimensionality parameters (calculated with the bi-factor model) supported a multidimensional structure (ECV = .51; omega = .84, omegaH = .59) for the LPFS-BF 2.0, with specific factors accounting for most of the common variance. Both specific factors demonstrated reliability (omegaself = .83; omegainterpersonal = .69) and captured reliable variance beyond the general factor (omegaHself = .35; omegaHinterpersonal = .31). Self and Interpersonal functioning factors were largely and significantly associated (r = .72) in the two correlated-factor models (see Figure 1).

*** INSERT FIGURE 1 HERE ****

Exploratory joint structure of the LPFS-BF 2.0 (Criterion A) and PID-5-SF (Criterion B) scales

PA indicated a maximum of three factors to be retained (see supplement, table S2). EKC (see supplement, table S3) and CD agreed retaining 3 factors (see supplement,

figure S1). Fit indices for different factor solutions of the exploratory factor analysis are displayed in table 3.

*** INSERT TABLE 3 HERE ****

Fit indices of the 3 factor solution showed adequate values (CFI = .998; TLI = .994; SRMR = .005; RMSEA = .033; 90% RMSEA CI = .001 - .0068) and difference of RMSEA between two and three factors suggest retaining three factors (Finch, 2020). Table 4 shows standardized factor loadings of the LPFS factor and PID-5 domains scales after oblimin rotation. F1 captured LPFS Self functioning along with PID-5 negative Affect, Disinhibition and Psychoticism; F2 accounted for the LPFS Interpersonal functioning and PID-5 Detachment; F3 had Antagonism as main loading. Correlation between factors ranged from .37 (F2-F3) to .69 (F1-F2).

*** INSERT TABLE 4 HERE ****

Predictive and incremental validity of LPFS-BF 2.0 (Criterion A) and PID-5-SF (Criterion B) scales to explain functional impairment as measured with the WHODAS 2.0

Considering cutoffs provided by Weekers et al. (2022), 928 participants (86.5%) had no indication of impairment, 88 participants (8.1%) had an indication of subclinical impairment, and 58 participants (5.4%) had a clinical impairment. Between the three groups significant differences ($F_{(2,1069)} = 152.14$, $p < .001$) were observed on WHODAS scores, with higher scores for the clinical group ($M = 37.43$, $DT = 9.58$) followed by the subclinical group ($M = 28.59$, DT = 10.24) and the no impairment group ($M = 18.14$, $DT = 7.69$).

Controlling for age and sex in step 1, results show that both LPFS-BF 2.0 scales, significantly contributed to explain functional impairment measured by WHODAS 2.0

in step 2, ($F_{(4,1061)}$ = 178.84; p < .001), reaching a R^2 = .40 (Model A) (see Table 5). When explaining WHODAS 2.0 scores using PID-5 domains in the second step (Model B), the model was also statistically significant ($F_{(7,1058)}$ = 124.33; p < .001), with all PID-5 domains scores contributing to the model, reaching a R^2 = .45, (see Table 6). In both models, LPFS-BF 2.0 and PID-5 thus included together in a third step. All variables remained significant, except for LPFS Interpersonal Functioning $F_{(9, 1056)}$ = 105.01; p < .001). The addition of PID-5 domains beyond LPFS lead to an increment of R^2 of 7% in model A. Adding LPFS in a third step incremented the explained variance with an additional 2% in model B. Standardized coefficients with moderate effect size (Peterson & Brown, 2005) corresponded to LPFS Self functioning (β = .26; r = .31) and Detachment (β =.24; r = .29).

*** INSERT TABLE 5 HERE ****

*** INSERT TABLE 6 HERE ****

Discussion

The present work provides empirical evidence to differentiate two general dimensions of criterion A, when operationalized through the LPFS-BF 2.0, and demonstrates the differential contribution of self and interpersonal functioning in the explanation of functional impairment. Although the two factors were highly intercorrelated, results showed they can be differentiated from each other. When jointly factored with the maladaptive personality domains, an intermingled structure between functioning and maladaptive traits was found. Yet the results also displayed clear differences between the personality functioning factors, with the self functioning factor more closely linked to negative affect, beside connections with disinhibition and psychoticism, and the interpersonal functioning factor linked to detachment. Moreover,

our results suggested a relevant role of self functioning in the explanation of the functional impairment along and beyond personality facets. The main results and their implications are further discussed below.

Confirmatory factor analyses of the LPFS-BF 2.0

The dimensionality analysis indicated that the specific factors of self and interpersonal functioning have a higher contribution of variance compared to the general factor. Also, the confirmatory factor results and fit indices support a two-dimensional conceptualization of personality functioning for the LPFS-BF 2.0. These findings are analogous to Bliton et al. (2022) in a sample of students. At the same time, a moderate-high correlation was observed between the factors, similar, to other LPFS-BF 2.0 studies that have found correlations between self and interpersonal functioning ranging from .46 to .69 (Bach & Hutsebaut, 2018; Lakuta, 2022; Weekers et al., 2019). This implies individuals may differ to the extent their problems in personality functioning maybe expressed more by self or interpersonal pathology (Zimmermann et al., 2022). Present work provides further important evidence on the robustness of the LPFS-BF 2.0 empirical two-dimensional structure. Previous work using different criterion A measures showed diverse evidences regarding the uni- versus multidimensional nature and it was therefore recommended by Roche and Jaweed (2021) to expand the research among the different LPFS instruments available. This study clearly corroborates the greater consensus towards a the two factor structure for the instrument under study, like observed with the original LPFS-BF (Bliton et al., 2022; Hutsebaut et al., 2016) and current LPFS-BF 2.0 (Bach & Hutsebaut, 2018; Lakuta, 2022; Le Corff et al., accepted 2022; Weekers et al., 2019).

Exploratory joint structure of the LPFS-BF 2.0 (Criterion A) and PID-5-SF (Criterion B) scales

Regarding the joint exploratory factor analysis of the LPFS-BF 2.0 and PID-5-SF scales, present results are mostly congruent with our hypotheses. On the one hand, as expected, our results could not identify a factor with high loadings from both self and interpersonal functioning. Some authors argue that interpersonal functioning is not a real independent component, yet is driven by mature self functioning, given having healthy relationships with others requires a well-developed self (Lakuta, 2022). Present results do not support this assumption and overall show distinctiveness in the functioning of both elements of personality impairment. Similarly congruent with our hypothesis, self and interpersonal functioning factors appeared intermingled with, yet also clearly differentially related to, maladaptive domains of AMPD, as operationalized with the PID-SF. Consistent with previous research (Few et al., 2013; Lakuta, 2022; Sleep et al., 2019; Sleep et al., 2020), self functioning was mostly linked to trait of negative affect, with also showing association with psychoticism. interpersonal functioning was grouped with the detachment domain of PID-5.

However, some discrepancies with our hypotheses were also found. Our results showed self functioning appears also related with disinhibition. We did not hypothesize this finding, yet Few at al. (2013) did find a medium-sized association of self-directedness, a facet of self functioning and disinhibition. Also, previous studies have found a medium-sized relationship between facets of disinhibition and personality functioning (Clark & Ro, 2014). Further, the antagonistic domain appeared separately in the third factor instead of linked to interpersonal functioning. Similarly, Zimmerman et al. (2015) found that certain facets (manipulativeness, attention seeking and deceitfulness) of antagonism emerged as a separate trait factor. Overall, the results of

the joint EFA corroborated previous literature by providing evidence that the two subdimensions of personality functioning combine differentially with the five maladaptive personality domains. Especially the relationship of self functioning with negative affectivity and interpersonal functioning with detachment appear robust. Yet, at the same time some of the medium sized relations observed need extended evidence to further clarify the mixed results over studies.

Predictive and incremental validity of LPFS-BF 2.0 (Criterion A) and PID-5-SF (Criterion B) scales to explain functional impairment as measured with the WHODAS 2.0

Results showed that level personality functioning is related to the degree of functional impairment. Groups formed by differences in LPFS-BF 2.0 total scores indicated that less personality functioning was significantly associated with more functional impairment measured by WHODAS 2.0 scores.

Multiple regression analyses also showed a significant contribution of each of two LSFS-BF 2.0 subscales in predicting functional impairment measured by the WHODAS 2.0 (R^2 adjusted = .40). Yet functional impairment was also predicted by traits measured by the PID-5-SF (R^2 adjusted = .45). LPFS-BF 2.0 with only 12 items was thus able to explain a high percentage of variance in functional impairment by itself, compared to the percentage of variance explained by PID-5-BF traits with 100 items (R^2 adjusted respectively .40 and .45). We can therefore conclude that although personality functioning only added limited incremental validity (i.e. 2% of variance) above maladaptive personality traits (whereas vice versa 7% of variance was added personality traits above personality functioning), the results indicate a higher efficiency of LPFS-BF 2.0 to explain functional impairment. Previous research yielded mixed

results, varying from low incremental validity using traditional PD constructs as outcomes (Bliton et al., 2022; Roche & Jaweed, 2021) but greater contribution when capturing psychological health (Bach & Hutsebaut, 2018). The current results showed the item coverage of LPFS-BF 2.0 is well designed to evaluate patient's overall health and impairment. The limited number of items make the LPFS-BF 2.0 a more effective measure than the PID-5-SF for those contexts where identification of impairment is relevant (and not the type of personality disorder a patient has).

It is also important to emphasize that present research suggested that once the personality domains have been introduced into the model, only self functioning remains as an explanatory variable. Congruently, a recently study by Lakuta (2022) retained only the self functioning scale of LPFS-BF 2.0 above the personality domains for explaining well-being in a non-clinical sample. These results suggest that self functioning requires special attention when explaining impairment and psychosocial functioning. Similarly, several studies found the identity component of self functioning, to be able to predict global functioning (Buer Christensen et al., 2020; Esguevillas et al., 2018), and well-being in an older personality disorder patients sample (Veenstra et al., 2022).

Clinical implications

From a clinical point of view our work has a number of implications. On one hand the incremental validity of criterion A could be judged to be limited above criterium B, and some therefore even consider measuring personality functioning as redundant (Sleep et al., 2019). Our study results indeed indicate limited incremental validity above traits in predicting functional impairment (and vice versa traits have limited incremental value above personality functioning). On the other hand, both

personality functioning and trait domains have substantial incremental validity (40-45%) above gender when predicting functional impairment. Presence of the personality functioning may vary depending on the elevated traits a patient presents (Clark et al., 2020) and, according to some researchers, criterion A can explain the expression of maladaptive traits, and can be interpreted as the underlying impairment in functioning. Overlap is consequently logical, although more conceptual clarity is needed (Sharp & Wall, 2021; Zimmermann et al., 2015). As demonstrated by our joint factor analysis, interpersonal dysfunction is difficult to differentiate from maladaptive traits. Still, our results at the same time indicated self and interpersonal functioning measured with the LPFS-BF 2.0 can be differentiated as demonstrated by the two-factor structure of the LPFS-BF 2.0, and corroborated by their differential loadings and correlations with traits when jointly factor analyzed with maladaptive traits, and by their differential ability to predict impairment. These results lead to consider the LPFS-BF 2.0 a useful tool for clinical routine monitoring. It is a brief measure that can be quickly applied to provide and index of self-reported overall severity of PD. At the same time self and interpersonal functioning can be differentiated and the instrument has adequate explanatory capacity in terms of impairment. The measure has also recently been recommended as part of a standard set of patient-reported outcomes for PD (Prevolnik Rupel et al., 2021).

Limitations

Some limitations of the present study results should also be highlighted. First, it should be noted that in our mixed sample, clinical patients most frequent diagnoses were depressive, anxiety and trauma related disorders. Combined with community data this might imply a lower representation of patients with PD compared to other studies

conducted specifically with PD patients, like for example the original validation study of the LPFS-BF 2.0 (Weekers et al., 2019). Although this aspect may limit the representation of the most severe form of traits and dysfunction, high scores of personality impairment in general clinical patients and even in community samples have been reported (Sleep, 2022). In our sample the number of persons with clinical impairment was limited, yet we had scores varying from no impairment, to subclinical, and up to clinical impairment.

On the other hand, as reported by Zimmermann et al. (2022), self-report measures likely catch impairment related to mental disorders in general. This relates to the second limitation. Several authors have pointed out that the exclusive use of self-report measures may constitute a limitation in the accuracy of the assessment of personality functioning (Ganellen, 2007; Miller & Lynam, 2015). Although complementing these measures with informant reports could extend the results, clinical practice mostly uses self-report measures, especially for routine patient monitoring.

Finally, it should be noted that the sample size of the present work in view of the power analysis performed, did not allow the application of an SEM approach for analysing the incremental validity of the LPFS-BF 2.0 above the PID domains, when predicting functional impairment as measured by the WHODAS 2.0. According to Wang & Eastwick (2020), this may lead to an increase in the Type I error rate, therefore we applied a Bonferonni correction. Additionally, the use of observable scores, instead of latent variables, can be more useful for a direct interpretation of these scores in clinical practice.

Conclusion

Despite the mentioned limitations, we conclude overall results are promising. The LPFS-BF 2.0 can capture general severity and differentiate self and interpersonal functioning. Although personality functioning was defined as a unidimensional severity criterion, self and interpersonal functioning behave as separate and distinct dimensions of personality functioning when measured by LPFS-BF 2.0, and level of personality functioning as measured by this instrument is associated with degree of functional impairment.

Acknowledgments

Not applicable

Declaration of interest

The authors declare that there are no conflicts of interest to report.

Data availability

The data that support the findings of this study are openly available in Arias Montano repository at http://hdl.handle.net/10272/21157.

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Table 1

Descriptive statistics and independent t-test between subsamples

	Total sample *N* = 1074	Community sample *n* = 717	Clinical sample *n* = 357			
	M (SD)	*M (SD)*	*M (SD)*	*t*	*p*	*d*
LPFS-Self	18.81 (6.41)	8.60 (2.99)	13.18 (4.84)	15.95	<.001	1.08
LPFS-Inter	10.02 (4.23)	8.38 (2.62)	9.69 (3.36)	6.25	<.001	0.44
LPFS total	18.81 (6.41)	16.99 (5.07)	22.87 (7.19)	13.48	<.001	0.91
PID-5 NegAff	8.63 (2.67)	7.77 (2.12)	10.49 (2.69)	16.92	<.001	1.03
PID-5 Detach	6.62 (2.51)	5.89 (1.86)	8.10 (2.95)	12.89	<.001	0.88
PID-5Antag	5.35 (1.65)	5.42 (1.66)	5.20 (1.61)	2.12	.034	0.13
PID-5 Disinh	6.73 (2.31)	6.01 (1.77)	8.16 (2.59)	14.08	<.001	0.92
PID-5 Psycho	6.07 (2.33)	5.40 (1.66)	7.43 (2.85)	12.35	<.001	0.87
WHODAS	20.03 (9.48)	16.33 (6.46)	27.50 (10.19)	18.84	<.001	1.17

Anh = Anhedonia; Antag= Antagonism; Anx = Anxiousness; Att = Attention seeking; Call = Callousness; Dec = Deceitfulness; Dep = Depressivity; Detach = Detachment; Dis = Distractibility; Disinh = Disinhibition; Ecc = Eccentricity; Emo = Emotional lability; Gran = Grandiosity; Hos = Hostility; Imp = Impulsivity; Int = Intimacy avoidance; Irr = Irresponsibility; LPFS-Self = Level of Personality Functioning Scale Self Functioning Scale; LPFS-Inter = Level of Personality Functioning Scale Interpersonal Functioning Scale; Man = Manipulativeness; NegAff = Negative Affect; Perc = Perceptual dysregulation; Pers = Perseveration; Psycho = Psychoticism; Res = Restricted affectivity; Rig = Rigid perfectionism; Risk = Risk taking; Sep = Separation insecurity; Sub = Submissiveness; Unu = Unusual beliefs; With = Whitdrawal.

Table 2.

Fit statistics for confirmatory factor analyses

	$\chi 2$ (d.f.)	CFI	TLI	SRMR	RMSEA [90% CI]
Model 1: 1 factor	698.217 (54)	.948	.937	.074	.105 [.098; .112]
Model 2: 2 correlated factors	338.18 (53)	.977	.972	.049	.071 [.064; .078]
Model 3: Bi-factor	132.742 (42)	.993	.989	.028	.045 [.036; .054]

Note. Estimation Method: Diagonally Weighted Least Squares Mean Variance Adjusted (WLSMV); CFI = Comparative Fit Index; TLI = Tucker Lewis Index; RMSEA = Root Mean Square Error Approximation; SRMR = Standardized Root Mean Square Residual. All chi-square values are statistically significant.

Table 3. *Fit indices for different factor solutions of exploratory factor analysis*

	$\chi 2$ (d.f.)	CFI	TLI	SRMR	RMSEA [90% CI]
1 factor	329.432 (14)	0.921	0.882	0.052	0.145 [0.132 – 0.159]
2 factors	122.646	0.971	0.925	0.029	0.116 [0.098 – 0.134]
3 factors	6.477 (3)	0.998	0.994	0.005	0.033 [0.001 – 0.068]

Table 4. *Factor loadings the Joint Exploratory Factor Analysis of the LPFS-BF 2.0 (Criterion A) and PID-5-SF (Criterion B) (N = 1074)*

	Factor 1	Factor 2	Factor 3
NA	**.891**	-.119	-.006
DET	.010	**.882**	.001
ANT	-.017	-.005	**.742**
DIS	**.617**	.089	.259
PSY	**.438**	.295	.278
LPFS-Self	**.704**	.296	-.117
LPFS-Inter	.188	**.422**	.289

Note. Factor loadings above .30 are indicated in bold
ANT = Antagonism; DET = Detachment; DIS = Disinhibition; NA = Negative Affect; PSY = Psychoticism; LPFS-Self = LPFS-BF 2.0 Self functioning; LPFS-Inter = LPFS-BF 2.0 Interpersonal functioning

Table 5.

Model A: Multiple regression analysis predicting WHODAS 2.0 scores (Criterion A second step).

		Coef.	Std. Err.	Beta	t	P > t	I.C. 95%		Adjusted R^2
							Lím. Inf.	Lím. Sup.	
Step 1	Gender (female)	3.23	0.58	.17	5,49	< .001	2.07	4.38	.03
	Age	-0.03	0.02	-.04	-1.43	.151	-0.07	0.01	
Step 2	Gender (female)	1.51	0.48	.08	3.18	.002	.58	2.45	.40
	Age	0.07	0.02	.10	4.12	< .001	.03	.10	
	Self functioning LPFS-BF 2.0	1.30	0.07	.57	18.64	< .001	1.16	1.43	
	Interpersonal functioning LPFS-BF 2.0	0.36	0.11	.10	3.42	.001	.15	.57	
Step 3	Gender (female)	0.64	0.46	.03	1.40	.163	-.26	1.55	.47
	Age	0.04	0.02	.07	2.90	.004	.01	.07	
	Self functioning LPFS-BF 2.0	0.59	0.09	.26	6.41	< .001	.41	.77	
	Interpersonal functioning LPFS-BF 2.0	0.01	0.11	.00	0.10	.922	-.21	.24	
	Negative affect	0.63	0.12	.18	5.35	< .001	.40	.86	
	Detachment	0.92	0.13	.24	7.31	< .001	.67	1.17	

Antagonism	-0.83	0.15	-.15	-5.54	< .001	-1.13	-.54
Disinhibition	0.37	0.15	.09	2.52	.012	.08	.66
Psychoticism	0.34	0.15	.08	2.26	.024	.04	.63

R^2 = .47; R^2 adjusted = .47; F(9, 1056) = 105.01; p < .001; LL = -3567.84; LR = 132.04; p < .001; *N* = 1074

Table 6.

Model B: Multiple regression analysis predicting WHODAS 2.0 scores (Criterion B second step).

		Coef.	Std. Err.	Beta	t	P > t	I.C. 95%		Adjusted R^2
							Lím. Inf.	Lím. Sup.	
Step 1	Gender (female)	3.23	0.58	.17	5.49	< .001	2.07	4.38	.03
	Age	-0.03	0.02	-.04	-1.43	.151	-0.07	0.01	
Step 2	Gender (female)	0.78	0.46	.04	1.69	.092	-.13	1.69	.45
	Age	0.03	0.02	.04	1.64	.102	-.01	.06	
	Negative affect	0.92	0.11	.26	8.30	< .001	.70	1.13	
	Detachment	1.23	0.11	.33	10.86	< .001	1.01	1.46	
	Antagonism	-0.99	0.15	-.17	-6.67	< .001	-1,28	-.70	
	Disinhibition	0.57	0.15	.14	3.88	< .001	.28	.85	
	Psychoticism	0.53	0.15	.13	3.60	< .001	.24	.82	
	Gender (female)	0.64	0.46	.03	1.40	.163	-.26	1.55	.47
	Age	0.04	0.02	.07	2.90	.004	.01	.07	
	Self functioning LPFS-BF 2.0	0.59	0.09	.26	6.41	< .001	.41	.77	

Step 3	Interpersonal functioning LPFS-BF 2.0	0.01	0.11	.00	0.10	.922	-.21	.24
	Negative affect	0.63	0.12	.18	5.35	< .001	.40	.86
	Detachment	0.92	0.13	.24	7.31	< .001	.67	1.17
	Antagonism	-0.83	0.15	-.15	-5.54	< .001	-1.13	-.54
	Disinhibition	0.37	0.15	.09	2.52	.012	.08	.66
	Psychoticism	0.34	0.15	.08	2.26	.024	.04	.63

R^2 = .47; R^2 adjusted = .47; F(9, 1056) = 105.01; p < .001; LL = -3567.84; LR = 132.04; p < .001; *N* = 1074

Figure 1.

Confirmatory factor analysis: The two-correlated factor model with completely standardized loadings