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The Structure of Personality Disorders within a Depressed Sample: Implications for Personalizing Treatment

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Abstract

Background—Personality disorders (PDs) and major depressive disorder (MDD) are both significant public health burdens. They are frequently comorbid, and this comorbidity predicts poorer treatment outcomes and lower maintenance of treatment effects. Although there is growing

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Contributions

JMB lead data analysis, data interpretation, and writing of the manuscript. **JCK** provided supplementary data analysis, data interpretation, and writing of the manuscript. **CLR** and **LMS** made substantial contributions to the collection of study data. **BWD**, **CBN**, and **HSM** made substantial contributions to the conception, design, and acquisition of study data, as well as to securing funding for the study. **WEC** made substantial contributions to the conception, design, and acquisition of study data, as well as to securing funding and to writing of the manuscript.

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consensus on the structure of personality pathology in non-depressed individuals, there is limited research on the structure of personality pathology in individuals experiencing MDD.

Method—As part of the Predictors of Remission in Depression to Individual and Combined Treatment (PREdict) randomized controlled trial, 192 treatment-naïve subjects meeting DSM-IV-TR criteria for MDD completed the International Personality Disorder Examination (IPDE). Using this sample, a principal components analysis explored the factor structure of the IPDE.

Results—A three-factor model comprised three factors labeled “NADA” (Negative Affectivity, Disinhibition, and Antagonism), “Social Anxiety,” and “Antisociality.” Factor intercorrelations were small-to-moderate, and the sum score of the three factors was highly correlated ($r = .94$) with the total IPDE score.

Limitations—Personality pathology was assessed with one instrument, and sample size was smaller than ideal for factor analytic research. \

Conclusions—Consistent with prior factor-analytic findings, a three-factor solution provided the most clinically and theoretically useful model. This finding lends support for the personality disorders retained in DSM-5 and some support for a model of personality pathology aligned with the personality traits found in the leading nonclinical models of personality. The obtained factors are potential moderators of clinical interventions and may serve as an avenue to personalizing treatments.

Keywords

factor analysis; personality disorders; depression; clinical research

1. Introduction

Major depressive disorder (MDD) carries one of the greatest disease burdens worldwide [1] and affects nearly 7% of adults in the United States each year [2]. In many cases, MDD co-occurs with one or more additional psychiatric disorders, and frequently these comorbidities predict poorer long-term outcomes. Notably, and of particular relevance to this study, rates of MDD are also drastically higher among individuals with personality disorders (PDs) than for the general population [3]. The converse is also true: i.e., there are significantly higher rates of PDs among individuals with MDD than among the general population [4]. These comorbidities consistently predict worse acute and maintenance treatment outcomes for MDD across treatment modalities including medications, a range of psychotherapeutic approaches, and combinations of somatic treatments with psychotherapy [4,5,6].

Due to their high comorbidity rates and the effects of MDD and PD diagnoses on the treatment of each other, it is reasonable to expect there may be a transactional relationship between symptoms of mood disorders and symptoms of PDs. In other words, over the developmental course of these disorders, each class of symptoms may influence the other, exacerbating the overall impairment experienced by an individual over time [7, 8].

Despite the attention given to personality traits and PDs in the context of depression, there has been little research on the factor structure of PD traits within a depressed sample. Because some personality traits may interact with depressive symptoms over time, it may be

the case that the structure of maladaptive personality traits in individuals with depression is distinct from the structure of these traits in a non-depressed sample. This study aimed to investigate the preceding issue by employing a factor analysis of a personality disorder assessment interview within a depressed sample, thereby providing results relevant to both depression and personality disorder research. Particularly, understanding the factor structure of personality disorders and that a depressed individual's score can vary on a particular factor or pattern of factors may play a substantial role in the process of personalizing a depressed individual's specific treatment (e.g., see [9]).

1.1 Factor Structure of Personality Disorders

Despite its long lifespan, the current DSM model of PD diagnoses (i.e., Clusters A, B, and C) has been repeatedly criticized since its inception (e.g. [10, 11, 12]). Specifically, there is a lack of empirical support for the three-cluster system, and the categorical nature of the model has demonstrated poor ecological validity. In response to these issues, and based on decades of research supporting the structural patterns of nonclinical personality traits (e.g. [13, 14, 15]), the DSM-5 work group proposed a novel approach to the classification and diagnosis of personality disorders. The proposed model was relegated to Section III of DSM-5 until sufficient evidence is gathered to support or discount it. Section III maintains and describes six PDs: Antisocial, Avoidant, Borderline, Narcissistic, Obsessive-Compulsive, and Schizotypal. It further categorizes disorders based on patterns and levels of elevation across five broad personality trait domains (i.e., negative affectivity, detachment, antagonism, disinhibition, and psychoticism). These domains, considered to be "maladaptive variants of ... the 'Big Five,' or Five-Factor Model of personality (FFM)" ([16], p.773), suggest that PDs are not entirely distinct from broad personality traits; therefore, existing research on personality traits may be extended to PDs through a more dimensional model. Within the alternative model, a number of more specific behaviors and constructs of PDs are arranged as facets of each of the five major personality domains.

A review of existing factor analytic work on PDs in the context of the DSM classification system [17] suggested strong evidence for either a three- or four-factor solution. However, there was meaningful variability across the reviewed studies in the criteria and disorders comprising each of the possible factor solutions. Additionally, results from an analysis of previously published data [18] indicated both three- and four-component solutions to the organization of PDs. These structures generally resembled the FFM [19]; the final four-factor solution included a neuroticism component, a low-agreeableness component, an extraversion (vs. introversion) component, and a conscientiousness component, which correspond fairly well to the Section III retained PDs of Borderline, Narcissistic, Antisocial, Avoidant, and Obsessive Compulsive PDs. The three-factor solution was highly similar to the first three components in the four-factor solution; however, adding the fourth factor allowed for inclusion of obsessive-compulsive PD in the final factor structure.

1.2. Aims and Hypotheses

The primary aim of the current study, therefore, was to examine the factor structure of PD traits in the context of a depressed sample. Based on prior factor analyses of personality disorder traits, it was hypothesized there would be three to five factors bearing strong

similarities to major models of personality (e.g. [13,20,15]) and to the DSM-5 Section III PD trait domains.

2. Method

2.1. Participants

Participants were drawn from the Predictors of Remission in Depression to Individual and Combined Treatments (PReDICT) project, a randomized controlled trial (RCT) for the treatment of depression (described in [21]). This sample comprises those participants ($n = 192$) who completed the International Personality Disorder Examination (IPDE) [22] at or very close in time to the baseline assessment.

Participants met DSM-IV-TR [23] criteria for major depressive disorder and had a Hamilton Depression Rating Scale (HDRS) [24] score of ≥ 18 at screening and ≥ 15 at their baseline visit. All participants were treatment naïve, defined as having never received treatment for a mood disorder with either: (i) an antidepressant medication at a minimum effective dose for 4 or more consecutive weeks; or (ii) 4 or more sessions of an evidence-based and structured psychotherapy (CBT, IPT, or behavioral marital therapy). All participants were assessed and treated either under the umbrella of a clinic at a university-affiliated hospital outpatient setting or at a Spanish-speaking outpatient setting at a large public hospital [25].

Key exclusion criteria included prior treatment of a mood disorder; lifetime history of dementia, a primary psychotic disorder, or bipolar disorder; or diagnosis of obsessive-compulsive disorder, an eating disorder, or a dissociative disorder within the past year. Participants were also excluded if they met criteria for substance abuse in the past 3 months, or for substance dependence in the 12 months prior to their first treatment visit.

Participants in the present analyses had a mean age of 38.8 ($SD = 11.4$); 58.9% were female. The participants' reported race was 38.5% Caucasian, 16.1% African American, and 45.3% other. Reported ethnicity was 39.1% Hispanic and 60.9% Non-Hispanic.

2.2. Procedure

Participants recruited to the PReDICT study [21] were screened by telephone and those who qualified were scheduled for an in-office visit. During this visit participants completed the Structured Clinical Interview for DSM Disorders (SCID) [26], were rated on the HDRS, and completed a clinical interview with a study psychiatrist. Participants subsequently completed baseline assessments, including the video recorded IPDE, either before or within two weeks of treatment randomization. Trained clinicians and raters completed all screening interviews and assessments; data were gathered from participants during 2007–2013.

2.3. Measures

International Personality Disorder Examination—The International Personality Disorder Examination [24] is a semi-structured 99-item clinical interview developed by the World Health Organization and National Institute of Health. The interview produces both dimensional and categorical scores for the 10 DSM-IV-TR personality disorders. Each item represents a personality trait or behavior and is scored by a clinician on a 3-point scale (0–

2); items 1–92 are considered diagnostic items and were included in the present factor analyses, whereas items 93–99 are considered “informational” items and were not included. The IPDE has adequate inter-rater reliability (intra-class correlation coefficients [ICCs] of .79 to .95) [22, 27] and temporal stability (ICCs of .68 to .92) [22] comparable to other widely used clinical measures.

3. Results

3.1. Reliability and Missing Data

Eighteen percent of the IPDEs were double-rated. The ICC, using Shrout and Fleiss [28] Category II conventions, was excellent at .98. This coefficient includes all dimensional scores from the IPDE (i.e., all 10 personality disorder dimensional scores, as well as the total score), averaged across all sets of two independent raters.

Analyses indicated that data were missing at random. However, IPDE item 75, which is conditional upon responses to other items, had approximately 24% (i.e., 46 cases) of item-level data missing. Therefore, this item was not included in the analyses. The remaining 21 cases of missing data (<1% of all data) were replaced with mean substitution when calculating the factor loadings and linear interpolation when calculating the factor scores.

3.2. Principal Components Analysis

Principal components analysis of the 91 clinical items (excluding item 75) indicated that 30 components had eigenvalues greater than one. A scree plot (Figure 1) suggested a solution comprising between three and five components; each of these solutions was evaluated for interpretability. The three-factor model, which accounted for 21.9% of the overall variance, was the most clinically and theoretically meaningful.

Promax rotation indicated the highest inter-factor correlation was .25; consequently, orthogonal (Varimax) rotation was performed. A factor-loading cutoff of .35 was used to determine the inclusion of variables in the rotated factor pattern. Fifty-seven items loaded on three factors, with only four items loading on more than one factor. The final factor structure is presented in Table 1. Based on the content of the factors' items, the factors were labeled “NADA (Negative Affectivity, Disinhibition, and Antagonism),” “Social Anxiety,” and “Antisociality.”

The NADA factor included items reflecting a considerable portion of DSM Cluster B personality pathology. Specifically, these items included self-dramatization, believes is special, unstable interpersonal relationships, dependence on others, entitlement, and identity disturbance. Twenty-nine items loaded on this scale, and Cronbach's α was excellent at .90.

The Social Anxiety factor largely included items that focused on discomfort in social situations (such as avoiding personal risks, fear of social rejection, and seeing self as socially inept) and a lack of close interpersonal relationships. There were 14 items on this scale, and Cronbach's α was excellent at .82.

The Antisociality factor included characteristics of antisocial behavior, including impulsivity and a disregard for both personal safety and the safety of others. There were 14 items on this scale, and Cronbach's α was good at .75.

The factor intercorrelations were small-to-moderate (see Table 2). All three factor scores were summed to produce an *alternate* total IPDE score (IPDE-A); this alternate total score correlated very highly ($r = .94$) with the IPDE total score (i.e., summed raw scores on all IPDE items), suggesting the standard IPDE total score may not add significant incremental validity beyond the IPDE-A.

3.3. Sex Differences

Means on the first two extracted factors did not differ significantly between men and women (respectively: $F[1, 188] = .10$; $F[1, 188] = 1.73$; both p 's $> .10$). Scores on the third factor, Antisociality, were significantly higher ($F[1, 189] = 6.97$, $p < .01$) for men than women but the effect size was small (Cohen's $d = .38$). In addition, scores on the IPDE-A were significantly higher for men than for women ($F[1, 188] = 4.18$, $p < .05$, Cohen's $d = .30$). However, after controlling for the Antisociality factor, sex differences on the IPDE-A were no longer significant ($F[1, 187] = .13$, $p > .10$), and there was no significant difference for the highly correlated IPDE total score ($F[1, 188] = 2.05$, $p > .10$).

4. Discussion

The three obtained factors align well with the retained PDs in Section III of DSM-5. The data match well for Antisocial, Avoidant, Borderline, and Narcissistic PDs. The overall study exclusion criteria of obsessive compulsive and psychotic disorders likely precluded the current analyses ascertaining OCPD and Schizotypal PD, the only two personality disorders of the alternative model in Section III of DSM-5 that were not identified in the current factor analysis of the IPDE.

Consistent with prior factor-analytic findings, a three-factor solution for the IPDE provided the most interpretable model for the current data. This finding adds some support for an alternative personality disorders diagnostic model (such as described in DSM-5, Section III) based on dimensional personality traits. Furthermore, the relationship of these three factors to the five domains in DSM-5's Section III may represent pathological extensions of the Big Three model(s) of personality [29, 30, 18]. Although each of these models has its own distinct terminology, all assess highly similar personality structures [15].

4.1. Rationale and Implications

The first factor (NADA) subsumes almost all the symptoms used to diagnose Borderline and Narcissistic PDs. Interestingly, Histrionic PD was not retained in Section III nor do its related symptoms have heavy loadings on factor one. Items that load heavily on the NADA factor and comprise its latent constructs include those associated with the DSM-5 alternative model personality domains of Negative Affectivity (facets: emotional lability and insecurity), Disinhibition (facet: impulsivity), and Antagonism (facets: attention seeking, grandiosity, and manipulativeness). In a broader context, this factor aligns with neuroticism combined

with maladaptive externalizing behaviors in non-clinical personality theory and research [29, 30].

The second factor (Social Anxiety) factor primarily appears to capture interpersonal avoidance, but also includes items that tap self-criticism and general social anxiety (e.g., “views self as socially inept”). This factor appears most closely related to DSM-5 Cluster C personality pathology, and especially to characteristics of avoidant personality disorder. This latent construct seems to underlie what the alternative model of PDs in Section III of DSM-5 describes as Avoidant Personality Disorder and specifically aligns with the detachment trait domain (facets: withdrawal, interpersonal avoidance, and suspiciousness). Again, the *neuroticism* factor in nonclinical models of personality subsumes many of these same tendencies, and neuroticism is often considered analogous to anxiety [31, 32].

Finally, the Antisociality factor comprises both specific behavioral items (e.g., “steals nontrivial items without confrontation”) as well as personality-based items (e.g., “highly irritable or aggressive”). These items align with the *Antagonism* domain (facets: manipulativeness, deceitfulness, callousness, and hostility) and the *Disinhibition* domain (facets: irresponsibility, impulsivity, and risk taking) [33, 34] of the personality traits in Section III of DSM-5.

The Social Anxiety factor accounted for moderate variance in these analyses, and this may be clinically meaningful. Depression and anxiety are extremely closely linked, with some studies indicating that at least 60% of individuals with MDD also meet criteria for at least one anxiety disorder [35]. It is therefore unsurprising that in a depressed sample, characteristics related to neuroticism, anxiety, and self-criticism account for a meaningful proportion of personality pathology. As discussed previously, however, neuroticism is also a trait that is consistently found across virtually all models of personality as well as the NADA factor in this sample. Comparisons of these findings with future factor analyses on non-depressed or remitted depression samples may illuminate any differences regarding whether the Social Anxiety factor is disproportionately represented in this factor.

Identifying which subtypes of the heterogeneous MDD syndrome respond best to which treatment (*personalized medicine*) has become the major focus of MDD clinical trials. Although much of that research has focused on biomarkers [36], subtypes identified by personality disorder factors provide another avenue to predicting which treatment might work best for which depressed individuals. For example, it is widely accepted that an expanded CBT is necessary for the successful treatment of depressed patients who also suffer from one or more personality disorders [37], although there has been very little empirical work on personality disorder or personality factors that suggests a specific treatment for a specific subtype [38, 17]. Knowing the factor scores for a depressed individual might allow for the development and implementation of factor-specific CBT that would result in greater remission rates for those individuals with high levels of a particular personality construct. For example, integrating specific CBT interventions for social anxiety [39] might provide a more appropriate treatment and higher remission rates for the currently identified negative emotion subtype of MDD. Further, it is possible that the personality factor-based subtypes might be related to patterns of neural connectivity that differentially

predict outcomes to antidepressant medications and CBT [40]. These potential relationships represent areas worthy of further investigation—areas that could very well result in novel treatments or combinations of existing treatments to produce enhanced clinical outcomes for specific subtypes of MDD with high levels of negative emotionality, positive emotionality, or disinhibition.

4.2. Limitations

The current findings may have been skewed in some way (e.g., method bias, item selection bias) due to the use of only one diagnostic instrument (i.e., the IPDE). Including multiple instruments in future studies, as well as measures of nonclinical personality, could provide further information about the validity and generalizability of the current findings.

It has been suggested that factor-analytic studies have at least three times the number of participants as items analyzed [41]; this study falls somewhat short of this ideal guideline. Thus, replications will be important to determine the robustness of these findings. Participant selection in this sample was also subject to diagnostic exclusions (e.g., OCD, which may have precluded finding a “conscientiousness” factor and related OCPD; psychosis, which might have precluded finding a Schizotypal PD and also have precluded alignment with the *psychoticism* domain). For comparative purposes, replications in broader and other clinical samples might provide valuable information.

4.3. Conclusion

The current findings strongly support the retained PDs in the alternative model of PDs in Section III of DSM-5. They also begin to bolster the case for a model of PDs based on broad personality traits. Such models have already begun to open doors to valuable research on the etiology and treatment of personality disorders [42]. Further, this approach is strengthened by the apparent consistency between the factor structure found here and previous factor structures found in non-depressed samples, although additional research is needed to confirm the parallels. Future investigators might consider including symptom-based measures of personality disorders in their studies so that these findings (and those of prior factor analyses) can be replicated and examined, and so that the field can advance understanding of clinical depression and personality disorder factors. Finally, the level of personality disorder factor scores should be studied in relationship to biomarkers of and predictors of differential treatment outcomes.

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Fig 1.
Scree plot of IPDE Factor Analysis

Table 1

Three factor solution for IPDE

IPDE Item	Factors			IPDE Item Description
	Narcissistic Iden. Disturb.	Social Anxiety	Antisociality	
ipde49	.650	-.079	-.069	Self-dramatization
ipde18	.648	-.082	.090	Uncomfortable if not center of attention
ipde22	.642	-.086	.257	Believes they are "special"
ipde06	.639	.004	-.024	Identity disturbance
ipde08	.627	.138	-.058	Identity disturbance
ipde07	.615	.111	.135	Identity disturbance
ipde19	.614	-.119	-.001	Uses physical appearance to draw attention
ipde41	.574	.122	-.144	Goes to excessive lengths to obtain nurturance from others
ipde39	.545	-.066	.148	Sense of entitlement
ipde20	.540	-.176	.203	Grandiose self-importance
ipde53	.535	.089	.068	Envious of others, believes others envious of them
ipde62	.519	-.083	.026	Inappropriately sexual behavior
ipde56	.517	-.135	.187	Efforts to avoid abandonment
ipde57	.510	.179	.181	Rapidly shifting or shallow emotions
ipde68	.492	.115	.028	Transient, stress-related paranoid ideation or dissociative symptoms
ipde58	.491	.248	.216	Affective instability due to reactive mood
ipde34	.487	-.064	.181	Urgently seeks another relationship when a close relationship ends
ipde03	.486	.100	.152	Preoccupied with details
ipde32	.485	.147	-.050	Considers relationships more intimate than they are
ipde33	.484	-.129	.214	Unstable or intense interpersonal relationships
ipde31	.476	.102	.026	Identity disturbance
ipde52	.460	.391	.073	Experiences feelings of emptiness
ipde12	.453	.341	.040	Suggestible
ipde54	.433	.069	-.103	Uncomfortable or helpless when alone
ipde40	.432	-.133	.322	Interpersonally exploitative
ipde17	.431	-.011	.069	Requires excessive admiration
ipde21	.389	.129	.186	Preoccupied with fantasies of unlimited success, power, etc.
ipde63	.378	-.223	.292	Impulsivity in sex
ipde77	.350	.310	-.071	Recurrent suicidal behavior, gestures, or threats, or self-mutilation
ipde60	.103	.631	.118	Reluctant to take personal risks
ipde13	.149	.586	-.065	Views self as socially inept or personally unappealing
ipde27	.011	.571	.001	Inhibited in new situations
ipde30	.359	.552	-.033	Preoccupied with being rejected
ipde28	.091	.551	.181	Restraint in intimate relations
ipde42	-.023	.532	.327	Reluctant to confide in others due to fear that information will be used against them

IPDE Item	Factors			IPDE Item Description
	Narcissistic Iden. Disturb.	Social Anxiety	Antisociality	
ipde25	-.102	.519	.128	Almost always chooses solitary activities
ipde29	-.028	.514	.012	Unwilling to be involved with others without a guarantee of approval
ipde43	-.012	.503	.412	Preoccupied with unjustified doubts about friends' loyalty
ipde04	.021	.430	.058	Avoids activities with interpersonal contact
ipde23	-.161	.413	.101	Lacks close friends or confidants
ipde46	.202	.378	.153	Reads hidden, demeaning, or threatening meanings into benign remarks
ipde47	.070	.361	.098	Suspects, without significant basis, that others are exploiting or deceiving
ipde48	.016	.353	.057	Ideas of reference
ipde74	.131	-.035	.595	Failure to conform to social norms
ipde73	.094	-.043	.562	Disregard for safety of self or others
ipde71	.104	.100	.544	Highly irritable or aggressive
ipde76	.329	-.156	.504	Engages in self-damaging impulsivity
ipde72	.129	-.191	.456	Engages in deceitfulness, lying, conning
ipde81	-.059	.158	.450	Steals nontrivial items without confrontation
ipde59	.420	-.064	.426	Inappropriate, intense anger
ipde86	-.032	.097	.424	Lies to obtain goods
ipde88	.039	-.118	.423	Set fires with intent of causing serious damage
ipde38	.065	.151	.413	Lacks empathy
ipde44	.131	.267	.409	Persistently bears grudges
ipde70	-.013	.007	.389	Consistent irresponsibility; failure to honor financial obligations
ipde92	-.053	.199	.362	Broke into someone else's house, building, or car
ipde80	-.142	.182	.355	Used a weapon that could cause serious physical harm to others

Table 2

IPDE factor correlations

	Narcissistic Identity Disturbance	Social Anxiety	Antisociality	Factor Total
Narcissistic Identity Disturbance	---			
Social Anxiety	.24 *	---		
Antisociality	.34 **	.22 *	---	
Factor Total	.74 **	.67 **	.67 **	---
IPDE Total	.79 **	.58 **	.56 **	.94 **

Notes:

*
p < .01,**
p < .001

n = 192