

# Deriving ICD-11 personality disorder domains from dsm-5 traits: initial attempt to harmonize two diagnostic systems

Bach B, Sellbom M, Kongerslev M, Simonsen E, Krueger RF, Mulder R. Deriving ICD-11 personality disorder domains from dsm-5 traits: initial attempt to harmonize two diagnostic systems.

**Objective:** The personality disorder domains proposed for the ICD-11 comprise Negative Affectivity, Detachment, Dissociality, Disinhibition, and Anankastia, which are reasonably concordant with the higher-order trait domains in the Alternative DSM-5 Model for Personality Disorders.

**Method:** We examined (i) whether designated DSM-5 trait facets can be used to describe the proposed ICD-11 trait domains, and (ii) how these ICD-11 trait features are hierarchically organized. A mixed Danish derivation sample ( $N = 1541$ ) of 615 psychiatric out-patients and 925 community participants along with a US replication sample ( $N = 637$ ) completed the Personality Inventory for DSM-5 (PID-5). Sixteen PID-5 traits were designated to cover features of the ICD-11 trait domains.

**Results:** Exploratory structural equation modeling (ESEM) analyzes showed that the designated traits were meaningfully organized in the proposed ICD-11 five-domain structure as well as other recognizable higher-order models of personality and psychopathology. Model fits revealed that the five proposed ICD-11 personality disorder domains were satisfactorily resembled, and replicated in the independent US sample.

**Conclusion:** The proposed ICD-11 personality disorder domains can be accurately described using designated traits from the DSM-5 personality trait system. A scoring algorithm for the ICD-11 personality disorder domains is provided in appendix.

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Key words: international classification of diseases; diagnostic and statistical manual of mental disorders; personality disorders; psychometrics; personality inventory

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Accepted for publication April 17, 2017

## Significant outcomes

- DSM-5 Section III personality disorder traits can be used for describing ICD-11 personality disorder domains (a scoring algorithm for Personality Inventory for DSM-5 is provided in Appendix 1).
- The proposed ICD-11 personality disorder domains seem parsimonious and feasible for 'busy' practitioners across countries and clinical settings, while also aligning with the domains of the more comprehensive and informative DSM-5 Section III personality disorder trait system as well as other recognized models of personality and psychopathology.
- For those clinicians who may have the interest and resources, the more detailed DSM-5 Section III personality disorder traits may add more clinically useful information to the simpler ICD-11 personality disorder domains.

## Limitations

- The generalizability of the results is potentially limited by the use of self-reported personality pathology, which may involve social desirability and response style variance.
- The findings warrant replication using informant- and interview-ratings.

### Introduction

Approximately 12% of the general population (1) and 50% of psychiatric out-patients (2) are estimated to meet the criteria for a personality disorder (PD), which is a critical predictor of poor psychosocial functioning (3). However, numerous studies have highlighted significant shortcomings of the categorical approach to PD diagnostics, including arbitrary diagnostic thresholds, extensive overlap among PD categories, and insufficient construct validity (4, 5). Consequently, the American Psychiatric Association (APA) committee for the Diagnostic and Statistical Manual of Mental Disorders (DSM), and the World Health Organization (WHO) committee for the International Classification of Diseases (ICD) have both proposed a trait-based model of personality pathology in two substantially similar but also somewhat divergent ways (6–9). The alternative model for personality disorders,<sup>1</sup> codified in Section III of DSM-5, involves separate evaluations of self- and interpersonal functioning, along with 25 trait facets organized in five trait domains (Negative Affectivity, Detachment, antagonism, Disinhibition, and psychoticism) that are operationalized with the Personality Inventory for DSM-5 [PID-5] (10). The proposed ICD-11 model instructs the user to select one of three different diagnostic codes according to PD severity<sup>2</sup> (mild, moderate, and severe), along with optional specification of five trait dimensions (Negative Affectivity, Detachment, Disinhibition, Dissociality, and Anankastia<sup>3</sup>), that may be observed or rated by clinicians or informants (11). This study is only addressing the *trait* component of these classifications and not the *severity* component. It might be argued that the two trait systems essentially reflect two different levels of latent domains in the hierarchy of normal and abnormal personality (12, 13). The domains of Negative Affectivity, Detachment, antagonism/Dissociality, and Disinhibition are concordant across both systems, whereas the ICD-11 domain of Anankastia and the DSM-5 domain of psychoticism are not. In the DSM-5 model, the domain of

Anankastia is somewhat represented by the facet of rigid perfectionism. In the ICD-11 model, trait features of psychoticism are not included because WHO consider psychotic phenomena (i.e., schizophrenia spectrum disorders) as segregated from PD phenomena (14, 15).

In contrast to the DSM, published by APA, the WHO ICD is the official world classification system for all diseases, including PDs. The current version of ICD-10, which was originally published in 1992, is currently being revised and is expected to be finalized in 2018. Although it is likely that this 11th revised edition will eventually be adopted by all WHO member countries as their official classification, the transition from ICD-10 to ICD-11 will happen on a country-by-country basis over the following years. However, as one of the main uses of a diagnostic system is to communicate with colleagues and institutions, clinicians may use different classification terms for different disorders dependent on what others are using in the clinician's practice milieu, irrespective of official national requirements. For example, in the UK and Denmark, the ICD-10 is officially being used for clinical practice<sup>4</sup>, whereas in the US and Australia, the DSM is dominant; but even in the US, national statistics have to adhere to the ICD classification (16).

This study was driven by four specific rationales: First, both the APA and the WHO have specifically called for harmonization of DSM-5 and ICD-11 (17–19). Second, at the time of writing this, no psychometrically validated instrument has been published for the assessment of ICD-11 trait domains. Accordingly, it seems obvious to take advantage of a suitable instrument (i.e., PID-5) that is already constructed, empirically tested, and freely available (10, 20, 21). Third, the ICD-11 system will be the official world classification system for all diseases (including PDs), and therefore, it seems highly appropriate to offer an ICD-11 algorithm ('DSM-5 to ICD-11 cross-walk') for clinicians and researchers using the DSM-5 system. Fourth, it seems worthwhile exploring the potential for an integrative hierarchy in which ICD-11 traits represent the dimensions scaffolding different structural levels of personality and psychopathology (now without features of psychoticism but including features of Anankastia), with particular emphasis on how the 'new' domain of Anankastia would emerge within this hierarchy (22). This study served as an initial attempt to fill these gaps.

<sup>1</sup>DSM-5 Section III ('emerging models and measures') introduces a new approach to PDs that aims to address shortcomings of the current official approach (60).

<sup>2</sup>There is also a code available for 'personality difficulty', which is below the threshold for a disorder.

<sup>3</sup>Anankastia is characterized by a narrow focus on the control and regulation of one's own and others' behaviour in order to ensure that things conform to the individual's particularistic ideal (11), which is conceptually related to ICD-10 F60.5 Anankastic (Obsessive–Compulsive) Personality Disorder.

<sup>4</sup>However, the SCID-II, and thus the DSM system, is widely used in European countries, at least in Germany, Denmark, Norway, and the Netherlands.

Aims of the study

This study aimed to examine (1) whether DSM-5 Section III pathological personality trait facets can be used to describe the forthcoming ICD-11 personality disorder domains, and (2) how these designated trait features are hierarchically organized from one general factor to five lower-order domains of personality and psychopathology.

**Material and methods**

Sample and procedure

The derivation sample ( $N = 1541$ ) was composed of 616 consecutively admitted psychiatric outpatients and 925 community-dwelling participants from Denmark. The average age for the total derivation sample was 32.64 years ( $SD = 12.04$ , range from 18 to 66), and 81% were women. All patients were evaluated by a psychiatrist or psychologist, and those suspected of having a current organic disorder, substance-related disorder, psychotic disorder, severe depression, autism spectrum disorder, or manic episode were not included in the clinical sample; they were diagnosed with at least one DSM-IV/5 mental disorder each with high prevalence of Cluster B and C personality disorders as well as co-occurring anxiety disorders, depressive disorders, and eating disorders. Detailed diagnostic characteristics are reported elsewhere (23). The patients were administered a computerized version of the PID-5 as a part of their initial routine assessment for treatment planning, whereas community-dwelling participants were administered the PID-5 via a secure online server and were subsequently e-mailed their trait profile as incentive for participation.

The replication sample ( $N = 637$ ) was composed of undergraduate students from a southern university in the United States. The average age for this sample was 19.36 years ( $SD = 1.64$ , range from 18 to 43), and 56% were women. The participants were administered a series of computerized self-report measures (including the PID-5) in groups up to ten under the supervision of a trained research assistant; they received course credit for their participation.

This study was approved by the Regional Ethics Committee of Zealand and the Danish Data Protection Agency (SJ-PSY-01).

Measure

The Personality Inventory for DSM-5 (PID-5) (10, 21) is a 220-item self-report inventory with a

4-point response scale (0 = very false or often false to 3 = very true or often true). Seventeen (approximately 8%) of the 220 items are reverse coded. It contains 25 lower-order facet scales that have been reported to consistently load onto five higher-order dimensions across more than ten countries and languages (24), and across adolescents (25) and older adults (26). Various studies support conceptual continuity between PID-5 traits and categorical PDs (23, 27, 28) as well as adequate stability over time (3, 29). The Danish version of the PID-5, used in the derivation sample, has demonstrated sound psychometric features in terms of internal consistency and factorial validity (30, 31) as well as criterion validity (23, 32–34). As detailed in the initial Danish validation study, official recommendations were followed for the translation of the PID-5 (30). Likewise, the original English version of the PID-5, used in the replication sample, has demonstrated good psychometric properties in general (10, 20).

Cronbach's alpha coefficients for the PID-5 facet scales in the derivation sample ranged from 0.75 (grandiosity) to 0.96 (depressivity) with a median alpha of 0.88. Likewise, for the US replication sample, alphas ranged from 0.70 (Irresponsibility) to 0.89 (Depressivity) with a median alpha of 0.83.

**Results**

Deriving a five-factor structure and scoring algorithm for ICD-11 trait domains

First, we designated 16 of the 25 PID-5 facets, which we hypothesized to cover the features of each proposed ICD-11 domain (see Table 1)<sup>5</sup>. To examine whether these facets resemble the proposed ICD-11 domains, we subjected the 16 designated PID-5 scales to an exploratory structural equation modeling (ESEM) analysis. The ESEM analysis was conducted in Mplus 7.4 (35) using robust maximum-likelihood estimation. To determine the appropriate number of factors to retain, we relied on empirical observations, interpretability, model fit statistics, and the Hull Method by selecting common factors, and detecting the model with an optimal balance between model fit and number of parameters. The Hull method involves graphing model fit (we used CFI) and degrees of

<sup>5</sup>The designation of the 16 facets was initially carried out by the first and second author until consensus was achieved. Subsequently, the constellation of designated facets was confirmed by the remaining authors (all authors are experts and highly updated on novel dimensional PD models, including the DSM-5 Section III and the forthcoming ICD-11).

## Harmonizing ICD-11 and DSM-5 personality domains

Table 1. Hypothesized correspondence between ICD-11 domain features and DSM-5 personality trait facets

ICD-11 Domains	Specified features	DSM-5 trait facets
ME10 Anankastia	Perfectionism Deliberativeness Orderliness and Conscientiousness Concern with following rules and meeting obligations Stubbornness Perseveration	Rigid Perfectionism (low Impulsivity)      Perseveration
ME11 Detachment	Emotional and behavioural constraint Social withdrawal Avoidance of intimate relationships and close friendships Aloofness or coldness in relation to other people Reduced experience and expression of emotion	Restricted Affectivity Withdrawal Intimacy Avoidance   Restricted Affectivity Restricted Affectivity
ME12 Disinhibition	Irresponsibility  Impulsivity / Impulsiveness Distractibility Recklessness	Irresponsibility (Carelessness)  Impulsivity Distractibility Risk Taking (Recklessness) Callousness
ME13 Dissociality	Callousness Ruthlessness Lack of empathy Hostility Aggression Very positive view of the self- Entitlement Manipulative Exploitative of others	Hostility   Hostility  Grandiosity  Manipulativeness
ME14 Negative Affectivity	Vulnerability Negative emotional states in response to even relatively minor actual or perceived stressors Anxiety Anger Irritability Depression Self-loathing	Emotional Lability    Anxiousness Hostility  Depressivity

The domain features are derived from the ICD-11 beta draft ([apps.who.int/classifications/icd11](http://apps.who.int/classifications/icd11)). PID-5 facets that were not included as follows: Submissiveness, Separation Insecurity, Suspiciousness, Anhedonia, Deceitfulness, Attention-Seeking, Eccentricity, Perceptual Dysregulation, and Unusual Beliefs and Experiences.

freedom and selecting a convex point (elbow) at which model fit increases are disproportionately smaller in light of parsimony loss (36). Model fit indices for 1 to 7 factor models are reported in Table S1, and the results of the Hull method are plotted in Figure S1. The five-factor solution provided the soundest solution in terms of both interpretability and model fit ( $\chi^2 = 358.989$  [df = 50]; RMSEA = 0.063; CFI = 0.977; TLI = 0.944; SRMR = 0.015). The Hull method indicated clearly that improvements to model fit (CFI) decreased sharply at this point. Factor eigenvalues and explained variance are reported in Table S2 and Table S3 (see part B). As shown in Table 2, the pattern of ESEM loadings overall supported

the proposed ICD-11 five-factor model, and the ‘new’ domain of Anankastia was characterized by Perseveration and Rigid Perfectionism. As also observed for the DSM-5 trait system (10), a number of PID-5 facets (Hostility, Depressivity, Distractibility, Anxiousness, Rigid Perfectionism, Callousness, and Risk Taking) showed considerable cross-loadings (involving two or more loadings above 0.30). Table 2 also displays the intercorrelations among the five ICD-11 trait domains in this sample. As can be seen these intercorrelations revealed poor (0.63; Negative Affectivity and Anankastia) to good (0.02; Negative Affectivity and Dissociality) ability to discriminate domains from one another (i.e., discriminant validity) with a median correlation coefficient of 0.23.

Next, we examined whether the derived ICD-11 five-factor structure could be replicated in an independent US university sample by subjecting the 16 designated PID-5 scales to the same ESEM procedure as presented in the aforementioned procedure (see Table 2). Model fit indices for the replication sample were satisfactory ( $\chi^2 = 208.043$  [df = 50]; RMSEA = 0.071; CFI = 0.957; TLI = 0.896; SRMR = 0.020). As presented in Table 2, the intercorrelations among the five ICD-11 trait domains in this sample revealed acceptable discriminant validity for all domains with a median correlation coefficient of 0.22. To ensure congruence between the derivation sample and the replication sample, we examined whether the measurement structure was invariant across the two samples (see Table S4). First, we specified a configural (baseline) model in which all factor loadings and indicator intercepts were freely estimated across the two groups; this model was associated with acceptable fit. Second, we specified a weak invariance model in which the factor loadings were constrained to be equal across the two groups and compared this model to the configural model. A change in CFI score <0.010 indicated that this model was tenable (37). Third, we specified a strong invariance model where the item intercepts were also constrained to be equal across groups; as revealed in Table S4, this model was also tenable when compared with the weak invariance model. This indicates acceptable factor equivalence between the two samples.

Finally, we developed a scoring algorithm based on the pattern of PID-5 facet scale loadings in Table 2. Correlations (and content overlap) between the computed DSM-5 and ICD-11 trait domains are illustrated in Table S5. The specific scoring algorithm for computing ICD-11 trait

Table 2. ESEM five-factor model loadings and factor correlations for Danish and US samples

Facet	Negative Affectivity		Detachment		Dissociality		Disinhibition		Anankastia	
	DK	US	DK	US	DK	US	DK	US	DK	US
Emotional Lability <sup>NA</sup>	<b>0.69</b>	<b>0.59</b>	-0.13	-0.27	-0.01	0.06	0.20	0.22	0.25	0.32
Anxiousness <sup>NA</sup>	<b>0.59</b>	<b>0.59</b>	0.18	0.07	-0.04	-0.05	-0.05	0.06	0.32	0.33
Depressivity <sup>NA</sup>	<b>0.44</b>	<b>0.57</b>	<b>0.42</b>	0.35	-0.17	0.09	0.16	0.09	0.23	-0.04
Restricted Affectivity <sup>DT</sup>	-0.21	-0.26	<b>0.71</b>	<b>0.75</b>	0.25	0.13	0.04	0.11	0.11	0.09
Withdrawal <sup>DT</sup>	0.29	0.30	<b>0.65</b>	<b>0.63</b>	-0.03	0.11	-0.01	-0.13	0.14	0.12
Intimacy Avoidance <sup>DT</sup>	0.03	0.07	<b>0.60</b>	<b>0.53</b>	-0.05	-0.05	0.02	0.01	0.11	0.01
Manipulativeness <sup>DS</sup>	-0.05	-0.16	0.00	0.04	<b>0.64</b>	<b>0.51</b>	0.18	0.23	0.06	0.26
Hostility <sup>DS + NA</sup>	<b>0.47</b>	0.30	0.13	-0.02	<b>0.48</b>	<b>0.53</b>	0.18	0.07	0.07	0.28
Callousness <sup>DS</sup>	0.07	0.06	0.32	0.25	<b>0.61</b>	<b>0.77</b>	0.22	0.02	-0.06	-0.09
Grandiosity <sup>DS</sup>	-0.10	-0.16	-0.07	-0.05	<b>0.65</b>	<b>0.49</b>	0.03	0.01	0.15	0.36
Impulsivity <sup>DI</sup>	0.17	0.03	-0.06	-0.08	0.15	0.21	<b>0.64</b>	<b>0.69</b>	0.10	-0.05
Risk taking <sup>DI</sup>	-0.22	-0.34	-0.05	-0.09	0.35	0.26	<b>0.50</b>	<b>0.57</b>	-0.10	-0.10
Irresponsibility <sup>DI</sup>	0.16	0.28	0.21	0.20	0.07	0.25	<b>0.51</b>	<b>0.44</b>	0.21	-0.16
Distractibility <sup>DI</sup>	0.15	0.28	0.15	0.17	-0.12	-0.19	<b>0.41</b>	<b>0.62</b>	<b>0.51</b>	0.17
Perseveration <sup>AN</sup>	0.04	0.26	0.10	0.19	0.03	-0.06	0.14	0.36	<b>0.83</b>	<b>0.52</b>
Rigid perfectionism <sup>an</sup>	0.32	-0.02	0.05	0.07	0.33	0.07	-0.32	-0.19	<b>0.54</b>	<b>0.76</b>
Factor correlations										
Detachment	0.32	0.23								
Dissociality	0.02	-0.01	0.15	0.21						
Disinhibition	0.23	0.24	0.21	0.10	0.33	0.32				
Anankastia	0.63	0.35	0.44	0.15	0.16	0.23	0.28	0.13		

DK, Danish derivation sample (N = 1541); US, US replication sample (N = 637); factor loadings of 0.40 and above are in bold; ESEM, Exploratory Structural Equation Modeling. Two-letter abbreviations indicate expected domain affiliation: NA, Negative Affectivity; DT, Detachment; DS, Dissociality; DI, Disinhibition; AN, Anankastia.

domain scores from PID-5 facet scores is provided in Appendix 1 (to be used by clinicians and researchers).

Structural hierarchy of ICD-11 trait features

The second objective of this study was to explore the hierarchical structure of the ICD-11 traits based on the derivation sample (see Fig. 1). For this purpose, we used Goldberg’s ‘bass-ackwards’ method for estimating the hierarchical factor structure of a personality inventory (38). This approach involves the estimation of a series of factor models with an increasing number of factors followed by correlating the factor scores with one another. The across-level correlations served to estimate the paths between levels of the hierarchy. First, we conducted a one-factor ESEM, followed by a series of GEOMIN rotated ESEM analyzes with two to five factors. One to five factors were specified, as five factors typically represents the upper bound associated with established and familiar models of personality and psychopathology (12), as well as the maximum number of interpretable factors in this study. The ESEM factor loadings for level 1 to 4 are provided in Table S6, whereas level 5 is provided in Table 2.

In the one-factor solution, 13 of the 16 designated PID-5 facets loaded at >0.40, with the exception of Risk Taking (0.05), Grandiosity (0.19), and Manipulativeness (0.28) indicating this single

factor captures overall ‘personality pathology’ (predominantly internalizing features). The general one-factor solution was split into two factors defined by internalizing and externalizing features, based on the pattern of loadings. The internalizing factor was primarily defined by loadings of Anxiousness, Depressivity, Perseveration, Emotional Lability, Withdrawal, Distractibility, and Rigid Perfectionism, whereas the externalizing factor was strongly marked by Callousness, Manipulativeness, Grandiosity, Risk Taking, Hostility, and Impulsivity.

In the three-factor solution, the internalizing factor split into factors of Negative Affectivity and Detachment, whereas the externalizing factor overall maintained its structure. The Negative Affectivity factor was marked by high loadings for Emotional Lability, Anxiousness, Perseveration, and Distractibility. The Detachment factor was so named because the indicators with the highest loadings were Restricted Affectivity, Withdrawal, and Intimacy Avoidance. At level four, the externalizing factor split into two factors defined by Dissociality and Disinhibition. Negative Affectivity was retained but further characterized by Anankastic features in terms of loadings for Rigid Perfectionism and Perseveration, while Detachment maintained its structure. The Dissociality factor was strongly marked by Manipulativeness, Grandiosity, Hostility, and Callousness. The Disinhibition factor was strongly marked by

## Harmonizing ICD-11 and DSM-5 personality domains

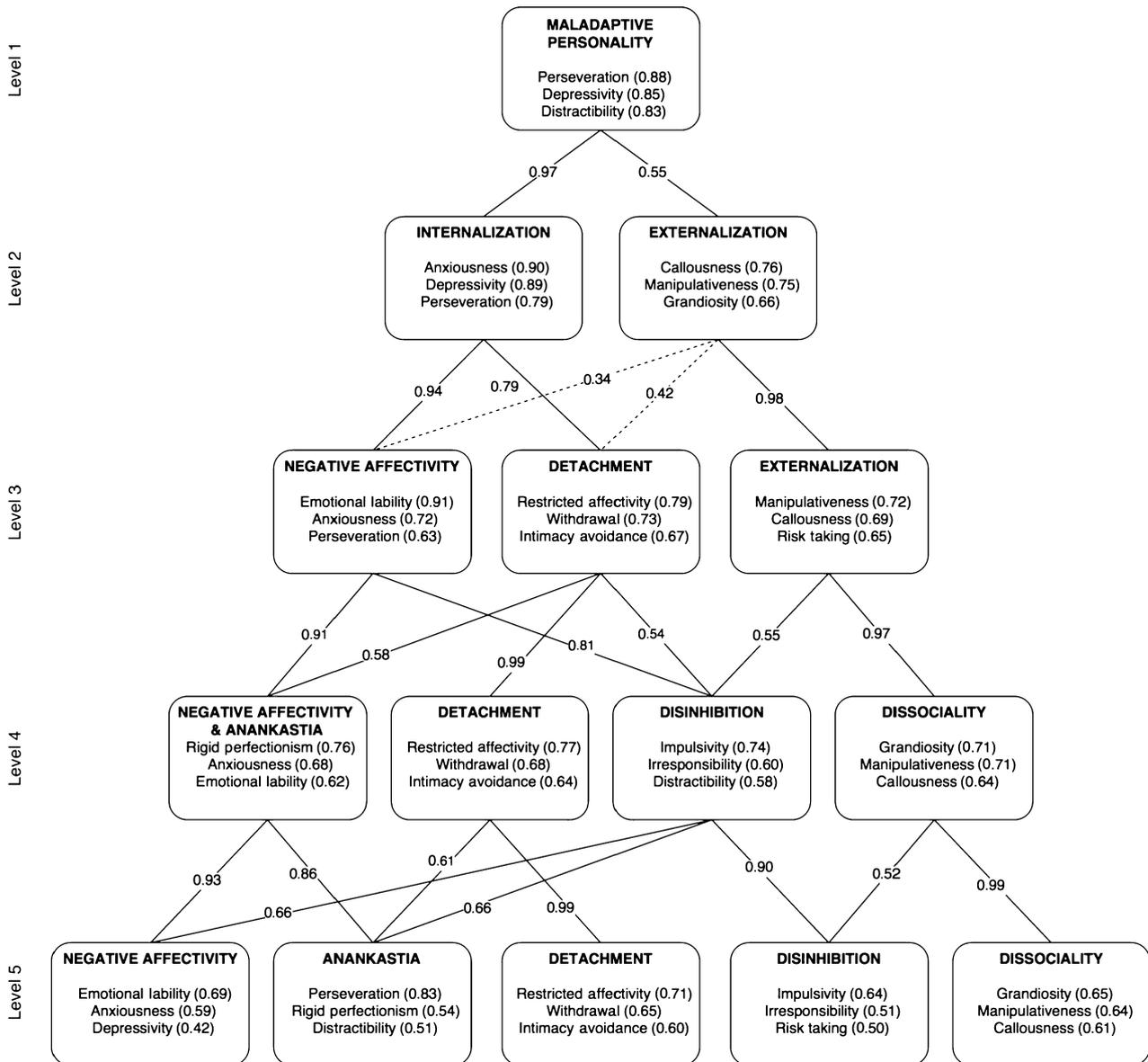


Fig. 1. Hierarchical structure of ICD-11 trait domains in derivation sample ( $N = 1541$ ). Exploratory structural equation modeling (ESEM) analyses with GEOMIN rotation were employed for each level. The three facets with the highest loadings are displayed for each domain. Only primary path coefficients (correlations between subordinate and superordinate factors) are reported.

Impulsivity, Distractibility, Emotional Lability, and Irresponsibility. At the final level of the hierarchy, a fifth factor of Anankastia emerged, marked by the facet scales of Perseveration, Rigid Perfectionism, Distractibility, and some Anxiousness, whereas the maintained Disinhibition factor was further characterized by considerable negative loading for Rigid Perfectionism.

### Discussion

The results demonstrate that the proposed ICD-11 trait domains and the DSM-5 Section III trait domains are largely commensurate. Designated

DSM-5 trait facets, as measured with the PID-5, can be used for characterizing features of the proposed ICD-11 personality disorder domains ('DSM-5 to ICD-11 cross-walk'). Consequently, it is possible for clinicians and researchers to measure and describe ICD-11 trait domains using the scoring algorithm for designated PID-5 facets presented in Appendix 1.

Based on the hierarchical ESEM analysis, we found that the designated ICD-11 traits were organized in accordance with the Widiger & Simonsen (12) model involving a hierarchical meta-structure of the spectra of internalizing and externalizing psychopathology in the top and maladaptive

variants of the FFM traits at the lower level. Thus, we revealed a potential for an integrative hierarchy based upon designated ICD-11 traits to represent the dimensions scaffolding personality psychopathology more generally, similar to previous studies exploring the complete DSM-5 trait system (22, 30). As shown in Table S6, the general ‘g-factor’ for the ICD-11 model was predominantly characterized by Perseveration, Depressivity, Distractibility, Anxiousness, and Emotional Lability, whereas the general ‘g-factor’ for all DSM-5 trait facets is predominantly characterized by Perseveration, Depressivity, Perceptual Dysregulation, Anhedonia, Distractibility, Anxiousness, and Suspiciousness (30). Accordingly, the Psychoticism subfacet of Perceptual Dysregulation (including dissociation proneness) seems to play a significant role in general maladaptivity, which is not accounted for in the ICD-11 domain model. In the complete DSM-5 trait model, the trait domain of Psychoticism primarily emerges from features of Disinhibition, Detachment, and Negative Affectivity (22, 30), whereas the ‘new’ ICD-11 domain of Anankastia predominantly emerged from a broader domain of Negative Affectivity (see Figure 1). Moreover, in several previous studies, the facet of Perseveration has shown substantial loadings on Psychoticism (10, 24, 31), whereas in the current study it showed a predominant and meaningful loading on Anankastia.

Following the general factor of maladaptivity at the first level, the meta-structure of internalizing and externalizing psychopathology emerged at the second level. Notably, the proposed ICD-11 trait model includes eight internalizing facets (i.e., emotional lability, anxiousness, depressivity, restricted affectivity, withdrawal, intimacy avoidance, perseveration, and rigid perfectionism) as well as eight externalizing facets (i.e., impulsivity, grandiosity, risk taking, irresponsibility, distractibility, manipulateness, hostility, and callousness) indicating that these two essential domains of psychopathology seem equally represented in the model. However, as evident from Table S3 (see part B), the internalizing factor explained 37.5% of the variance, whereas the externalizing factor only explained 17.9% in the traits, although the latter factor is associated with a smaller set of indicators. At the third level, three factors were found that approximately correspond to the ‘Big Three’ models of personality (39). At the fourth level of the hierarchy, the domains were conceptually related to the domains in the renowned Dimensional Assessment of Personality Pathology (DAPP) model by Livesley & Larstone (40) comprising Emotional Dysregulation ( $\approx$  Negative Affectivity), Inhibition ( $\approx$  Detachment), Dissocial ( $\approx$  Dissociality),

and Compulsivity ( $\approx$  Anankastia). Finally, at the fifth level, five domains emerged as a recognizable structure that may in part be interpreted as pathological forms of the FFM domains (12): Negative Affectivity ( $\approx$  high Neuroticism), Detachment ( $\approx$  low Extraversion), Disinhibition ( $\approx$  low Conscientiousness), Dissociality ( $\approx$  low Agreeableness), and Anankastia ( $\approx$  high Conscientiousness).

A major finding of the current study was the identification of a sound five-factor model that captured all the proposed ICD-11 domains, including the ‘new’ Anankastia domain along with a distinct Disinhibition domain. In contrast, previous field trials and preliminary research on the ICD-11 domains involved ratings by global clinical impression (41) and factor analyzes of interview-rated categorical PD symptoms (42). In the first study, domains of Anankastia, Detachment, and Dissociality showed good discrimination, whereas two separate domains of anxious-dependent and emotionally unstable overlapped too much resulting in a combined domain of Negative Affectivity as evident from the current ICD-11 proposal (41). In the latter study, the results failed to confirm the presence of a distinct Disinhibition factor, whereas the remaining four proposed ICD-11 domains were resembled (42). However, Disinhibition (or low conscientiousness) has consistently emerged in other factor analytic trait studies, including the present study, and has consistently appeared in research on PID-5 and other trait models (43). Therefore, this previous finding may perhaps be due to insufficient representation of Disinhibition within the DSM-IV criterion sets for its emergence within a factor analysis (43). Taken together, the current study demonstrated that the aforementioned deficiencies may be solved using a suitable measure of pathological traits (e.g., PID-5).

Implications for the harmonization of ICD-11 and DSM-5 trait models

After the DSM-5 was published in 2013, the ICD-11 has to some extent had the advantage of being able to respond or adapt to the criticisms that have followed the publication of DSM-5 (16, 44). The alternative DSM-5 model for personality disorders has been criticized for being too complicated and cumbersome for busy clinicians (45, 46). Therefore, it seems reasonable to state that the proposed ICD-11 model, relatively simple as it is, is more parsimonious and feasible for practitioners in all cultures and settings, while also aligning with the domains of the DSM-5 model (7, 47). However, a perceived drawback of not including specifying subfacets may involve insufficient information

about the patient's unique problems and specified targets of treatment (48, 49). Accordingly, this absence may frustrate clinicians with expertise in personality disorders. Thus, for those clinicians who may have the interest and resources, the specified DSM-5 subfacets may add more useful information to the simpler ICD-11 trait domains. In that way, the DSM and ICD approaches may potentially be harmonized, while DSM may also enhance the utility of ICD by adding more detailed and clinically useful information to it.

### Strengths and limitations

The major strength of the present study is the appropriate inclusion of a mixed heterogeneous sample composed of clinical and community-dwelling participants followed by replication in a US sample; this was an important first step to empirically test the current beta-version of the ICD-11 personality disorder domains. However, certain limitations and recommendations for future research should be emphasized.

First, the trustworthiness and generalizability of the results are potentially limited by the use of self-reported PID-5 data, which may involve social desirability and response style variance (50). Nevertheless, self-reported personality traits are by far the most common approach used in the study of personality pathology (51). Moreover, self-reported personality testing may be considered as sampling of behaviour directly from the individual being assessed, whereas all the test items may be thought of as mini-quasi-experiments in regard to the constructs being assessed (52). Consequently, all respondents are exposed to the exact same stimuli (i.e., test items), and the self-report format is like a fully systematized patient interview in which the respondent is both the interviewer and interviewee. Such a methodologically consistent procedure for data collection is hard to obtain when using other approaches.

Second, the derivation sample was potentially biased by an overrepresentation of women (81%). However, the findings were replicated in a US sample with a more equal composition of men and women, and existing research on DSM-5 traits overall supports their gender invariance (53).

### Future directions

First, future studies should develop and evaluate corresponding informant-report and interview-rating measures of the ICD-11 traits (8). Second, future research should attempt to replicate the proposed ICD-11 five-factor structure (in particular the 'novel' Anankastia factor) in clinical and non-

clinical samples, separately. Third, future evaluations could look into how to best maximize the domain assessment using PID-5 scales as 220 items (or the 143 items left in the 16 facets) are hardly needed for assessment of the five ICD-11 trait domains. Fourth, abbreviated and more feasible versions (similar to the PID-5 brief form) of clinician-rating forms, self-report and informant report measures for ICD-11 traits should be developed. Fifth, in the present study, we employed the PID-5, which is the official instrument to operationalize and describe the DSM-5 trait system, and it was initially constructed for that purpose (10). Subsequently, an informant-report version of PID-5 was developed (54), and recently a structured clinical interview for the personality trait criterion has been published [SCID-AMPD Module II] (55). Additionally, subsequent research has shown that other established measures may be used to delineate DSM-5 traits. For example, it has been demonstrated that DSM-5 traits may be assessed with MMPI-2-RF (56) and Personality Assessment Inventory [PAI] (57). Thus, we encourage researchers and clinicians to use these measures as well. Sixth, in order to emphasize continuity with established and familiar constructs, future research should investigate the association of ICD-11 trait domains with categorical PD types and the normal personality traits, including conscientiousness-related features of Anankastia, which may not be sufficiently captured by PID-5. Seventh, future research should also attempt to harmonize the two systems in terms of DSM-5 personality functioning and ICD-11 PD severity. Finally, beyond narrowing the gap between DSM-5 Section III and ICD-11 PD operationalization, future research should also endeavor to harmonize and narrow the gap between DSM-5/ICD-11 PD domains and the Research Domain Criteria (RDoC) constructs (58) as well as the newly developed Hierarchical Taxonomy Of Psychopathology (HiTOP) framework (59).

### Acknowledgements

Grants have been received from the Health Scientific Research Fund of Region Zealand.

### Declaration of interests

The authors have no conflict of interests.

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### Supporting Information

Additional Supporting Information may be found in the online version of this article:

**Figure S1.** Hull method for selecting the optimal number of major common factors.

**Table S1.** ESEM Model fits for 1-7 factor models in Danish derivation sample and US replication sample.

**Table S2.** Eigenvalues and % of variance.

**Table S3.** EFA Maximum Likelihood Equamax-rotated Five-Factor Model Loadings for Danish and US samples

**Table S4.** Measurement invariance across Danish derivation sample ( $n = 1541$ ) and US replication sample ( $n = 637$ ).

**Table S5.** Correlations between computed domain scores of ICD-11 traits and DSM-5 traits.

**Table S6.** One, Two, Three, and Four Factor ESEM Structure of 16 designated ICD-11 trait facets.

### Appendix 1 Algorithm for Computing ICD-11 Trait Domain Scores Using Personality Inventory for DSM-5.

**Step 1.** Compute the PID-5 trait facet scores according to the official scoring algorithm (APA, 2013). **Step 2.** Compute the ICD-11 trait domains using the scoring table below

ICD-11 trait domains	DSM-5 trait facet scales	Average score
Anankastia	Rigid Perfectionism, Perseveration	
Detachment	Restricted Affectivity, Withdrawal, and Intimacy Avoidance	
Disinhibition	Impulsivity, Irresponsibility, Risk Taking, and Distractibility	
Dissociality	Grandiosity, Manipulativeness, Callousness, and Hostility	
Negative affectivity	Emotional Lability, Anxiousness, and Depressivity	