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A Self-Report Measure for the ICD-11 Dimensional Trait Model Proposal: The Personality Inventory for ICD-11

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Abstract

Proposed for the 11th edition of the World Health Organization's International Classification of Diseases (ICD-11) is a dimensional trait model for the classification of personality disorder (Tyrer, Reed, & Crawford, 2015). The ICD-11 proposal consists of five broad domains: negative affective, detachment, dissocial, disinhibition, and anankastic (Mulder, Horwood, Tyrer, Carter, & Joyce, 2016). Several field trials have examined this proposal, yet none has included a direct measure of the trait model. The purpose of the current study was to develop and provide initial validation for the Personality Inventory for ICD-11 (PiCD), a self-report measure of this proposed five-domain maladaptive trait model. Item selection and scale construction proceeded through three initial data collections assessing potential item performance. Two subsequent studies were conducted for scale validation. In Study 1, the PiCD was evaluated in a sample of 259 MTurk participants (who were or had been receiving mental health treatment) with respect to two measures of general personality structure: The Eysenck Personality Questionnaire-Revised and the 5-Dimensional Personality Test. In Study 2, the PiCD was evaluated in an additional sample of 285 participants with respect to two measures of maladaptive personality traits: The Personality Inventory for DSM-5 and the Computerized Adaptive Test for Personality Disorders. Study 3 provides an item-level exploratory structural equation model with the combined samples from Studies 1 and 2. The results are discussed with respect to the validity of the measure and the potential benefits for future research in having a direct, self-report measure of the ICD-11 trait proposal.

Keywords

ICD-11; self-report; personality disorders; personality traits; maladaptive personality

There has long been a call for a shift in the diagnosis of personality disorders within the World Health Organization's (WHO) and the American Psychiatric Association's (APA) diagnostic manuals from a categorical to a dimensional model (e.g., Clark, 1992; Eysenck, 1987; Livesley, 1985; Presly & Walton, 1973; Tyrer, 1988a; Tyrer & Alexander, 1979; Widiger & Frances, 1985). The limitations of the existing categorical model have been well documented (e.g., Clark, 2007; Krueger & Eaton, 2010; Skodol, 2012; Tyrer, 2012; Tyrer, Reed, & Crawford, 2015; Widiger & Trull, 2007). A significant step toward a dimensional model of classification occurred with the fifth edition of the APA Diagnostic and Statistical

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Manual of Mental Disorders (DSM-5; APA, 2013) through the proposal to include a five-domain dimensional trait model, consisting of negative affectivity, detachment, antagonism, disinhibition, and psychoticism (Krueger et al., 2011). The official measure of this model is provided by the Personality Inventory for DSM-5 (PID-5; Krueger, Derringer, Markon, Watson, & Skodol, 2012).

The dimensional trait model, though, did not receive final approval. It was approved by the DSM-5 Task Force but not by the APA Board of Trustees (Krueger, 2013). However, it was included within Section III of DSM-5 for "emerging measures and models" (APA, 2013, p. 729). It is also noteworthy that a considerable body of research has rapidly accumulated concerning the DSM-5 trait model and/or the PID-5 (Bagby, 2013; Krueger & Markon, 2014).

Receiving less attention has been the dimensional trait model proposed for the eleventh edition of the WHO International Classification of Diseases (ICD-11). The relationship of the APA DSM to the WHO ICD perhaps warrants some clarification. The DSM is the authoritative classification for the diagnosis of mental disorders within the United States. The ICD is the authoritative classification for the diagnosis of mental disorders for the 194 Member States of the WHO, including the United States. The United States, as a member of the WHO, is required to use the coding system of the ICD. DSM-5 is essentially the United States' version of the ICD. The code numbers used in all clinics and hospitals within the United States (and included within DSM-5) are ICD code numbers. Each Member State of the WHO can modify the ICD diagnostic criteria for a respective disorder as long as the modification does not result in a substantially or fundamentally different disorder. Each country can also decline to include a particular disorder within its version of the ICD. Finally, each member country can also add a disorder to its own version of the ICD that is not included in the ICD, as long as that country does not use a code number that is already in use within the ICD.

The ICD-11 Working Group for the Revision of Personality Disorders (WGR-PD) has also proposed a dimensional trait model for the next edition of the WHO diagnostic manual (Tyrer et al., 2015). In fact, the proposal for ICD-11 is to replace the ICD-10 (WHO, 1992) diagnostic categories with this dimensional trait model (along with an overall level of severity of personality dysfunction), rather than using the traits as diagnostic criteria for the existing personality disorder categories as proposed in Section III of DSM-5 (APA, 2013). The ICD-11 dimensional trait model proposal includes the five broad domains of negative affective, detachment, dissocial, disinhibition, and anankastic (Tyrer et al., 2015). It is perhaps self-evident that four of the five ICD-11 domains are closely aligned, at least conceptually, with four of the five DSM-5 Section III domains (Mulder, Horwood, Tyrer, Carter, & Joyce, 2016); more specifically, ICD-11 negative affective, detachment, dissocial, and disinhibition align with DSM-5 Section III negative affectivity, detachment, antagonistic, and disinhibition, respectively. However, as yet, no study has demonstrated this alignment empirically.

The ICD-11 proposal does not include a domain of psychoticism. The absence of psychoticism, though, is consistent with the manner in which schizotypal personality

disorder is understood within ICD-10. Schizotypal is a variant of schizophrenia in ICD-10, rather than a personality disorder. A comparable proposal was actually considered for DSM-5, in which schizotypal personality disorder would be shifted out of the personality disorders section and into the schizophrenia section (First et al., 2002). One of the few changes that occurred for the personality disorders within Section II of DSM-5 was in fact to cross-code schizotypal personality disorder within the schizophrenia spectrum section (APA, 2013, p. 90), as well as retaining it within the personality disorders section (APA, 2013, p. 655).

The absence of an anankastic dimension within the DSM-5 Section III trait model is also not a particularly striking difference, in that a compulsivity domain that would have been comparable to ICD-11 anankastic was included within the initial DSM-5 proposal (Clark & Krueger, 2010). It was deleted through the course of the effort to reduce the original list of 37 traits to 25 (Krueger et al., 2012). One notable difference between the two proposals is that the ICD-11 five domains do not include any underlying facets, the model being confined to the level of the domains (Tyrer et al., 2015). Consideration was given to the inclusion of subscales within each domain. However, the ICD-11 WGR-PD felt that their inclusion would provide an unnecessary complexity (Mulder et al., 2011; Tyrer, 2012; Tyrer et al., 2011).

The ICD-11 proposal was informed and guided by an extensive review of the personality disorder and trait literature (Mulder, Newton-Howes, Crawford, & Tyrer, 2011; Tyrer et al., 2011). There have also been a series of field trials concerning the ICD-11 proposals. For example, Kim et al. (2015) compared the ICD-11 proposed domains with the ICD-10 diagnostic categories, normal range personality domains, and the maladaptive personality traits assessed by the Personality Assessment Schedule (PAS; Tyrer, Alexander, Cicchetti, Cohen, & Remington, 1979). The PAS is a semi-structured interview and/or clinician rating form that assesses for the presence of 24 traits (e.g., anxiousness, rigidity, conscientiousness, childishness, hypochondriasis, irritability, shyness, worthlessness, vulnerability, aggression, submissiveness, and pessimism). The ICD-11 trait domains were rated on the basis of the available clinical information by the psychiatrist treating the patient. The results confirmed an expected convergence with the respective diagnostic categories and PAS traits.

Tyrer et al. (2014) recoded assessments obtained with the PAS-Q (Tyrer, 2000) with respect to the ICD-11 trait domains and then compared these to the diagnosis of personality disorder that would be provided by ICD-10. The primary result was a close correspondence in whom would receive a personality disorder diagnosis, although the threshold for diagnosis did appear to be somewhat lower for ICD-11. Comparisons with individual personality disorders were not provided.

Mulder et al. (2016) assigned 57 DSM-IV personality disorder diagnostic criteria to each one of the five ICD-11 proposed domains, and then submitted parcels of these criteria to factor analysis. They failed to confirm the presence of the disinhibition domain. However, this may have reflected an insufficient representation of disinhibition within the DSM-IV criterion set. In addition, the criteria selection for disinhibition may have also been somewhat questionable (e.g., including perceives attacks on one’s character, rapidly shifting

emotions, use of physical appearance to draw attention to oneself, and suggestibility as indicators of disinhibition).

Additional ICD-11 field trials have not been concerned with the dimensional trait model, focusing instead on the global severity of personality disorder rating scale (e.g., Kim, Blashfield, Tyrer, Hwang & Lee, 2014; Tyrer, Tyrer, Yang, & Guo, 2016). It is notable, however, that none of the field trials that did concern the trait model included a direct measure of this proposed model. The studies typically used an existing measure, such as the PAS-Q (i.e., Tyrer et al., 2014) or the DSM-IV criterion sets (i.e., Mulder et al., 2016). Kim et al. (2015) assessed the trait model through unstructured ratings provided by clinicians treating a respective patient. Research concerning the ICD-11 dimensional trait model proposal would clearly be facilitated by the presence of a measure developed explicitly for its assessment.

The most direct assessment is perhaps provided by the PAS interview (Tyrer, 1988b; Tyrer et al., 1979) in that the PAS has been used for the assessment of the ICD-11 trait model (e.g., Tyrer et al., 2014). However, there might be some limitations of the PAS for this assessment. The 24 PAS traits have traditionally been organized into four domains of sociopathic, passive-dependent, anankastic, and schizoid (Tyrer, 1988b). The PAS does not include a higher-order domain of disinhibition. In addition, one might question some of the traits included within the four PAS domains. PAS Sociopathic does appear to align well with ICD-11 dissocial, as does PAS Schizoid with ICD-11 detachment. Passive-Dependent would appear to align reasonably well with ICD-11 negative affective. PAS Passive-Dependent, though, involves the traits of anxiousness, vulnerability, childishness, resourcelessness, and dependence (Tyrer, 1988b), whereas ICD-11 negative affective includes anger, irritability, self-loathing, as well as vulnerability and anxiousness (Tyrer et al., 2011; Mulder et al., 2016). Similarly, PAS Anankastic would align with ICD-11 anankastic, although the former includes the traits of introspection, sensitivity, conscientiousness, rigidity, and hypochondriasis (Tyrer, 1988b), whereas ICD-11 anankastic concerns more specifically the control and regulation of behavior, including such traits as perfectionism, deliberativeness, orderliness, and concern with following rules (Mulder et al., 2016; Tyrer et al., 2011, 2015). In sum, it is feasible to recode the PAS in terms of the ICD-11 trait model (e.g., Tyrer et al., 2014), but the assessment of ICD-11 disinhibition would be problematic and perhaps some of the PAS traits might not be optimal to include (albeit this could be tested empirically).

The purpose of the current study was to develop and provide initial validation of a self-report measure of the ICD-11 five-domain maladaptive trait model proposal. Convergent and discriminant validity of the five domain scales of the Personality Inventory for ICD-11 (PiCD) were considered with respect to two measures of normal personality, including the Eysenck Personality Questionnaire-Revised (EPQ-R; Eysenck, Eysenck, & Barrett, 1985) and the 5-Dimensional Personality Test (5-DPT; van Kampen, 2012). Also considered was their relationship with two measures of maladaptive personality traits, including the PID-5 (Krueger et al., 2012), and the Computerized Adaptive Test for Personality Disorders – Static Form (CAT-PD-SF; Simms et al., 2011). Most of the convergent validity hypotheses are straightforward (e.g., convergence of PiCD Negative Affective with EPQ-R Neuroticism, 5-DPT Neuroticism, PID-5 Negative Affectivity, and CAT-PD-SF Negative Emotionality).

However, EPQ-R Psychoticism is expected to converge with both PiCD Dissocial and Disinhibition, consistent with prior research concerning EPQ-R Psychoticism (van Kampen, 2009). No convergence is expected to occur for any PiCD scale with 5-DPT Absorption. PiCD Anankastic is expected to converge positively with 5-DPT Orderliness and negatively with PiCD Disinhibition, PID-5 Disinhibition and CAT-PD-SF Disconstraint (Mulder et al., 2016).

An item-level cross-validation of the PiCD using Exploratory Structural Equation Modeling (ESEM; Marsh, Morin, Parker, & Kaur, 2014) was also provided with the combined sample of Studies 1 and 2 to test the hypothesis of a four-factor solution. The expectation is that the items would load primarily on the respective factors corresponding to each domain. In addition, it is expected that the Disinhibition and Anankastic items would load in opposite directions on the same factor, consistent with the hypothesized negative correlations of PiCD Anankastic with PID-5 Disinhibition and CAT-PD-SF Disconstraint, and with prior research indicating a negative relationship between traits of compulsivity and traits of disinhibition (e.g., Anderson et al., 2013; Crego & Widiger, in press; De Fruyt et al., 2013; Thomas et al., 2013; Wright & Simms, 2014).

Item and Scale Development

Study participants were recruited via MTurk. Potential participants were informed that this study was seeking persons who were “currently or have been in some form of mental health treatment.” MTurk is an online research tool where responders receive financial compensation for their participation in research (Chandler & Shapiro, 2016). Participants were compensated $1.00 for completion of the questionnaires. Research concerning the MTurk population has indicated that the results obtained therein are consistent with those obtained from other populations (Chandler & Shapiro, 2016; Gosling & Mason, 2015). In all five data collections considered herein, missing data were imputed with the expectation maximization (EM) procedure. EM has been shown to create estimates of population parameters that are more accurate than substitution of mean values (Enders, 2006). The study was approved by the local university institutional review board (IRB protocol #15-0373-P4G).

Item construction and selection proceeded through a series of iterative stages (Clark & Watson, 1995). An initial set of 130 draft items were written by the co-authors (initially independently and then reviewed together for redundancy) to develop scales for the five domains proposed for ICD-11 (i.e., negative affective, detachment, dissocial, disinhibition, and anankastic) as described by the ICD-11 WGR-PD (e.g., Mulder et al., 2011; 2016; Tyrer et al., 2011, 2015). Tyrer et al. (2015), for example, stated that “the negative affectivity trait domain is characterised primarily by the tendency to manifest a broad range of distressing emotions including anxiety, anger, self-loathing, irritability, vulnerability, depression, and other negative emotional states, often in response to even relatively minor actual or perceived stressors” (p. 723). Traits in the dissocial domain include callousness, lack of empathy, aggression, ruthlessness, hostility, ruthlessness, manipulative, and exploitativeness. Traits in the disinhibition domain include impulsivity, irresponsibility, distractibility, and disorderliness. “The core of the detachment trait domain is emotional and interpersonal

distance, manifested in marked social withdrawal and/or indifference to people" (Tyrer et al., 2015, p. 723). Finally, "the core of the anankastic trait domain is a narrow focus on the control of … behavior to ensure that things conform to the individual's particularistic ideal" (Tyrer et al., 2015, p. 723). Tyrer et al. (2015) indicated that "traits in this domain include perfectionism, perseveration, emotional and behavioural constraint, stubbornness, deliberativeness, orderliness, and concern with following rules and meeting obligations" (p. 723). Further articulation of the content of the domains was also facilitated by the PAS (Tyrer, 1979, 2000), which has been used by the authors of the ICD-11 trait model for its assessment (e.g., Tyrer et al., 2014). For instance, the PAS includes within the domain of anankastic scales for conscientiousness, rigidity, introspection, and sensitivity. The PAS also includes illustrative questions for each respective construct. For example, for the trait of conscientiousness there are suggested questions such as, "Do you plan everything down to the last detail or do you seldom plan anything in life?" and "Do people ever say you are too fussy or conscientious, or even a perfectionist?" (Tyrer, 1979, p. 157).

The 130 draft items were evaluated with respect to psychometric properties in an initial sample of 385 persons currently receiving or had received mental health treatment (19 persons were excluded due to elevations on a scale assessing non-content based responding). Factor analysis and inter-item correlation were used as a primary basis for item performance. To develop convergent and discriminant validity at the item level, items from one construct (for example, detachment items) were submitted to a joint factor analysis with items from another construct (for example, negative affective items), as recommended by Clark and Watson (1995). Two factors were extracted. Items that did not load primarily with their own construct were not considered to have adequate discriminant validity and were not considered further. Due to the large number of draft items, item-level factor analyses of all items from all domains were not always feasible (i.e., at least five to ten times more participants than the number of items is preferable; e.g., Comrey & Lee, 1992; Floyd & Widman, 1995; Haynes, Smith, & Hunsley, 2011). Therefore, items were organized into parcels within each domain on the basis of similarity in content. For instance, five parcels of items within the anankastic domain sampled content concerning perfectionism, rigidity, introspection, constraint, and workaholism. Multiple factor analyses were then conducted with various combinations of these parcels. It was apparent that some of the parcels within the anankastic, dissocial, and negative affective domains demonstrated relatively high cross-domain loadings. More specifically, anankastic parcels cross-loaded on a negative affective factor, and dissocial parcels cross-loaded on a detachment factor. These results suggested a need for some construct refinement, as well as item revision (Clark & Watson, 1995). If a factor analysis suggested a particular parcel had problematic discriminant validity, the individual items within that parcel were then analyzed to identify the weakest performing items.

Twenty-six items were identified as being the most problematic on the basis of their cross-domain correlations; 15 of these were deleted, and 11 were modified, and 111 new potential items (largely for the domains of anankastic and dissocial) were prepared. For example, items concerning introspection were deleted, as it appeared that this potential component of anankastic could not be well distinguished from the anxiousness of negative affective. Some introspection items were revised to assess for an alternative component of deliberativeness

(e.g., “I spend a lot of time thinking about how I feel and what I do,” “I tend to get lost in my thoughts,” and “Throughout the day, I spend much of the time ‘in my head,’” were deleted, and replaced by “I give every decision a lot of careful thought,” and “I carefully think things through before I act”). Similar deletion and/or revision of items from other domains also occurred, particularly from the domain of dissocial. For example, items presumably assessing a dissocial callousness may have correlated with the detachment domain because they concerned (in part) a lack of desire for the company of others (e.g., “I am unconcerned about other persons,” and “It is easy for me to ignore the feelings of others”) and were therefore revised to more explicitly concern a lack of regard for others (e.g., “I would be a good soldier because I wouldn’t worry about harming someone,” “Some people deserve to be homeless,” and “I am not concerned with hurting someone’s feelings”).

Two hundred twenty-six second-round items were then evaluated within a new sample of 448 persons currently or historically within mental health treatment (15 persons were excluded due to elevations on a non-content based responding scale). Items were again organized into parcels, which for the most part aligned with the parcels included within the first scale construction iteration, albeit not entirely (e.g., a set of introspection items were replaced by a rumination parcel). Multiple factor analyses were again conducted with alternative combinations of parcels. It was evident that the rigidity items from the anankastic domain continued to be problematic. When these items were deleted, there were no longer any significant problematic cross-loading for the anankastic parcels, and therefore these items (along with the dissocial items) did not appear to be in need of further revision or refinement. The items within these parcels were then analyzed individually to identify the optimally performing items. The anankastic and dissocial items that obtained the highest convergent factor loadings, along with relatively low discriminant factor loadings with the other domains were retained. However, deletion of parcels from the detachment and disinhibition domains did not adequately address problematic cross-loading with negative affective. For example, item parcels concerning shyness and irresponsibility were loading with negative affective parcels. Therefore, 43 new items were drafted for detachment and disinhibition (along with 108 retained items), resulting in further construct refinement for these domains. For example, items considered to be assessing shyness (e.g., “Shyness has caused social problems for me,” “I tend to avoid people because I am shy,” and “I have trouble making new friends,”) were revised to assess an aloofness (e.g., “I talk less frequently than most other people,” “I am quiet around others,” and “I am always a ‘wallflower’ in social settings”). Another illustration is that some items considered to be assessing irresponsibility (from the disinhibition domain) loaded with negative affective. These items may have implied a sense of dissatisfaction or distress with respect to the irresponsibility (e.g., “I’m not as dependable as I probably should be”) and were therefore revised in a manner that removed this distress (e.g., “When I feel like it, I fail to show up for work”).

These 151 potential items were evaluated in a third data collection with 183 new participants, (14 persons were excluded due to elevations on a non-content based responding scale), but with a focus only on the factor structure issues that were evident in the second data collection (i.e., problems with detachment and disinhibition cross-loading with negative affective). Some of the detachment and disinhibition items continued to correlate with the

negative affective domain. However, with the deletion of the shyness and eccentricity parcels from detachment (both of which had been included in the PAS within this domain) and the deletion of aimless and distractibility parcels from disinhibition, no further problems with discriminant validity occurred. The detachment and disinhibition items that obtained the highest convergent loadings within their respective domains, along with relatively low discriminant loadings with negative affective items, were retained (along with the 36 anankastic, dissocial, and negative affective items) to comprise the five PiCD scales (12 items per domain). The domain scales were then cross-validated in two additional data collections. The final PiCD measure is provided as a Supplemental File.

Scale Validation: Study One

Participants

Two hundred and seventy-eight potential participants were recruited and paid $1.00 for their time. Fifteen persons were excluded due to elevations on a non-content based responding scale (described below), and four were excluded for providing questionable responses (e.g., repeating the same answer numerous times), leaving a final sample of $N = 259$. These 259 participants ($M_{age} = 35.7$ years, $SD = 11.0$ years, 68% female) were 83% percent white/Caucasian, 7% black/African-American, 4% Hispanic/Latino, 2% Asian, and 3% other. Thirty-five percent were married, 34% single, 16% cohabiting, 11% divorced, and 2% widowed. All participants were currently receiving or had received mental health treatment at some point in the past: Forty-one percent currently, 7% within the last month, 20% within the past year, 18% within the past five years, 10% within the past ten years, and 2% longer than ten years ago.

Measures

The following measures were administered in order, following the demographic questionnaire.

PiCD—The PiCD includes 60 items assessing the five proposed domains for the ICD-11 (Mulder et al., 2016). Each item is rated on a scale from 1 (*strongly disagree*) to 5 (*strongly agree*). Internal consistency was good, with moderate mean inter-item correlations (MICs): Negative Affective (α = .89; MIC = .41), Detachment (α = .87; MIC = .36), Dissocial (α = .85; MIC = .32), Disinhibition (α = .88; MIC = .37), and Anankastic (α = .84; MIC = .31).

EPQ-R (Eysenck et al., 1985)—The EPQ-R contains 100 questions that are answered *yes* or *no* and assess three personality domains: Psychoticism (α =.78; MIC = .11), Extraversion (α = .87; MIC = .23), and Neuroticism (α = .81; MIC = .26).

5-DPT (van Kampen, 2012)—The 5-DPT contains 100 questions that are answered *yes* or *no* and assess five personality domains: Neuroticism (α = .92; MIC = .38), Extraversion (α = .88; MIC = .27), Insensitivity (α = .84; MIC = .20), Orderliness (α = .86; MIC = .23), and Absorption (α = .88; MIC = .26).

Non-content based responding scale—A four -item scale was also administered to ensure that participants were paying attention to the content of the questionnaires. Each item describes a behavior that was very unlikely to be true (e.g., "I have not used a computer in the past 2 years"), thus the response suggests whether the individual is or is not attending to the item's content. The items are rated on a five-point Likert scale whose values range from 1 (*strongly disagree*) to 5 (*strongly agree*). Items were spaced throughout the questionnaire battery, and scored so that higher scores reflected less content-based responding. Participants with a total score ten or higher ($n = 15$) were eliminated from the dataset.

Results

Table 1 displays the correlations among the PiCD, the EPQ-R, and the 5-DPT. Because correlations as low as .12 would be statistically significant at $p < .05$ due to the large sample size, results are provided with respect to magnitude of effect size (Cohen, 1992).

Convergent correlations for the PiCD with the 5-DPT displayed large effect sizes, with absolute values ranging from $r = .54$ (PiCD Detachment with 5-DPT Extraversion) to $r = .78$ (PiCD Negative Affective with 5-DPT Neuroticism), and a median of $r = .56$. As expected, 5-DPT Orderliness correlated negatively with PiCD Disinhibition (as well as positively with PiCD Anankastic). Convergent correlations for the PiCD with the EPQ-R were medium to large, ranging from absolute values of $r = .48$ (PiCD Detachment with EPQ Extraversion) to $r = .78$ (PiCD Negative Affective with EPQ-R Neuroticism), and a median of $r = .53$. As expected, EPQ-R Psychoticism obtained large effect size relationships with both PiCD Dissocial and PiCD Disinhibition.

With respect to discriminant validity, there were no large effect size relationships for any correlations among the PiCD scales, although there were some medium effect size relationships (two each for PiCD Disinhibition and PiCD Negative Affective). Discriminant correlations among the PiCD scales ranged from $r = -.12$ (Detachment with Anankastic and Dissocial with Anankastic) to $r = .49$ (Dissocial with Disinhibition), with a median of $r = .22$.

There was only one medium effect size relationship for the discriminant validity relationship of the PiCD scales with the 5-DPT (PiCD Disinhibition with 5-DPT Insensitivity), with a median of $r = .18$. 5-DPT Absorption generally correlated weakly with all five PiCD scales, consistent with expectations. Comparable results were obtained with the EPQ-R, with only three discriminant validity relationship reaching medium effect sizes (PiCD Anankastic with EPQ-R Psychoticism, and PiCD Detachment and PiCD Disinhibition with EPQ-R Neuroticism), and a median of $r = .29$.

Table 2 provides an exploratory principal factor analysis with an oblique rotation of the relationships among the PiCD, the 5-DPT, and the EPQ-R scales. Parallel analysis (i.e., the number of eigenvalues from the actual data compared to mean eigenvalues generated by random data) was conducted in R statistical software (R Core Team, 2013) using the paran package (Dinno, 2012). Factor analysis was conducted in IBM SPSS Statistics (Version 23). A four-factor solution was suggested as being an optimal fit to the data (the first five eigenvalues were 3.936, 3.115, 1.849, 1.270, and 0.751). The first four factors explained

78% of the variance. Table 2 provides the pattern factor solution which emphasizes the unique contribution of each scale to a respective factor. Factor 1 is defined by 5-DPT Neuroticism, EPQ-R Neuroticism, and PiCD Negative Affective; Factor 2 by 5-DPT Extraversion, EPQ-R Extraversion, and PiCD Detachment; Factor 3 by 5-DPT Orderliness and PiCD Anankastic, with a negative loading by PiCD Disinhibition; and Factor 4 by PiCD Dissocial, 5-DPT Insensitivity, and EPQ-R Psychoticism, with secondary loadings by PiCD Detachment and PiCD Disinhibition. 5-DPT Absorption did not load on any factor, with its highest, albeit still weak, loading on the first factor.

Scale Validation: Study Two

Procedure

An additional sample was obtained for Validation Study 2. Data collection procedure and statistical methods, however, were otherwise identical to Study 1, with the addition of measures of maladaptive personality.

Participants

Three hundred and six potential participants were recruited and paid $1.50 for their time. Twenty were excluded due to total scores of 10 or above on the non-content based responding scale (described earlier), and one person was excluded for providing questionable responses (e.g., repeating the same answer numerous times), leaving a final sample of $N = 285$. These 285 participants ($M_{age} = 35.1$ years, $SD = 10.9$ years, 66% female) were 82% percent white/Caucasian, 6% black/African-American, 5% Hispanic/Latino, 5% Asian, and 2% other. Thirty-three percent were married, 37% single, 20% cohabiting, 7% divorced, and 2% widowed. All participants were currently receiving or had received mental health treatment at some point in the past: Thirty-eight percent currently, 7% within the last month, 25% within the past year, 17% within the past five years, 10% within the past ten years, and 2% longer than ten years ago.

Measures

The following measures were administered in order, following the demographic questionnaire. The same non-content based responding items from Study 1 were again dispersed evenly throughout the questionnaire battery.

PiCD—The PiCD again displayed good internal consistency for the five maladaptive personality scales, with moderate mean inter-item correlations (MICs): Negative Affective ($\alpha = .87$; MIC = .36), Detachment ($\alpha = .87$; MIC = .36), Dissocial ($\alpha = .87$; MIC = .37), Disinhibition ($\alpha = .89$; MIC = .40), and Anankastic ($\alpha = .84$; MIC = .31).

PID-5 (Krueger et al., 2012)—The PID-5 is a 220-item self-report questionnaire that was developed to assess the five proposed domains of maladaptive personality traits of the alternative model of personality disorder included in an appendix to the DSM-5. The items were rated on a scale from 1 (*very false or often false*) to 5 (*very true or often true*). Five maladaptive personality domains are assessed: Negative Affectivity ($\alpha = .93$; MIC = .37),

Detachment (α = .95; MIC = .45), Antagonism (α = .95; MIC = .45), Disinhibition (α = .94; MIC = .43), and Psychoticism (α = .97; MIC = .47).

CAT-PD-SF (Simms et al., 2011)—The CAT-PD-SF contains 216 items that are rated on a scale from 1 (*very untrue of me*) to 5 (*very true of me*). Five maladaptive personality domains are assessed: Negative Emotionality (α = .97; MIC = .31), Detachment (α = .92; MIC = .27), Antagonism (α = .97; MIC = .42), Disconstraint (α = .85; MIC = .11), and Psychoticism (α = .93; MIC = .37).

Results

Table 3 displays the correlations among the PiCD, PID-5, and CAT-PD-SF scales. Convergent correlations for the PiCD with the PID-5 were all large effect sizes, ranging from $r = .77$ (PiCD Dissocial with PID-5 Antagonism) to $r = .85$ (PiCD Disinhibition with PID-5 Disinhibition), and a median of $r = .80$. PiCD Anankastic converged negatively with PID-5 Disinhibition at a medium effect size. Large effect size convergent validity correlations were also obtained with the respective CAT-PD-SF scales (median $r = .75$), although convergence for PiCD Disinhibition with CAT-PD-SF Disconstraint was relatively lower ($r = .54$). PiCD Anankastic obtained a large effect size negative relationship with CAT-PD-SF Disconstraint.

With respect to discriminant validity within each measure, only one PiCD scale obtained a large effect size relationship with another PiCD scale (the negative correlation of PiCD Anankastic with PiCD Disinhibition was expected). PiCD Disinhibition obtained a large effect size relationship with PiCD Dissocial. However, in comparison, PID-5 Disinhibition and PID-5 Psychoticism both obtained large effect relationships with all four of the other PID-5 scales. CAT-PD-SF Disconstraint demonstrated consistently better discriminant validity than the PID-5, although CAT-PD-SF Psychoticism obtained large effect size relationships with two other CAT-PD-SF scales, and CAT-PD-SF Negative Emotionality obtained a large effect size relationship with CAT-PD-SF Detachment. Fisher's r to z transformations were used to evaluate average absolute value discriminant validity coefficients for each instrument. The average discriminant validity coefficient for the PiCD scales' relationships with one another was .29; the average discriminant validity for the CAT-PD-SF scales' relationships with one another was .38; for the PID-5 average discriminant validity was .52.

With respect to discriminant validity relationships of the PiCD scales with the other measures, all of the discriminant validity correlations were lower than the convergent with the PID-5. PiCD Negative Affective did obtain (marginally) large effect size relationships with three other PID-5 scales, as did PiCD Disinhibition with two other PID-5 scales (median PiCD/PID-5 discriminant $r = 37$). However, similar results were obtained for the relationship of the PID-5 with the CAT-PD-SF. In fact, PID-5 Disinhibition correlated significantly higher with CAT-PD-SF Negative Emotionality ($z = 4.21$, $p < .01$), CAT-PD-SF Antagonism ($z = 2.80$, $p < .01$), and CAT-PD-SF Psychoticism ($z = 3.83$, $p < .01$) than it did with CAT-PD-SF Disconstraint. CAT-PD-SF Psychoticism obtained large effect size relationships with three other PID-5 scales. No large effect size discriminant validity

relationships with CAT-PD-SF scales were obtained for PiCD Negative Affective, Detachment, Dissocial, or Anankastic (median PiCD/CAT-PD-SF discriminant $r = .25$). PiCD Disinhibition did obtain large effect size relationships with three CAT-PD-SF scales that were equal to its relationship with CAT-PD-SF Disconstraint. These relationships were not significantly greater than the relationship between PiCD Disinhibition and CAT-PD-SF Disconstraint ($z = 0.18$, $z = 1.25$, and $z = 0.92$).

Table 4 provides an exploratory principal factor analysis with an oblique rotation of the relationships among the PiCD, PID-5, and CAT-PD-SF scales. Parallel analysis suggested a four factor solution as the optimal fit to the data (the first five eigenvalues were 7.219, 2.468, 1.556, 1.314, and 0.594). The first four factors explained 84% of the variance. Table 4 provides the pattern factor solution. Factor 1 is defined primarily by PID-5 Antagonism, CAT-PD-SF Antagonism, and PiCD Dissocial, along with CAT-PD-SF Psychoticism (which obtained a comparable secondary loading on the fourth factor). Factor 2 is defined by the detachment scales of the PID-5, CAT-PD-SF, and PiCD. Factor 3 is defined by PID-5 Disinhibition, PiCD Disinhibition, CAT-PD-SF Disconstraint, along with PiCD Anankastic (in the opposite direction). Finally, Factor 4 is defined by PID-5 Negative Affectivity, PiCD Negative Affective, and CAT-PD-SF Negative Emotionality, along with PID-5 Psychoticism, which obtained a comparable loading on the first factor.

Although parallel analysis and eigenvalues supported a four-factor solution, there might be interest in observing the structure if a five-factor solution was extracted. Table 5 provides the pattern factor solution for a five-factor solution. Despite the forced extraction of an additional factor, the bipolar factor including PiCD Anankastic loading opposite to PiCD Disinhibition, PID-5 Disinhibition, and CAT-PD-SF Disconstraint remained. The only change that occurred was that the PID-5 and CAT-PD-SF Psychoticism scales defined their own separate factor, which is consistent with the hypothesis that they are not aligned with any PiCD scale.

Scale Validation: Study Three

Factor analyses informed the selection of items during the scale development. Study 3 provides an item-level factor analysis of the 60 PiCD items on the basis of the combined samples of Studies 1 and 2. This provides a stringent validation test of the PiCD because it involves new and independent data collections, rather than capitalizing on the item selection within the first three samples. The expected structure for the PiCD items is a four-factor model, as the anankastic traits are considered to be opposite to traits of disinhibition (Widiger & Simonsen, 2005). ESEM was used to assess the model fit for the hypothesized four-factor solution.

An exploratory structural equation model was conducted using Mplus 6.12 (Muthen & Muthen, 1998–2010) with oblique geomin rotation (Browne, 2001) of four factors. Three fit indices were examined to evaluate model fit: Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and Standardized Root Mean Square Residual (SRMR) fit indices. There is generally a range of values for what is considered to represent good fit: CFI values above either .90 or .95, SRMR values of less than .05, and RMSEA

values lower than .06, with adequate fit lower than .08, and marginal at less than .10 (Browne & Cudek, 1993; Hu & Bentler, 1999; Kline, 2005).

Procedure

For this study, data were combined across Validation Study 1 and Validation Study 2. Nineteen participants were excluded (due to matching IP addresses in the two data collections) so that the same persons would not participate more than once. This provided a combined sample of $N = 525$. ESEM of the PiCD was then conducted at the item level.

Results

Two of three fit indices indicated adequate-to-good fit for the model: RMSEA = .065 and SRMR = .047. CFI was less than adequate (0.779). CFI is, however, influenced by the number of variables included in the analysis (Kenny & McCoach, 2003), which was rather large in this case (i.e., 60). Table 6 displays the factor loadings for the four-factor solution. Ninety-three percent of the items performed as expected, obtaining their highest loading on their parent domain (with 90% of the items loading above .40 on their parent domain). Only four of the 60 items obtained results inconsistent with expectation: one item from Detachment, one item from Negative Affective, and two items from Disinhibition. It should be noted that these items had obtained good convergent and discriminant validity in the final scale construction analyses.

There might be some interest for what would have been obtained for a five-factor solution These results can be found in Supplemental Table S1. In that analysis, a fifth factor emerged consisting of three Negative Affective items, one Anankastic item, and one Detachment item separated from the original four factors. The bipolar factor of Anankastic and Disinhibition items remained.

Discussion

A substantial amount of research on the dimensional trait proposal for DSM-5 (APA, 2013) has been published (Bagby, 2013; Krueger & Markon, 2014), facilitated in part by the availability of a self-report measure (Krueger et al., 2012). In contrast, there has been relatively little research on the dimensional trait proposal for ICD-11 (International Advisory Group for the Revision of ICD-10, 2011). This is perhaps due in part to greater interest in the DSM-5 dimensional trait model relative to the ICD-11 proposal. However, the ICD-11 proposal concerns the authoritative nomenclature used by the 194 Member States of the WHO. Every mental health agency within the United States uses the DSM-5, but most every mental health agency within much of the rest of the world uses the ICD. By international treaty, the WHO is responsible, through the ICD-11, to provide the authoritative nomenclature to be used by all of its member countries (First, Reed, Hyman, & Saxena, 2015). Even the diagnostic manual of the United States would need to be consistent with ICD-11 (Frances, First, & Pincus, 1995). The ICD-11 proposal does perhaps warrant increased attention given its international authority and recognition, and this attention would be facilitated by an available self-report measure for its assessment. The current study

provided the development of and initial validation for a self-report measure, the PiCD, for the ICD-11 dimensional trait proposal.

In addition, it is also worth noting that the proposals for ICD-11 are in some regards more extensive than the final proposals that were made for DSM-5. “A radical change in the classification of personality disorder has been proposed for ICD-11” (Tyrer et al., 2015, p. 721). DSM-5 Section III includes the five-domain dimensional trait model, but this dimensional trait model is not being recommended as a replacement for the traditional diagnostic categories (Tyrer, 2012, 2014). Researchers and clinicians diagnosing personality disorders from the perspective of DSM-5 Section III would still be diagnosing six of the traditional personality syndromes (i.e., borderline, schizotypal, antisocial, obsessive-compulsive, avoidant, and narcissistic). The only time in which a clinician would describe a patient in terms of the five DSM-5 Section III domains of negative affectivity, detachment, antagonism, disinhibition, and psychoticism (along with perhaps the underlying traits) is when the patient fails to meet criteria for one of the six traditional syndromes. The traits within the dimensional model are simply part of the diagnostic criteria for the six traditional categories and they do not even provide all of the necessary features. Also included are deficits in the sense of self and interpersonal relatedness considered to be additional diagnostic criteria that are independent of the maladaptive personality traits (Skodol, 2012). In stark contrast, the ICD-11 proposal excludes all of the ICD-10 personality syndromes (comparable to the DSM-IV syndromes) and replaces them with the five broad domains of negative affective, detachment, dissocial, disinhibition, and anankastic. “The proposed ICD-11 classification abolishes all type-specific categories of personality disorder” (Tyrer et al., 2015, p. 721). In this regard, the ICD-11 proposal may indeed represent a paradigm shift in how personality disorders are conceptualized and diagnosed within the next edition of the ICD (Krueger, 2016; Tyrer, 2014).

PiCD, ICD-11 Trait Model, and General Personality

The DSM-5 trait model is aligned with the five-factor model of general personality structure and the Personality Psychopathology Five (Harkness, McNulty, & Ben-Porath, 1995). As expressed in DSM-5, “these five broad domains are maladaptive variants of the five domains of the extensively validated and replicated personality model known as the ‘Big Five’ or Five Factor Model [FFM] of personality and are also similar to the domains of the Personality Psychopathology Five (PSY-5)” (APA, 2013, p. 773). There is indeed empirical support for this alignment with both the FFM (e.g., De Fruyt et al., 2013; Gore & Widiger, 2013; Griffin & Samuel, 2014; Thomas et al., 2013; Wright & Simms, 2014) and the PSY-5 (Anderson et al., 2013; Harkness, Finn, McNulty, & Shields, 2012; Watson, Stasik, & Clark, 2013). These findings are consistent with the broader view that the DSM-5 Section II personality disorders can be understood as extreme and/or maladaptive variants of general personality structure (Clark, 2007; Widiger & Costa, 1994).

The current study similarly explored the relationship of the PiCD traits with dimensional models of general personality, albeit the European models of Eysenck (Eysenck & Eysenck, 1985), as assessed by the EPQ-R (Eysenck et al., 1985), and van Kampen (2009), as assessed by the 5-DPT (van Kampen, 2012). Eysenck and Eysenck (1978) had indeed

argued as well quite some time ago that personality disorders should be considered maladaptive variants of general personality. “The concept of personality disorders is not seen as a categorical diagnosis but as behavior characterized by the confluence of three major dimensions of personality” (Eysenck, 1987, p. 215).

Two of the three domains of Eysenck’s (1987) dimensional trait model align closely with two domains of the FFM. Neuroticism, for Eysenck, is the disposition to be anxious, depressed, guilty, tense, shy, moody, and emotional; extraversion is the disposition to be sociable, lively, active, assertive, sensation-seeking, carefree, dominant, surgent, and venturesome. Costa and McCrae (1980) had aligned their FFM domains of neuroticism and extraversion closely with these respective domains of Eysenck and Eysenck (1978). Psychoticism, however, has long been a problematic domain of Eysenck’s model (Zuckerman, Kulman, & Camac, 1988; van Kampen, 2009). It is not at all aligned with psychoticism as assessed within the PSY-5 (Harkness et al., 1995) or within the DSM-5 dimensional trait model. Psychoticism for Eysenck (1987) is the disposition to be aggressive, cold, egocentric, impersonal, impulsive, creative, nonconformist, unempathic, independent, reckless, and tough-minded. The current study obtained support for the convergent and discriminant validity of the relationship of the PiCD with the EPQ-R. The convergence did not always achieve large effect size relationships, but this is to be expected for the convergence of maladaptive to normal personality traits, and is consistent with previous research relating the PID-5 and other personality disorder measures to the normal personality traits of the FFM (Saulsman & Page, 2004).

The 5-DPT is an extension of the original three-dimensional trait model of Eysenck (van Kampen, 2009). The dimensions of neuroticism and extraversion were retained, but psychoticism was dismantled and revised into dimensions of insensitivity and orderliness, as well as adding a dimension of absorption (van Kampen, 2009) that was included within Tellegen’s (1993) measure of general personality structure. The 5-DPT is a “theory-based revision of Eysenck’s PEN model” (van Kampen, 2009, p. 9), in which there is a “replacement of P by three orthogonal and theory-based factors, Insensitivity (S), Orderliness (G), and Absorption (A)” (p. 9), Consistent with this understanding, 5-DPT Neuroticism and Extraversion converged strongly with EPQ-R Neuroticism and Extraversion, respectively; 5-DPT Insensitivity and Orderliness converged with EPQ-R Psychoticism; and 5-DPT Absorption was uncorrelated with all three EPQ-R scales.

The 5-DPT is also aligned with the FFM. “The 5-DPT model, although embracing Eysenck’s theory-informed methodology rather than the lexical approach advocated by, among others, Saucier and Goldberg (1996), can be said to conform, at least to some extent, to the Big Five/FFM model” (van Kampen, 2012, p. 93). 5-DPT Neuroticism, Extraversion, Insensitivity, Orderliness, and Absorption align conceptually and empirically with FFM neuroticism, extraversion, antagonism, conscientiousness, and openness, respectively (van Kampen, 2012). In the current study, the PiCD aligned with the 5-DPT in a manner consistent with the relationship of the PID-5 with the FFM (Krueger & Markon, 2014). One of the more controversial issues for the alignment of the PID-5 with the FFM is the inconsistent and/or weak alignment of PID-5 Psychoticism with FFM openness (Gore & Widiger, 2013; Watson, Clark, & Chmielewski, 2008). The ICD-11 trait proposal, however,

does not include a domain of psychoticism and, consistent with its absence, 5-DPT Absorption was uncorrelated with all five PiCD scales. Joint factor analysis of the PiCD, EPQ-R, and 5-DPT confirmed the expected structural relationship of these respective abnormal and normal personality scales, with EPQ-R Psychoticism loading on both the dissocial and disinhibition factors and 5-DPT Absorption not loading appreciably on any one of the four factors.

PiCD, ICD-11 Trait Model, and Maladaptive Personality

The current study also investigated the relationship of the PiCD with two measures that are closely aligned with the DSM-5 dimensional trait model, the PID-5 (Krueger et al., 2012) and the CAT-PD-SF (Simms et al., 2011). Neither the PID-5 nor the CAT-PD-SF include a domain scale that would align in a positive direction with PiCD Anankastic. Consistent with expectations, PiCD Anankastic correlated negatively with PID-5 Disinhibition and CAT-PD-SF Disconstraint, as these constructs do appear to represent opposite poles of the same domain (Skodol, 2012; Widiger & Simonsen, 2005).

It is worth noting that a compulsivity domain was included within the initial version of the DSM-5 dimensional trait model (Clark & Krueger, 2011) but was deleted in the course of a reduction of the model through factor analysis (Krueger et al., 2012). Compulsivity, however, is one of the four fundamental domains included within Livesley's (2011-a) four-domain model of personality pathology (the other three being emotional dysregulation, dissocial behavior, and inhibitedness, which align in theory with ICD-11 negative affective, dissocial, and detachment, respectively). The domain of compulsivity appears to be necessary to account for the traits of the obsessive-compulsive personality disorder (Bagby, Marshall, & Georgiades, 2005; Livesley, 2011-a) and research has indeed raised concerns with respect to the coverage of obsessive-compulsive personality disorder by the PID-5 (Bagby, 2016; Crego, Samuel, & Widiger, 2015; Rojas & Widiger, in press).

On the other hand, the ICD-11 trait model and PiCD inventory do not include psychoticism, consistent with the fact that the ICD has never included schizotypal within the personality disorders section of the diagnostic manual (WHO, 1992). One might then expect that PID-5 and CAT-PD-SF Psychoticism would not correlate with any PiCD scale, consistent with the results obtained for 5-DPT Absorption. However, a potential problem with discriminant validity of this construct and/or its assessment (discussed further below) was evidenced by the finding that PID-5 and CAT-PD-SF Psychoticism obtained medium to large effect size relationships with four of the five PiCD scales (the one exception being Anankastic).

The present study and prior research have suggested concerns with respect to the discriminant validity of the PID-5 (Al-Dajani, Gralnick, & Bagby, 2016; Crego, Gore, Rojas, & Widiger, 2015; Quilty, Ayearst, Chmielewski, Pollock, & Bagby, 2013; Watson et al., 2013). These results could represent an unavoidable reflection of a general factor of impairment that is common to all maladaptive personality trait scales (Krueger et al., 2012; Quilty et al., 2013). It is also apparent that the assessment of the psychoticism domain (not included within the PiCD) is problematic for the CAT-PD-SF, as well as the PID-5, with respect to discriminant validity. However, it may also be the case that relatively more

attention was given to discriminant validity in the construction of the CAT-PD-SF and PiCD inventories.

The current study included an ESEM of the 60 items of the PiCD. Ninety-three percent of the PiCD items obtained their primary loading on their parent domain. Perfect simple structure is difficult to obtain for multiscale personality inventories (Hopwood & Donnellan, 2010; Marsh et al., 2014). An item factor analysis has not been provided for comparable measures, such as the PID-5 (Krueger et al., 2012) or CAT-PD (Simms et al., 2011). It will be useful for future research to further explore the extent and basis for scale and item discriminant validity obtained by the PiCD, CAT-PD-SF, and PID-5. Discriminant validity, though, may not have received emphasis in the construction of the PID-5 domain scales, perhaps even with an explicit and understandable intention to include important scales that would likely occupy interstitial space (Krueger et al., 2012). However, a purported strength of the dimensional trait model relative to the DSM-IV diagnostic categories has been discriminant validity (Clark, 2007; Krueger & Eaton, 2010; Widiger & Trull, 2007). A primary reason for the proposed deletion of DSM-IV diagnostic categories (and a shift toward a dimensional model) has been excessive diagnostic co-occurrence and inadequate discriminant validity (Skodol, 2012). If the dimensional trait model is to ultimately replace the diagnostic categories (rather than simply reproduce them), a purported advantage or strength of this shift would be an improvement in discriminant validity (Crego et al., 2015).

Structural Model for the PiCD and ICD-11 Traits

A four-factor solution was the expected structure for the PiCD, even though the ICD-11 proposal includes five domains. Perhaps one might have expected a five-factor model, given the presence of five, apparently independent, domains within the ICD-11 trait model. The initial DSM-5 dimensional trait model proposal was for six domains, including comparable domains of compulsivity and disinhibition (Clark & Krueger, 2010; Skodol, 2012). The initial version of this proposal did indeed appear to suggest that compulsivity and disinhibition would not be considered opposite poles of the same domain, representing instead separate, independent domains (Clark & Krueger, 2010; Krueger et al., 2011). Consistent with this understanding, disinhibition was said to be negatively related to FFM conscientiousness whereas compulsivity was said to be independent of conscientiousness (Clark & Krueger, 2010; Krueger et al., 2011). However, this is not the understanding or expectation of the ICD-11 WGR-PD. As expressed by Mulder et al. (2016), all five domains of the ICD-11 proposal are considered to be aligned with the FFM: “Negative Affective with neuroticism, Detachment with low extraversion, Dissocial with low agreeableness, Disinhibited with low conscientiousness and Anankastic with high conscientiousness” (p. 85). From this perspective, disinhibition and anankastic would be opposite to one another. Consistent with this expectation of Mulder et al., the current study indeed found that PiCD Anankastic and Disinhibition correlated in opposite directions with 5DPT Orderliness, and within the joint factor analysis of the PiCD, 5DPT, and EPQ-R scales, PiCD Anankastic and Disinhibition loaded in opposite directions on the same factor.

There is also a considerable body of empirical support for considering compulsivity (or anankastic) traits to be opposite to traits of disinhibition (Widiger & Simonsen, 2005). These

traits routinely appear opposite to one another in current trait models. For example, the 12 scales within the Schedule for Nonadaptive and Adaptive Personality (SNAP; Clark, 1993) are organized into three domains: negative affectivity, positive affectivity, and constraint. The three scales within constraint define a bipolar domain, including Propriety and Workaholism loading positively and Impulsivity loading negatively. This SNAP bipolarity has been replicated in many subsequent factor analytic studies (e.g., Markon et al., 2005; Watson et al., 2008). The CAT-PD (Simms et al., 2011) includes a domain of disconstraint, with Irresponsibility, Nonplanfulness, and Non-Perseverance loading positively and compulsivity (or anankastic) scales of Perfectionism, Rigidity, and Workaholism loading negatively (Wright & Simms, 2014). Even within the DSM-5 dimensional trait research, the anankastic (compulsivity) trait of rigid perfectionism has typically loaded negatively within the disinhibition domain (e.g., Anderson et al., 2012; Crego & Widiger, in press; De Fruyt et al., 2012; Thomas et al., 2012; Wright & Simms, 2014).

Perhaps then the ICD-11 trait model should be revised to a four domain model, with anankastic and disinhibition defining opposite poles of the same domain, as suggested by Widiger and Simonsen (2005), and consistent with the SNAP, CAT-PD, and PID-5 research. However, there are compelling reasons for the existing presentation of the five domains. One of the consistent arguments against a dimensional trait model has been its potential complexity (First, 2005). Having four domains be unipolar with respect to maladaptive functioning and one be bipolar is inconsistent in structure and perhaps unnecessarily confusing. Ease of communication and understanding for clinicians throughout the world, including third-world countries, is a major point of emphasis in the development of ICD-11 (First et al., 2015; Reed, 2010). Some clinicians unfamiliar with dimensional trait models might even interpret the bipolarity of a disinhibition-compulsivity domain in a manner consistent with the more common clinical understanding of the term “bipolarity,” as if the model is suggesting that persons cycle or fluctuate between the two poles. In any case, the avoidance of any unnecessary complexity is a priority for ICD-11 (Reed, 2010).

The five domains of the ICD-11 trait model proposal are also consistent with the clinical tradition of simply listing the primary variants of personality disorder with no presumption of a particular structural relationship. No structural organization has ever been provided for the ICD-10 personality syndromes (WHO, 1992). The DSM-III personality disorders, in contrast, were organized within three clusters that has continued into DSM-5, albeit this organization was not empirically based (Millon, 1981). There is a considerable body of research to indicate that the ICD-10 (and DSM-IV) personality syndromes can be understood within a structural model (e.g., schizoid as opposite to histrionic), but an empirically-based structural model for these syndromes would not be consistent with the existing three clusters (Sheets & Craighead, 2007). In sum, ease of clinical understanding, usage, and tradition support the ICD-11 trait model presentation.

In contrast, consistency with a particular structural model has been a point of emphasis for the DSM-5 trait model (Krueger et al., 2011). It is unclear, however, how the model would have been presented and understood if the originally proposed domain of compulsivity had been retained. In the final version of the trait model, “there are healthy, adaptive, and resilient personality traits identified as opposite of these traits … (i.e., Emotional Stability,

Extraversion, Agreeableness, Conscientiousness, and Lucidity)" (APA, 2013, p. 773). If compulsivity continued to be considered independent of disinhibition (and conscientiousness), its normal variant might have been difficult to conceptualize. In addition, although Clark and Krueger (2010) and Krueger et al. (2011) had originally suggested that disinhibition and compulsivity were independent of one another, Krueger et al. (2012) subsequently located the original DSM-5 compulsivity traits of orderliness, rigidity, risk aversion, and perfectionism as being opposite to the disinhibition traits of distractibility, impulsivity, irresponsibility, and recklessness within the revised, five-domain version of the model. In sum, the DSM-5 Personality Disorders Work Group might have recognized the bipolar structure, although still keeping the domains independent within the presentation of the model. Indeed, the Chair of the DSM-5 Personality Disorders Work Group had always understood the DSM-5 compulsivity and disinhibition domains to be opposite to one another, stating that the original six domains consisted of "negative affectivity, detachment, antagonism, *disinhibition versus compulsivity*, and psychoticism" (Skodol, 2012, p. 327, our emphasis).

Conclusions, Limitations, and Future Directions

In sum, the results of the current study provide support for the validity of a self-report measure for the five-domain maladaptive trait model proposed for ICD-11, with two of the domains representing opposite poles of the same higher-order domain (Mulder et al., 2016; Tyrer et al., 2014). If this proposal is ultimately approved, it would represent a major shift in the conceptualization and assessment of personality disorder (Krueger, 2016; Livesley, 2011-b; Tyrer, 2012, 2014; Widiger & Oltmanns, 2016). However, the DSM-5 dimensional trait model was met with considerable opposition (e.g., Clarkin & Huprich, 2011; Gunderson, 2010, 2013; Shedler et al., 2010) and was eventually rejected and relegated to Section III of DSM-5 for emerging measures and models (APA, 2013; Krueger, 2013). There is similar opposition to the ICD-11 trait model proposal (e.g., Bateman, 2011; Davidson, 2011; Gunderson & Zanarini, 2011), and it may then indeed meet the same fate. However, the relegation of the DSM-5 trait model proposal to Section III does not appear to have hindered research interest (Bagby, 2013; Krueger & Markon, 2014), facilitated in part by the availability of the PID-5 self-report measure. The availability of a self-report measure of the ICD-11 trait model proposal may also be useful in obtaining further empirical support for this proposal.

A potential limitation of the PiCD, and the ICD-11 dimensional trait model proposal, is the absence of lower-order trait scales. The lower-order traits can be particularly important when covering and describing personality disorder syndromes (Reynolds & Clark, 2001; Samuel & Widiger, 2008). However, it was the judgment of the ICD-11 WGR-PD that their inclusion would provide an unnecessary complexity (Mulder et al., 2011; Tyrer et al., 2011). As noted earlier, one of the common criticisms of dimensional trait models has been their potential complexity (First, 2005), which contributed in part to the decision to reduce the DSM-5 trait model from 37 traits to 25 (Krueger et al., 2012).

A limitation of the current study was the confinement of the measures to self-report inventories. There is as yet no semi-structured interview for the DSM-5 dimensional trait

model and much of this research has itself been confined to self-report inventories. Nevertheless, some studies have included structured and/or unstructured clinical interviews (e.g., Morey et al., 2015). It would be important for future research concerning the PiCD to also consider its relationship across methods of assessment. Of particular interest would be its relationship to the PAS (Tyrer et al., 1979), which assesses closely related constructs (Tyrer et al., 2014).

The present study was conducted using items that screened for non-content based responding. However, future research should also utilize validity scales, especially in clinical contexts. These validity scales would have the capacity to detect non-credible over-reporting and under-reporting responding (whether intentional or unintentional), as such responding has the potential to invalidate the scores on the substantive trait scales. The present study was focused on developing a valid self-report measurement for the proposed trait domains of the ICD-11, and validity scales were not within the scope of this aim. Concerns have been raised with respect to the absence of validity scales for the PID-5 (e.g., Dhillon, Kushner, Burchett, & Bagby, in press; McGee Ng et al., 2016). Such concerns would apply to the PiCD as well.

An additional potential limitation was sampling participants solely from MTurk. The current study sampled persons who have or had been within mental health treatment (two thirds of whom were currently or within the past year in mental health treatment). However, internet data collection provides less control over research participation than would be available in a face-to-face context. On the other hand, there has been extensive research concerning the MTurk site and the results have indicated that MTurk data quality is at least equal to the results obtained through more common methods of data collection (Chandler & Shapiro, 2016; Gosling & Mason, 2015). It would clearly be useful though to confirm and extend the current findings within other populations including face-to-face community, student, and other clinical populations.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Public significance

The purpose of the present study was to develop and validate a self-report measure of the personality disorder trait model proposed for the World Health Organization's International Classification of Diseases (ICD-11). Three studies addressed the convergent and discriminant validity of the PiCD with respect to other normal and abnormal personality trait measures, as well as its factor structure.

Table 1

Study 1 Descriptive Statistics and Correlations Among the PiCD, EPQ-R, and 5-DPT Scales

Scale	*M*	*SD*	PiCD NA	PiCD DT	PiCD DL	PiCD DN	PiCD AN	5DPT N	5DPT E	5DPT S	5DPT G	5DPT A	EPQ P	EPQ E
PiCD NA	38.83	9.87												
PiCD DT	33.73	9.59	.48											
PiCD DL	26.98	8.44	.20	.22										
PiCD DN	29.49	9.39	.40	.32	.49									
PiCD AN	39.70	8.28	.15	.12	−.12	−.48								
5-DPT N	12.83	6.01	**.78**	.32	.02	.29	.09							
5-DPT E	7.91	5.27	−.29	**−.54**	.23	.08	−.09	−.28						
5-DPT S	8.34	4.67	.34	.30	**.56**	.43	−.12	.33	.09					
5-DPT G	13.08	4.89	−.03	−.01	−.15	**−.61**	**.67**	−.02	−.08	−.06				
5-DPT A	9.81	5.29	.30	.17	.19	.23	.07	.26	.19	.30	.02			
EPQ P	8.08	4.63	.16	.27	**.53**	**.57**	−.48	.03	.04	.43	−.48	.14		
EPQ E	8.51	5.52	−.23	−.48	.34	.21	−.19	−.23	**.89**	.19	−.15	.19	.16	
EPQ N	16.54	5.81	**.78**	.30	.09	.33	.05	**.89**	−.23	.37	−.05	.30	.07	−.15

Note. N = 259; PiCD = Personality Inventory for ICD-11; 5-DPT = 5-Dimensional Personality Test (van Kampen, 2012); EPQ = Eysenck Personality Questionnaire-Revised (Eysenck et al., 1985); NA = Negative Affective; DT = Detachment; DL = Dissocial; AN = Anankastic; DN = Disinhibition; N = Neuroticism; E = Extraversion; S = Insensitivity; G = Orderliness; A = Absorption; P = Psychoticism. Large effect size correlations (> |.50|; Cohen, 1992) in bold.

Table 2

Study 1 Joint Factor Analysis of the PiCD, the 5-DPT, and the EPQ-R Scales

	Factor			
Scale	**1**	**2**	**3**	**4**
5-DPT Neuroticism	**.97**	−.07	−.04	−.15
EPQ-R Neuroticism	**.96**	−.01	−.06	−.09
PiCD Negative Affective	**.76**	−.18	.02	.15
5-DPT Absorption	*.30*	.19	.09	.25
5-DPT Extraversion	−.07	**.92**	.01	.09
EPQ-R Extraversion	−.03	**.90**	−.08	.18
PiCD Detachment	.11	**−.62**	.06	**.48**
5-DPT Orderliness	−.07	−.02	**.88**	.07
PiCD Anankastic	.07	−.06	**.81**	.04
PiCD Disinhibition	.26	.02	**−.58**	.39
PiCD Dissocial	−.10	.11	−.02	**.81**
5-DPT Insensitivity	.22	.06	.00	**.61**
EPQ-R Psychoticism	−.10	−.09	**−.46**	**.57**

Note. N = 259; PiCD = Personality Inventory for ICD-11, 5-DPT = 5-Dimensional Personality Test (van Kampen, 2012), EPQ-R = Eysenck Personality Questionnaire-Revised (Eysenck et al., 1985). Loadings ≥|.40| in bold. Loadings ≥ |.30| in italics.

Table 3

Study 2 Descriptive Statistics and Correlations Among the PiCD, the PID-5, and the CAT-PD-SF Scales

Scale	*M*	*SD*	PiCD NA	PiCD DT	PiCD DL	PiCD DN	PiCD AN	PID5 NA	PID5 DT	PID5 A	PID5 DN	PID5 P	CAT NE	CAT DT	CAT A	CAT DC
PiCD NA	39.28	9.34														
PiCD DT	34.11	10.03	.39													
PiCD DL	27.15	9.42	.21	.26												
PiCD DN	29.39	9.89	.44	.30	**.58**											
PiCD AN	40.54	8.47	−.03	.05	−.20	**−.50**										
PID-5 NA	69.54	19.48	**.81**	.28	.18	.43	−.11									
PID-5 DT	66.73	21.99	**.51**	**.80**	.23	.36	−.12	.44								
PID-5 A	45.83	18.12	.21	.22	**.77**	**.59**	−.30	.27	.26							
PID-5 DN	52.75	18.86	**.52**	.37	**.52**	**.85**	−.46	**.59**	**.50**	**.60**						
PID-5 P	80.42	30.90	**.54**	.41	.49	**.62**	−.28	**.57**	**.50**	**.60**	**.75**					
CAT NE	174.48	49.49	**.75**	.46	.26	**.53**	−.24	**.80**	**.66**	.34	**.72**	**.71**				
CAT DT	88.45	22.48	.37	**.75**	−.02	.12	−.01	.28	**.85**	−.04	.25	.27	**.51**			
CAT A	92.40	35.91	.24	.35	**.78**	**.61**	−.32	.28	.41	**.83**	**.67**	**.62**	.48	.14		
CAT DC	117.87	19.89	.19	.10	.12	**.54**	**−.64**	.16	.18	.19	**.52**	.30	.31	.10	.17	
CAT P	52.52	18.70	.47	.38	.49	**.59**	−.25	**.51**	.48	**.59**	**.71**	**.90**	**.70**	.23	**.68**	.25

Note. N = 285; PiCD = Personality Inventory for ICD-11; PID-5 = Personality Inventory for DSM-5 (Krueger et al., 2012), CAT = Computerized Adaptive Test - Personality Disorders-Static Form (Simms et al., 2011). NA = Negative Affective or Negative Affectivity, DT = Detachment, DL = Dissocial, AN = Anankastic, DN = Disinhibition, A = Antagonism, P = Psychoticism, NE = Negative Emotionality, DC = Disconstraint. Large effect size correlations (≥ |.50|) in bold.

Table 4

Study 2 Joint Factor Analysis of the PiCD, PID-5, and CAT-PD-SF Scales

	Factor			
Scale	**1**	**2**	**3**	**4**
PID-5 Antagonism	**.90**	−.06	−.02	.00
CAT Antagonism	**.90**	.12	−.02	−.03
PiCD Dissocial	**.88**	.00	.04	−.08
CAT Psychoticism	**.51**	.08	−.06	**.42**
CAT Detachment	−.21	**.98**	−.03	−.02
PID-5 Detachment	.08	**.86**	−.04	.11
PiCD Detachment	.17	**.82**	.08	−.03
PiCD Anankastic	−.07	.05	**.77**	.10
PID-5 Disinhibition	*.38*	.07	**−.42**	*.39*
PiCD Disinhibition	**.42**	.00	**−.47**	.23
CAT Disconstraint	−.14	.04	**−.89**	.01
PID-5 Negative Affect	−.05	−.09	.05	**.98**
PiCD Negative Affective	−.07	.08	.05	**.84**
CAT Negative Emotionality	.04	.22	−.12	**.75**
PID-5 Psychoticism	**.46**	.09	−.10	**.48**

Note. $N = 285$; PiCD = Personality Inventory for ICD-11, PID-5 = Personality Inventory for DSM-5 (Krueger et al., 2012), CAT-PD-SF = Computerized Adaptive Test - Personality Disorders-Static Form (Simms et al., 2011). Loadings ≥ |.40| in bold. Loadings ≥ |.30| in italics.

Table 5

Study 2 Five-Factor Solution for the PiCD, PID-5, and CAT-PD-SF Scales

	Factor				
Scale	**1**	**2**	**3**	**4**	**5**
CAT Psychoticism	**1.00**	.00	.02	−.02	.02
PID-5 Psychoticism	***.73***	.04	−.06	.15	.09
CAT Detachment	−.01	***.97***	−.03	−.02	−.19
PID-5 Detachment	.05	***.86***	−.05	.09	.07
PiCD Detachment	.00	***.82***	.08	−.02	.17
PiCD Anankastic	−.04	.05	***.76***	.11	−.05
PID-5 Disinhibition	.18	.07	***−.42***	.33	.31
PiCD Disinhibition	.00	.02	***−.49***	.26	***.44***
CAT Disconstraint	−.03	.04	***−.87***	.02	−.11
PID-5 Negative Affectivity	.06	−.08	.04	***.95***	−.02
PiCD Negative Affective	−.04	.09	.04	***.87***	.01
CAT Negative Emotionality	.33	.21	−.11	***.57***	−.08
PiCD Dissocial	−.07	.02	.03	.02	***.93***
PID-5 Antagonism	.16	−.06	−.03	−.01	***.80***
CAT Antagonism	.23	.12	−.02	−.07	***.75***

Note. N = 285; PiCD = Personality Inventory for ICD-11, PID-5 = Personality Inventory for DSM-5 (Krueger et al., 2012), CAT-PD-SF = Computerized Adaptive Test - Personality Disorders-Static Form (Simms et al., 2011). Loadings ≥ |.40| in bold. Loadings ≥ |.30| in italics.

Table 6

Study 3 Exploratory Structural Equation Model of the PiCD

	Factor			
Item	**1**	**2**	**3**	**4**
AN9	**.76**	.06	.13	.05
AN3	**.72**	−.03	.17	−.16
AN12	**.72**	.04	.10	−.02
AN11	**.65**	−.08	.24	.09
AN5	**.59**	−.04	.25	.06
AN7	**.58**	*.39*	−.04	.11
DN1	**−.56**	.28	−.08	*.30*
DN10	**−.55**	.32	.01	.28
AN4	**.54**	*.39*	−.03	.16
DN4	**−.52**	*.36*	.04	.29
DN7	**−.51**	*.38*	.01	.14
AN1	**.50**	*.36*	−.08	.26
AN6	**.48**	.01	.26	−.24
DN3	**−.46**	−.09	.24	.10
AN8	**.45**	.00	.08	.18
AN10	**.44**	.10	−.18	.14
AN2	**.44**	−.06	.29	.09
DN2	**−.43**	.16	.20	.05
DN6	**−.43**	.00	.14	.18
DN12	**−.42**	.08	.20	.04
DN11	*−.37*	.26	.08	.15
DN9	*−.35*	.08	.18	−.14
DL10	.07	**.66**	−.03	.00
DL3	.16	**.64**	−.17	−.12
DL9	−.08	**.63**	.10	.03
DL4	.17	**.62**	−.05	.00
DL11	.02	**.60**	*.34*	*−.32*
DL12	−.04	**.59**	−.04	.06
DL7	−.04	**.59**	.20	.02
DL6	.07	**.57**	−.11	.10
DL8	−.07	**.51**	*.33*	−.23
DL2	−.02	**.51**	*.34*	−.15
DL5	−.06	**.49**	.24	−.22
DL1	−.11	**.42**	.07	.13
DN5	−.10	*.34*	*.30*	.04
DN8	−.20	.28	.20	.11
DT9	.04	−.18	**.75**	.00
DT3	.10	−.26	**.71**	.08

	Factor			
Item	**1**	**2**	**3**	**4**
DT7	−.07	.08	**.70**	.06
DT12	.04	−.24	**.67**	.21
DT2	.04	.22	**.62**	−.17
DT6	.11	−.05	**.60**	.20
DT1	−.03	−.02	**.59**	.17
DT4	−.09	.12	**.58**	.01
DT8	−.10	.06	**.56**	−.06
DT10	−.08	.16	**.54**	.04
DT11	−.06	*.33*	**.52**	*−.32*
NA6	−.08	.17	.18	.13
NA4	.07	−.01	.19	**.69**
NA1	.04	.01	.10	**.68**
NA9	−.12	.14	−.02	**.62**
NA2	.15	.09	.16	**.60**
NA3	−.13	.16	.02	**.60**
NA5	−.05	−.02	.20	**.59**
NA10	.00	.02	.20	**.59**
NA7	.03	−.10	*.30*	**.56**
NA12	−.16	.22	.07	**.56**
DT5	.12	.16	*.31*	**−.45**
NA11	−.04	.04	*.38*	**.43**
NA8	.00	−.06	.12	**.43**

Note. N=525. AN=Anankastic, DN=Disinhibition, DT=Detachment, DL=Dissocial, NA=Negative Affective. Loadings ≥ |.40| in bold. Loadings ≥ |.30| in italics.