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Abstract

Historically, personality disorders have been conceptualized as qualitatively distinct clinical syndromes, based on operational criteria. Consistent with this model, ten distinct set personality disorder criteria are outlined in the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (American Psychiatric Association, 2013*)*. However, debate persists about the clinical utility of this categorical model, with many (Krueger, et al.) researchers supporting a dimensional model that focuses on pathological levels of normative personality traits.

An exploratory factor analysis (De Fruyt et al., 2013) of the *NEO Personality Inventory-3* (NEO-PI-3; Costa & McCrae, 2010) and *The Personality Inventory for DSM-5* (PID-5; Krueger, Derringer, Markon, Watson, & Skodol, 2012), suggests that normative and pathological personality traits may fall under the same common set of domains: negative affectivity-neuroticism, extraversion-detachment, openness-psychoticism, antagonism-agreeableness, and conscientious-disinhibition. The purpose of this study was to further explore the relationship between normative and pathological personality traits and to test the De Fruyt et al. model by conducting a conjoint confirmatory factor analysis (CFA) of the NEO-PI-3 and PID-5. It was hypothesized that the PID-5 and NEO-PI-3 share the same underlying factor structure. Using mPlus, the model was tested in a sample of 306 undergraduate students at a private Midwestern university. Fit indices suggested a poor fit between the CFA model and the sample data, meaning the CFA model was not adequate. Subsequently, an exploratory principle component analysis was conducted, and results revealed that 42 facets loaded on to a 5-factor model and accounted for 58.26% of the variance. More research needs to be conducted to understand the relationship between the NEO-PI-3 and PID-5, which is important, as they are consistently used to diagnose and aid in treatment of individuals with personality disorders.

Acknowledgements

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Introduction

Personality disorders (PD) are characterized by consistent maladaptive ways of behaving, thinking, and experiencing the world. Approximately nine percent of the population are diagnosed with a personality disorder (Lenzenweger, Lane, Loranger, & Kessler, 2007). According to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5; American Psychiatric Association, 2013*)*, there are currently ten PDs: paranoid, schizoid, schizotypal, antisocial, borderline, histrionic, narcissistic, avoidant, dependent, and obsessive-compulsive. Common symptoms include an aversion to relationships, perceptual distortions, paranoia, manipulation of others, and extreme emotional instability. Individuals diagnosed with a PD often have severe difficulties with properly functioning in life, such as in a work-place environment or maintaining healthy social relationships. If the PD is left untreated, these individuals have distressing lives and are often not able to function as healthy adults. The current conceptualization of PDs is problematic for diagnosis and treatment. Therefore, continued research is needed to improve diagnosis and aid in the development of more effective diagnostic and treatment approaches.

History of Normative Personality Research: The Five Factor Model

Before determining what constitutes pathological personality, researchers first began to explore how to best capture features of normative personality. Decades of research has shown that the Five Factor Model (FFM) of personality is the most empirically supported conceptualization of typical personality traits (Wiggins & Trapnell, 1997). The FFM asserts that there are five broad domain dimensions on which everyone varies: Neuroticism, Extraversion, Openness, Conscientiousness, and Agreeableness. The

FFM traces its origins to the early 1930s, but empirical research on its validity truly beings in the 1970s (Costa & McCrae, 1976). In the mid-1980s, Costa and McCrae (1985, 1989, 1992) developed *The NEO Personality Inventory (NEO-PI)*, which was designed to measure the FFM. Costa and McCrae found convergence, or overlap, between their NEO-PI and seven other commonly used personality assessments, including the Myers-Briggs Type Indicator, Personality Research Form, Eysenck Personality Test, Minnesota Multiphasic Personality Inventory, Institute of Personality Assessment and Research, California Q-Set, Interpersonal Adjective Scales, and Self-Directed Search. The fact that they found convergence across a wide variety of personality scales supports the validity of the NEO-PI and suggests that it may be the most comprehensive measure of personality to date (Wiggins & Trapnell).

Costa and McCrae's revised version of the NEO-PI (NEO-PI-R; Costa & McCrae, 1992) added six facets for each of the five main domains. These additions made the questionnaire more detailed and exhaustive. Costa and McCrae (2010) released the second revision of the measure, the *NEO Personality Inventory-3* (NEO-PI-3), an updated version of the NEO-PI-R, which was the first rendition to include normative data for adolescents as well as adults. Numerous studies have examined the validity and reliability of the NEO-PI-R and the NEO-PI-3, and research supports its test-retest reliability, criterion validity, and construct validity (DeFruyt, DeBolle, McCrae, Terracciano, & Costa, 2009; McCrae, Costa, & Martin, 2005; McCrae, Kurtz, Yamagata, & Terracciano, 2010).

Personality Pathology Conceptualizations: Categorical vs. Dimensional

When certain personality traits lead to difficulty in cognition, affectivity,

interpersonal function, and impulse control, personality pathology develops and negatively affects a person's ability to adapt and function in life. Historically, personality pathology has been conceptualized according to a system in which a person must meet certain criteria for a particular PD in order to receive a diagnosis. This system is known as the categorical model and has been officially endorsed by the *Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition, 4th Edition,* and *5th Edition* (American Psychiatric Association, 1980, 1994, 2013). In this model, for example, borderline personality disorder has nine diagnostic features, and at least five of the features must be displayed by the patient in order to receive a borderline personality disorder diagnosis (DSM-5). This system allows for the natural diversity among individuals, but it also causes issues in regard to comorbidity, consistency, and the development of adequate instrumentation.

One of the major issues with the categorical model is comorbidity, which essentially means that most patients do not fit nicely into only one diagnosis and instead often display the criteria of many PDs (Krueger, 2013). Gunderson (1996) indicated that the average number of PD diagnoses per patient has ranged from 2.8 to 4.6. This means that on average, if a person is diagnosed with one PD, they are also likely to be diagnosed with another two to five disorders (Krueger, Hopwood, Wright, & Markon, 2014). Additionally, heterogeneity is a significant problem with the categorical model. Although there is natural diversity among individuals, diagnostic heterogeneity occurs when there is wide variation across symptom profiles of individuals who meet criteria for a particular diagnosis. This often occurs because of comorbidity and symptom overlap across diagnoses resulting in contrasting behavior across individuals with the same categorical

diagnosis (Krueger et al.).

Comorbidity and heterogeneity are particularly problematic for clinicians when treating PDs. If an individual is diagnosed with four PDs, the treatment provider is faced with an interesting challenge: do you treat each one separately, with treatment tailored to each diagnosis? Or do you try to integrate them into one comprehensive treatment? Currently, there is not an empirical guideline for integrating multiple PD treatments from a categorical perspective (Krueger et al.). It is also challenging to formulate treatment for individuals with a specific PD if each person with that disorder presents with their own unique constellation of symptoms. A treatment for one individual with dependent PD, for example, might be effective, but the same treatment for another person might be useless. It is difficult to generate empirically validated therapies if patients significantly differ from one another and efficacy rates vary significantly (Krueger, 2013). These issues have also led to difficulties in developing valid and reliable instruments to assess PDs, which further contributes to the diagnostic challenges clinicians experience. In theory, the main advantage of the categorical model is that it can provide a simple and efficient way for clinicians to communicate with each other about patient symptoms and diagnoses. However, in practice this model often does not provide complete or accurate information, due to heterogeneity and comorbidity (Krueger et al.). Recent research has shown that the categorical model of PDs is inherently problematic, and an alternative model is becoming increasingly necessary.

The DSM-5 (American Psychiatric Association, 2013) included two different models of PDs. In Section II, the traditional categorical model was reported as the official model. In Section III, however, an alternative dimensional model was proposed. The

DSM-5 called for additional research on the dimensional model in order for it to become more accepted and empirically endorsed in the field so that it may be considered as a possible future replacement for the current, but problematic, categorical model. The dimensional model conceptualized PD symptoms as abnormal or maladaptive extensions of normative personality traits. For example, the model considers the abnormal trait of "detachment" is to be an extreme manifestation of the normal trait "introversion." Rather than providing a diagnosis, category, or label, the dimensional model provides a dimensional score for an individual on sets of trait continuums. Although this approach can decrease the simplicity of diagnosis, it has quite a few advantages. The model has been shown to have more reliable scores, both across time and across scorers (Heumann & Morey, 1990). It also reduces the problems associated with the lack of boundaries between categorical PD diagnoses, and the dimensional model allows and accounts for significant overlap between the criteria for PDs. Additionally, since abnormal traits are anchored on the same scale as normal traits, the dimensional model links PDs to the large body of literature on normal personality. Since the publication of the DSM-5, the results of numerous studies have supported the validity and clinical utility of the dimensional model (De Fruyt et al, 2013; Griffin & Samuel, 2014; Suzuki, Samuel, Pahlen, & Krueger, 2015; Thomas et al., 2012; Wright et al., 2012; Wright & Simms, 2014).

Measuring Pathological Personality: The *Personality Inventory for DSM-5*.

Along with revising the *Personality Disorders* section for the DSM-5, the personality workgroup developed the *Personality Inventory for DSM-5* (PID-5; Krueger, Derringer, Markon, Watson, & Skodol, 2012). Their main aim in developing this new personality measure was to construct an empirical trait model for the DSM-5 and to

provide a corresponding assessment to reflect this model (Krueger et al.). The PID-5 measures trait attributes that are typically displayed by individuals with PDs. Factor analysis revealed that a five-factor solution best fit the data collected on a preliminary list of pathological personality traits, meaning the 25 facets belong to the five overarching domains of Negative Affect, Detachment, Antagonism, Disinhibition, and Psychoticism.

The PID-5 was released relatively recently, in 2012, so studies are still being conducted to assess its validity, but early studies suggest that its validity is high. Multiple studies have examined its criterion validity by comparing it to previous measures of personality pathology (Few et al., 2013; Fossati, Krueger, Markon, Borroni, & Maffei, 2013; Wright et al., 2014; Zimmerman et al., 2014). Construct validity is a type of content-related validity, and it essentially asks if the measure relates to the underlying theoretical concepts. Theoretically, the PID-5 and the FFM have the same underlying construct because both are based off a five-factor structure and, according to the dimensional model, the PID-5 just measures extreme extensions of the FFM. Studies that support this idea increase the construct validity of the PID-5 because the underlying theoretical constructs are being reinforced. Several studies have compared the PID-5 to various measures of the FFM and have found strong overlap between the two, improving the construct validity of the PID-5 (Griffin & Samuel, 2014; Suzuki, Samuel, Pahlen, and Krueger, 2015; Wright & Simms, 2014).

To examine overlap between normal and pathological personality traits, De Fruyt et al. (2013) analyzed the dimensional model by running a series of exploratory factor analyses (EFA). The investigators first ran two EFAs on the PID-5 and the NEO-PI-3 separately in order to confirm their five-factor structure. Then, they conducted a joint

EFA of both measures to determine the extent to which they overlap. The five domains of the NEO-PI-3 should theoretically match up with the five domains on the PID-5. De Fruyt et al.'s conjoint EFA examined the measures at the facet-level and found that a five-factor solution best fit the data. They used a loading of 0.30 to determine what constituted a significant loading, and they did not eliminate facets that significantly loaded on more than one factor. Their model showed that each facet significantly loaded on the factor that it theoretically should load on. For example, all three Psychoticism facets from the PID-5 loaded with all six Openness facets from the NEO-PI-3; they found similar overlap between the other four domains. Subsequently, the authors proposed the following joint domains: neuroticism-negative affectivity, extraversion-detachment, agreeableness-antagonism, openness-psychoticism, and conscientiousness-disinhibition. This suggests that the FFM is able to describe both adaptive and maladaptive personality (De Fruyt et al.). Essentially, the investigators linked the domains from the NEO-PI-3 to the domains of the PID-5, thus suggesting that they lie on the same continuum, which supports the dimensional model and increases the construct validity of the PID-5.

The Present Study

Within a relatively short amount of time, an abundance of research findings support the dimensional model of PD diagnoses and suggest strong overlap between normative and pathological personality traits (Suzuki et al., 2015; Wright & Simms, 2014; Wright et al., 2014; Zimmermann et al., 2014). However, altering an entire diagnostic system for a psychiatric disorder is an enormous task, so additional research needs to be conducted to show the dimensional model is more empirically valid. Only one previous study (De Fruyt et al.) has examined overlap in the factor structure of the

NEO-PI-3 and the PID-5 using EFA, and no study to date has tested De Fruyt et al.'s model using a confirmatory factor analysis. Subsequently, the current study seeks to add to the body of research supporting the dimensional model of PDs by conducting a confirmatory factor analysis of the conjoint five-factor model reported by De Fruyt et al. It is hypothesized that the conjoint five-factor model will be a strong fit for the data.

Methods

Participants

This study utilized a sample of university students from a mid-sized, private Midwestern university who were enrolled in psychology courses that require research credit. Data was gathered from two separate studies related to personality pathology, both of which received separate approval from the University of Dayton RREC committee. The first sample consisted of 120 students (54.5% female; *M* age = 19.19, *SD* = 1.15), and the second sample contained 224 participants (74.6% female; *M* age = 19.04, *SD* = 1.26). Out of a combined 344 participants, 38 students were omitted from analyses because of missing data; one or more domains could not be computed due to missing item data. In total, 306 participants from the university sample were used for this study (67% female; *M* age = 19.10, *SD* = 1.12).

Measures

NEO-PI-3.

The NEO-PI-3 is a self-report measure of the FFM of normative personality traits (Costa & McCrae, 2010). It consists of 240 items, assessing five domains and 30 facets. The reliability for the measure is strong, with Cronbach's α for the domains ranging from

.87 to .95. However, a few facets obtained relatively low Cronbach's α scores, meaning a value of .70 or lower: Impulsiveness, Activity, Excitement Seeking, Actions, Values, Straightforwardness, Compliance, Tender-Mindedness, and Dutifulness. This suggests that these facets have poor reliability, and additional research on them is needed. Other studies also support the construct and content validity of the NEO-PI-3 (DeFruyt, DeBolle, McCrae, Terracciano, & Costa, 2009; McCrae, Kurtz, Yamagata, & Terracciano, 2010).

PID-5.

The PID-5 is a self-report measure of pathological personality traits from a dimensional perspective, as outlined by the DSM-5 PD workgroup (Kruger, Derringer, Watson & Skodol, 2013). It contains 220 items, assessing five domains and 25 facets. Reliability for the measure is strong, with Cronbach's α ranging from .72 to .96.

Procedure

Since this thesis utilized data from two separate studies, their procedures slightly differ. In the first study, after undergoing informed consent and completing a short demographic questionnaire, participants were administered an olfactory threshold assessment and an olfactory hedonic rating task as part of a larger study about olfaction and personality traits. Participants then completed the NEO-PI-3 and the PID-5. The order in which they completed the measures was counterbalanced so that administration order can be eliminated as a confounding variable. Participants were given a debriefing form at the conclusion of the study and were given the opportunity to ask questions about the study and their participation. For this thesis, only the NEO-PI-3 and PID-5 data was utilized. In the second study, after undergoing informed consent, participants completed a

short demographic questionnaire, the NEO-PI-3, and the PID-5. Again, order in which they completed the measures was counterbalanced, and at the end of the study, participants were debriefed and given an opportunity to ask questions about their participation.

Results

Preliminary Analyses

Preliminary analyses were conducted using SPSS version 23 to examine skewness and kurtosis to determine normality of the data. None of the variables fell outside acceptable ranges and were determined to be fairly normal. Means and standard deviations were computed for each facet of the NEO-PI-3 and the PID-5 and are displayed in Tables 1 & 2.

Table 1. Domains, Facets, and Descriptive Statistics for the NEO-PI-3.

	M	*SD*
Neuroticism		
N1: Anxiety	55.56	10.52
N2: Angry Hostility	46.89	11.25
N3: Depression	54.13	11.47
N4: Self-Consciousness	55.86	10.81
N5: Impulsiveness	50.85	11.02
N6: Vulnerability	51.63	10.82
Extraversion		
E1: Warmth	52.74	11.09
E2: Gregariousness	49.19	12.47
E3: Assertiveness	48.52	11.52
E4: Activity	46.89	11.55
E5: Excitement Seeking	49.43	11.92
E6: Positive Emotions	50.27	12.35
Openness		
O1: Fantasy	49.73	11.08
O2: Aesthetics	48.61	12.30
O3: Feelings	51.14	10.88
O4: Actions	46.56	11.22
O5: Ideas	51.07	11.57
O6: Values	52.93	10.42
Agreeableness		
A1: Trust	52.98	11.43
A2: Straightforwardness	54.38	11.85
A3: Altruism	55.26	10.12
A4: Compliance	53.32	10.79
A5: Modesty	53.88	11.11
A6: Tendermindedness	57.06	10.89
Conscientiousness		
C1: Competence	51.23	11.18
C2: Order	51.95	11.44
C3: Dutifulness	53.12	10.28
C4: Achievement Striving	52.67	10.60
C5: Self-Discipline	49.57	11.63
C6: Deliberation	53.65	11.12

Table 2. Domains, Facets, and Descriptive Statistics for the PID-5.

	M	*SD*
Negative Affect		
Anxiousness	13.73	6.42
Emotional Lability	7.90	5.24
Hostility	8.66	5.25
Perseveration	9.01	5.26
Restricted Affectivity	6.08	4.46
Separation Insecurity	7.62	4.70
Submissiveness	5.43	2.76
Detachment		
Anhedonia	5.82	4.20
Depressivity	7.05	7.57
Intimacy Avoidance	3.58	3.54
Suspiciousness	6.83	3.42
Withdrawal	7.17	5.77
Disinhibition		
Distractibility	9.95	6.18
Impulsivity	5.35	3.95
Irresponsibility	3.29	3.25
Rigid Perfectionism	11.11	6.79
Risk Taking	19.51	7.26
Antagonism		
Attention Seeking	8.60	5.05
Callousness	4.87	5.12
Deceitfulness	7.11	5.43
Grandiosity	3.17	3.03
Manipulativeness	3.86	3.40
Psychoticism		
Eccentricity	12.81	9.79
Cognitive & Perceptual Dysregulation	8.00	6.31
Unusual Beliefs & Experiences	5.21	4.77

Confirmatory Factor Analysis

The confirmatory factor analysis (CFA) of De Fruyt et al's (2013) conjoint five-factor model of the NEO-PI-3 and PID-5 was conducted using Mplus version 7 software. De Fruyt et al.'s five-factor model included 21 facets (11 from the NEO-PI-3 and 10 from the PID-5) that loaded significantly on more than one factor. These were included in both domains in our analysis, for a total of 80 variables, or facets, across the proposed five

factors (see *Figure 1*). To assess model fit, we examined three indices: 1) The Comparative Fit Index (CFI; Bentler, 1990) ranges from 0 to 1, with values closer to 1 indicating a good fit, 2) The Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) also ranges from 0 to 1, but lower values (<.08) are indicative of a good fit, 3) The model Chi-Square fit, which suggests a good fit if the value is not significant at the .05 level. All fit indices for the present study indicated that the hypothesized model was not a good fit for the data (CFI = 0.606; RMSEA = 0.104; χ^2 = 5971.59, p < .0000).

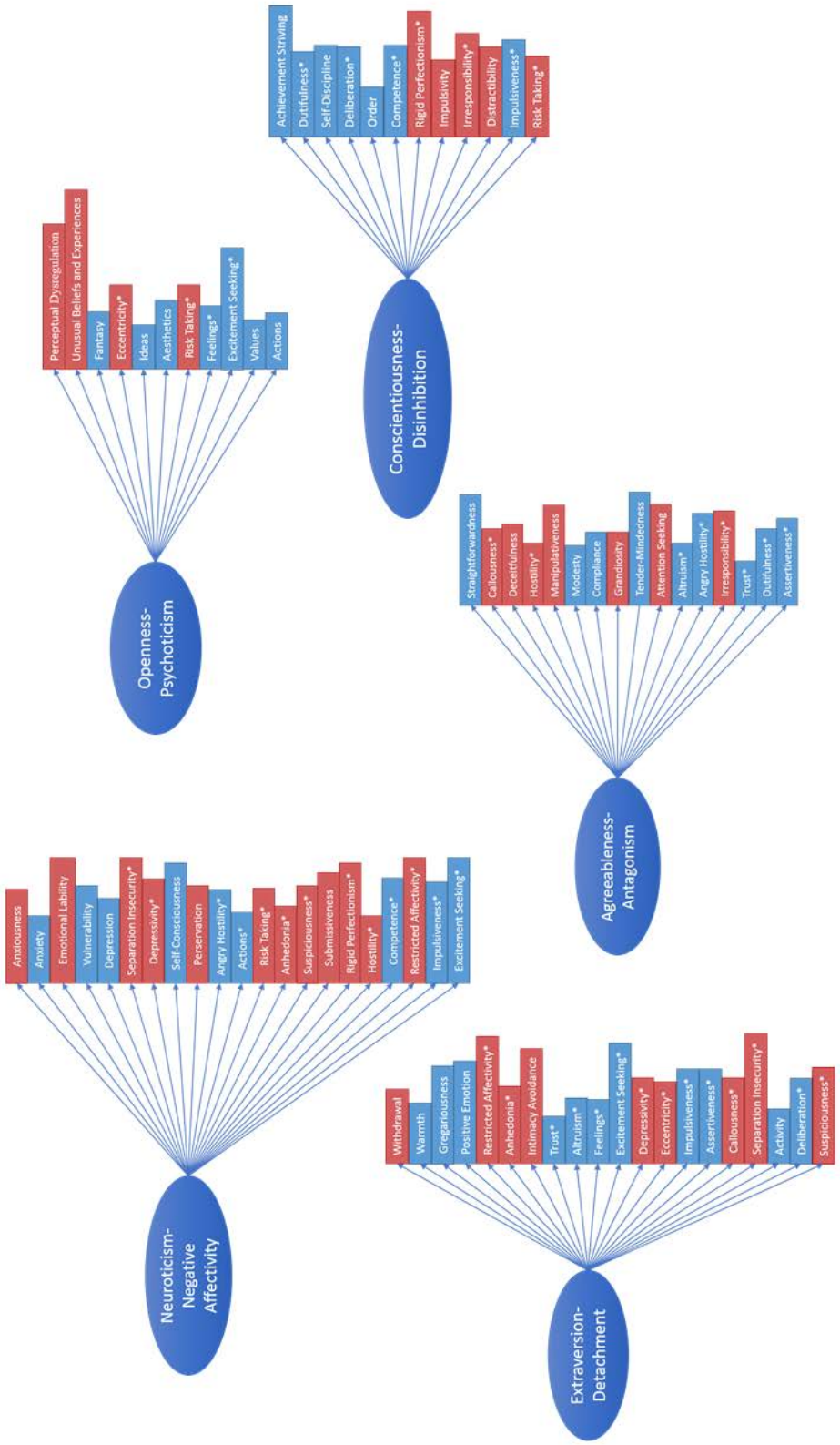

Figure 1. Conjoint confirmatory factor analysis model for NEO-PI-3 and PID-5, based on De Fruyt et al. Blue represents facets from the NEO-PI-3, and red represents facets from the PID-5. Joint domains are presented in the blue ovals. * represents facets that double loaded and appear on more than one factor.

Follow-Up Analysis: Exploratory Principal Component Analysis

To determine the factor structure of the dataset, since a CFA failed to provide support for a five-factor solution, SPSS 23.0 was used to conduct a conjoint exploratory principal component analysis **(**PCA) with oblimin rotation at the facet-level using the same university student sample. The factorability of the NEO-PI-3 and PID-5 was examined first. The Kaiser-Meyer-Olkin measure of sampling adequacy was .873, above the recommended minimum value of .50 (Kaiser, 1974). Bartlett's test of sphericity was significant ($\chi^2 = 8256.3$, $p < .001$). These metrics indicate the two measures' facets are related to each other and that factor analysis among the variables would be useful and meaningful. They indicated that the PCA could proceed.

The initial PCA resulted in 10 factors accounting for 69.3% of the variance. Subsequent analyses limited the number of factors to five, based on observation of the initial scree plot and eigenvalues (>1). Two facets from the NEO-PI-3 (O6: Values and A6: Tender-Mindedness) and two facets from the PID-5 (Risk Taking and Suspiciousness) did not significantly load (≥0.40) on any factor and were excluded from analyses. Additionally, five facets from the NEO-PI-3 (N2: Angry Hostility, N5: Excitement-Seeking, N6: Vulnerability, E4: Activity, and O3: Feelings) and five facets from the PID-5 (Attention Seeking, Distractibility, Hostility, Perceptual Dysregulation, and Rigid Perfectionism) loaded significantly on more than one factor and were excluded from the model. The PCA was repeated until at least three facets loaded on each factor and simple structure was maintained. Interscale reliability was assessed using Cronbach's alpha coefficients, and interscale correlations were assessed using Pearson's r.

NEO-PI-3 and the PID-5 facet exploratory PCA results supported a five-factor model as the best fit for the university student sample data. Factor results and loadings can be found in *Table 3*. The five factors accounted for 58.26% of the variance as follows: Neuroticism-Negative Affectivity (23.57%), Extraversion-Detachment (12.70%), Agreeableness-Antagonism (9.87%), Conscientiousness-Disinhibition (6.76%), and Openness-Psychoticism (5.36%). Intrascale reliability was assessed with Cronbach's alpha, which ranged from .739 (Psychoticism) to .876 (Conscientiousness). Additionally, interscale correlations were minimal to moderate, with Pearson's r ranging from .032 to -.431, which suggests a relatively orthogonal factor structure and that each scale uniquely measures an aspect of personality; they do not assess overlapping traits (see *Table 4*).

Table 3. Final Exploratory PCA Pattern Matrix of NEO-PI-3 and PID-5 Facets.

	I	II	III	IV	V
Anxiousness	**.79**	-.13	-.02	.06	-.03
Emotional Lability	**.74**	.13	.00	-.09	.12
Separation Insecurity	**.71**	.24	-.16	-.01	-.10
Submissiveness	**.65**	.17	-.08	.01	-.19
Perseveration	**.63**	-.18	-.18	-.03	.22
N3: Depression	**.62**	-.22	.14	-.28	-.01
N1: Anxiety	**.61**	-.10	.15	-.08	-.05
Depressivity	**.59**	-.33	.03	-.23	.14
N4: Self-Consciousness	**.54**	-.36	.22	-.19	.03
E2: Gregariousness	.02	**.82**	-.17	-.15	-.09
E1: Warmth	.14	**.81**	.08	.15	.20
Withdrawal	.24	**-.78**	-.09	.08	.18
E6: Positive Emotions	-.04	**.67**	-.09	.10	.29
Anhedonia	.38	**-.62**	-.07	-.13	.05
Restricted Affectivity	-.05	**-.58**	-.31	.07	.09
Intimacy Avoidance	.00	**-.54**	-.03	.03	.14
E5: Excitement-Seeking	-.04	**.54**	-.23	-.26	.10
A3: Altruism	.30	**.48**	.32	.38	.25
A1: Trust	.01	**.42**	.25	.17	.21
Manipulativeness	.22	.00	**-.80**	.02	.06
A5: Modesty	.14	-.19	**.72**	-.10	.10
Grandiosity	.20	-.06	**-.70**	.25	.11
A2: Straightforwardness	.04	.00	**.69**	.21	.05
Callousness	.05	-.37	**-.67**	-.02	.09
Deceitfulness	.32	.01	**-.67**	-.24	.07
A4: Compliance	.16	.01	**.56**	.12	.10
E3: Assertiveness	-.24	.34	**-.44**	.28	.10
C3: Dutifulness	.03	.03	.13	**.84**	.04
C1: Competence	-.13	.04	-.10	**.83**	-.04
C4: Achievement Striving	-.08	.13	-.17	**.76**	.10
C5: Self-Discipline	-.20	.00	-.05	**.77**	-.07
C6: Deliberation	.00	-.31	.12	**.71**	-.16
C2: Order	.02	-.08	-.03	**.59**	-.10
Impulsivity	.19	.22	-.24	**.54**	.22
Irresponsibility	.21	-.18	-.31	**-.52**	.20
O5: Ideas	-.18	-.08	-.02	.17	**.79**
O2: Aesthetics	.20	-.03	.14	-.10	**.74**
O1: Fantasy	-.08	.12	.06	-.32	**.61**
Eccentricity	.33	-.25	-.11	-.15	**.53**
Unusual Beliefs & Experiences	.30	-.15	-.38	-.01	**.51**
O4: Actions	-.21	.24	-.07	-.22	**.47**

Note. I = Neuroticism-Negative Affectivity; II = Extraversion-Detachment; III = Agreeableness-Antagonism; IV = Conscientiousness-Disinhibition; V = Openness-Psychoticism. Loadings ≥.40 are given in bold.

Table 4. Correlations between Factors and Reliability Statistics for the NEO-PI-3 and PID-5.

	I	II	III	IV	V	Cronbach's α
I	-					.866
II	-.347*	-				.821
III	.038	.032	-			.746
IV	-.431*	.076	.118**	-		.876
V	.195*	.142*	.182*	-.332*	-	.739

Note. *$p < .01$; **$p < .05$. I = Neuroticism-Negative Affectivity; II = Extraversion-Detachment; III = Agreeableness-Antagonism; IV = Conscientiousness-Disinhibition; V = Openness-Psychoticism.

Discussion

The present study sought to conduct a CFA of De Fruyt et al.'s (2013) conjoint five-factor model of the NEO-PI-3 and the PID-5. It was hypothesized that the two measures would share the same underlying five-factor structure, despite the fact that each measure was designed to assess different types of personality traits. However, CFA results suggested that De Fruyt et al.'s five-factor model did not adequately fit the data. Subsequently, a conjoint exploratory PCA was conducted. Results supported a five-factor model consisting of the following five joint domains: Neuroticism-Negative Affectivity, Extraversion-Detachment, Agreeableness-Antagonism, Conscientiousness-Disinhibition, and Openness-Psychoticism. The PCA results are consistent with De Fruyt et al.'s findings and the Five Factor Model of personality. In the present analysis, only one facet (E3: Assertiveness) loaded highest on a different factor (Agreeableness-Antagonism) than in De Fruyt et al.'s analysis (Extraversion-Detachment).

There are two limitations of De Fruyt et al.'s EFA that may have contributed to the poor CFA model fit. The previous authors retained 21 items that significantly loaded

on more than one factor in the model; they did not retain simple structure. They also used a lower cutoff point (≥0.30) for what they considered to be a high loading. These two methodological choices may have led to a less psychometrically robust model, and the present study's CFA results reflected this. Additionally, De Fruyt et al. used a Dutch sample, using Dutch translations of the NEO-PI-3 and the PID-5. It is possible that cultural and linguistic differences between their sample and our sample partially explains the poor CFA fit indices.

A few aspects of the PCA were surprising. Research is mixed on the Openness-Psychoticism domain, so it was surprising to find clean, high loadings of two facets of Psychoticism (Eccentricity and Unusual Beliefs and Experiences) on the joint Openness-Psychoticism domain. Research has found that this joint domain is the most problematic and difficult to capture, as some studies find strong support for a joint domain (De Fruyt et al.; Wright & Simms, 2014) and other studies fail to find significant evidence that their facets load together (Griffin & Samuel, 2014). Although Perceptual Dysregulation was removed from analysis for significantly loading on more than one factor, the remaining two Psychoticism facets loaded fairly high and cleanly with four Openness facets that remained in the analysis (O1: Fantasy, O2: Aesthetics, O4: Actions, and O5: Ideas). This support for an Openness-Psychoticism domain further adds to the complicated and mixed research on the validity of a joint domain for these personality traits. More research is needed to further clarify the relationship.

Three facets of Disinhibition were removed from analysis for either loading significantly on more than one factor (Distractibility and Rigid Perfectionism) or failing to load on any factor (Risk Taking). This was a bit surprising, as De Fruyt et al. (2013)

and Wright and Simms (2014) found strong support for these facets on the joint Conscientiousness-Disinhibition domain. In particular, it was surprising that Risk Taking did not load significantly on any factor, as previous research has found it overlaps with multiple factors (De Fruyt et al.; Griffin & Samuel, 2014). It would be expected for Risk Taking to load on more the one factor but was surprising that it did not load on any factor.

Overall, the exploratory PCA results from the current study yielded higher and cleaner facet loadings on each factor than in the De Fruyt et al. model. This is likely due to the fact that we sought simple structure in our analysis and used a higher cutoff ($\geq$0.40) for labeling a high loading. Because the current model is more simplified, it might be more conducive to a CFA than De Fruyt et al.'s model. In general, factor loadings were consistent with what was theoretically expected; no facet loaded on a factor that was completely unexpected or bizarre.

The present study sought to add support to the dimensional model of PDs by demonstrating overlap between normative personality traits, assessed by the NEO-PI-3, and pathological personality traits, assessed by the PID-5. Although the current exploratory PCA model is comparable to the De Fruyt et al. model, the extent to which normal and abnormal traits overlap is not entirely congruent. Inconsistencies between models suggest that more research is needed to fully validate the new conceptualization of PDs and obtain agreement among researchers. This project has also added psychometric support for the PID-5 by reporting high interscale reliability statistics and demonstrating convergent validity with the NEO-PI-3.

Limitations and Future Directions

The current study used a university student sample, which has a few limitations. University samples typically show overall lower levels of personality pathology and psychopathology, which can decrease the strength of analysis. While our sample had high levels of some pathological traits (Anxiousness, Rigid Perfectionism, and Risking Taking), it also reported low levels of more "extreme" pathological traits (e.g. Manipulativeness, Unusual Beliefs and Experiences, and Grandiosity). Ideally, the sample would show more pathological variability across traits. Additionally, since the population is mostly younger adults, results may not generalize to a middle-age or older adult population; the model is valid among college students, but it may not be as supported in an older adult sample. Therefore, future studies should replicate the model in an adult community sample in order to increase the generalizability and validity of the model. Research should also be conducted among a clinical sample to bolster the validity of the model in a population that most commonly displays pathological personality traits.

Conclusions

Personality and PDs are an important focus of research, as approximately nine percent of the population suffer from at least one PD (Lenzenweger, Lane, Loranger, & Kessler, 2007). A core feature of all PDs is interpersonal dysfunction, meaning those with them often have extreme difficulty interacting with those around them in a healthy way; this dysfunction can manifest itself in different ways (Hengartner, et al., 2015; Wright et al., 2012). Therefore, those who endure PDs are often not able to successfully function as adults, both personally and professionally, due to extreme difficulties in interacting with others. For example, they often are not capable of maintaining a steady job, and this

impairment leads to a significant amount of stress, both financially and personally. Additionally, relationships with family and friends is strained for these individuals because, without treatment, they are not capable of successfully and healthily maintaining them. Simply put, PDs are a prevalent problem that require empirical and clinical attention. The categorical model, the current way practicing clinicians diagnose PDs, is fundamentally flawed and problematic, and the need for an alternative model is becoming increasingly necessary. Research similar to this thesis is important as it would add support to the DSM-5's alternative model of PDs. Due to its ability to overcome problems inherent in the categorical model, adoption of a dimensional model would help streamline and clarify the diagnosis of PDs and subsequently improve treatment efficacy. Ultimately, the goal of PD research is to effectively identify maladaptive personality traits and improve interventions to better the lives of those suffering from PDs. Adopting a new and updated model would allow clinicians and researchers to properly aid individuals who experience these issues.

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