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The DSM-5 Dimensional Trait Model and the Five Factor Model

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THE DSM-5 DIMENSIONAL TRAIT MODEL AND THE FIVE FACTOR MODEL

THESIS

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By

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ABSTRACT OF THESIS

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The current thesis tests empirically the relationship of the dimensional trait model proposed for the fifth edition of the American Psychiatric Association's (APA) *Diagnostic and Statistical Manual of Mental Disorders* with five-factor models (FFM) of personality disorder (PD). The DSM-5 Personality and Personality Disorders Work Group proposes to diagnose the disorders largely in terms of a 25 trait dimensional model organized within five broad domains (i.e., negative affectivity, detachment, antagonism, disinhibition, and psychoticism). Consistent with the authors of DSM-5, it was predicted that negative affectivity would align with FFM neuroticism, detachment with FFM introversion, antagonism with FFM antagonism, disinhibition with low FFM conscientiousness and, contrary to the authors of DSM-5, psychoticism would align with FFM openness. Suggested changes in trait placements according to FFM of PD research were also tested. Four measures of five factor models of general personality were administered to 445 undergraduates along with the Personality Inventory for DSM-5. The results of the present study provided support for the hypothesis that all five domains of the DSM-5 dimensional trait model are maladaptive variants of general personality structure, including the domain of psychoticism; however, the findings provided mixed support for suggested trait placement changes in the DSM-5 model.

KEYWORDS: Personality Disorders, DSM-5, Five Factor Model, Dimensional Diagnoses, Maladaptive Personality Traits

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Chapter One: Introduction

The purpose of this thesis was to test empirically the relationship of a dimensional trait model proposed for the forthcoming fifth edition of the American Psychiatric Association's (APA) *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; APA, 2011) with five-factor models of personality disorder (PD). Significant changes in the diagnosis of PDs are likely to occur with the fifth edition of the DSM-5. The DSM-5 Personality and Personality Disorders Work Group proposes to delete four of the PD diagnoses and to partially (if not largely) diagnose the remaining types in terms of a 25 trait dimensional model organized within five broad domains. The dimensional model may be utilized in several ways (Skodol, 2012). The first is that the traits included therein may be used as diagnostic criteria for the PDs retained, in combination with PD specific features of self and interpersonal impairment. The second is that clinicians will have the option of simply describing clients in terms of the dimensional trait model. The third is that clinicians will be able to recover the deleted PD diagnoses through the dimensional trait model. In sum, the dimensional model of 25 traits might play a significant role in the diagnosis of DSM-5 personality disorders, or at least it was proposed at one point to play a significant role.

This emerging shift in the diagnosis of personality disorders is the result of a longstanding debate and a substantial body of empirical research (Widiger & Simonsen, 2005a). A proposal to include a supplementary dimensional model was made for DSM-IV (APA, 1994; Widiger, 1991), but was ultimately rejected in favor of simply mentioning the existence of this alternative perspective within the text of the diagnostic manual (Widiger, 1996). However, it became evident during conferences preliminary to

the development of DSM-5 that there would be more support for such a shift within this next edition of the diagnostic manual.

A series of conferences were held in anticipation of the development of DSM-5. The initial conference included small work groups in charge of addressing specific concerns and issues. The Nomenclature Work Group, charged with addressing fundamental assumptions of the diagnostic system, concluded that it is "important that consideration be given to advantages and disadvantages of basing part or all of DSM-V on dimensions rather than categories" (Rounsaville et al., 2002, p. 12). They suggested that the personality disorders in particular be the first section of the diagnostic manual to shift to a dimensional classification. "If a dimensional system of personality performs well and is acceptable to clinicians, it might then be appropriate to explore dimensional approaches in other domains" (Rounsaville et al., 2002, p. 13). The work group concerned with the personality disorders did not develop an actual proposal, but did endorse this shift and identified what they considered to be the primary alternative dimensional models (First et al., 2002).

The initial DSM-V Research Planning Conference was followed by a series of international conferences, one of which was devoted specifically to shifting the personality disorder classification from a categorical to a dimensional model (Widiger, Simonsen, Krueger, Livesley, & Verheul, 2005). A consistent problem in replacing the DSM diagnostic categories with a dimensional model is deciding which dimensional model to use (Frances, 1993). The approach taken at the international conference was to try to find a compromise or common ground among the existing alternative choices. The model proposed by Widiger and Simonsen (2005b) consisted primarily of four broad,

bipolar domains: emotional dysregulation versus emotional stability, extraversion versus introversion, antagonism versus compliance, and constraint versus impulsivity (Widiger & Simonsen, 2005b). They suggested though that a fifth broad domain, unconventionality versus closed to experience, would also be necessary to fully account for all of the maladaptive trait scales included within the alternative dimensional models. This fifth domain was not included within their common model because it is missing from some of the predominant alternatives, including the four factor model of Livesley (2007) and the three factor model of Clark (1993; Clark & Watson, 2008). The domain of unconventionality versus closedness to experience though has been included within the five-factor model (Widiger, Costa, & McCrae, 2002; Widiger & Mullins-Sweatt, 2009).

One of the final DSM-5 preparatory conferences was devoted to proposals for shifting the entire diagnostic manual to dimensional models (Helzer et al., 2008), including of course the personality disorders (Krueger, Skodol, Livesley, Shrout, & Huang, 2008). A tentative proposal was provided at this conference, consisting of a modified version of the four-factor model of Livesley (2007), with some additional subscales. Krueger and colleagues (2008) stated that a primary goal of the DSM-5 PD Work Group "will be the carefully examine facet level constructs to arrive at the most clinically optimal set of facets" (p. 91).

The initial proposal for a dimensional trait model by the DSM-5 Personality and Personality Disorders Work Group was not simply one of the existing alternative models, nor was it an effort to represent the major alternative models within a common structure (Livesley, 2010; Trull, in press). Instead, DSM-5 Personality and Personality Disorder Work Group members generated 37 proposed traits to include within a newly developed

model (Krueger, 2010, Krueger, Eaton, Clark, et al., 2011). As indicated by Krueger, Eaton, Derringer, et al. (2011), the 37 traits were "generated as a result of discussions in the *DSM-5* Personality and Personality Disorders Work Group" (p. 326). These 37 traits were organized within 6 broad unipolar domains (i.e., negative emotionality, introversion, antagonism, disinhibition, compulsivity, and schizotypy) on the basis of an unpublished factor analysis (Krueger, 2010, Krueger, Eaton, Derringer, et al., 2011). Table 1 provides the six domains and the location of the traits as specified by Clark and Krueger (2010) and Krueger, Eaton, Derringer, et al. (2011).

Table 1

DSM-5 37-Trait Dimensional Model

I. Negative Emotionality	1. Emotional lability
	2. Anxiousness
	3. Submissiveness
	4. Separation Insecurity
	5. Pessimism
	6. Low self-esteem
	7. Guilt/shame
	8. Self-harm
	9. Depressivity
	10. Suspiciousness
II. Introversion	11. Social withdrawal
	12. Social detachment
	13. Intimacy avoidance
	14. Restricted affectivity
	15. Anhedonia
III. Schizotypy	16. Unusual perceptions
	17. Unusual beliefs
	18. Eccentricity
	19. Cognitive dysregulation
	20. Dissociation proneness
IV. Antagonism	21. Callousness
	22. Manipulativeness
	23. Narcissism
	24. Histrionism
	25. Hostility
	26. Aggression
	27. Oppositionality
	28. Deceitfulness
V. Compulsivity	29. Perfectionism
	30. Perseveration
	31. Rigidity
	32. Orderliness
	33. Risk aversion
VI. Disinhibition	34. Impulsivity
	35. Distractibility
	36. Recklessness
	37. Irresponsibility

Note. Krueger, Eaton, Clark, et al., 2011

Krueger, Eaton, Clark, et al. (2011) indicated that the Personality and Personality Disorders Work Group reviewed the literature on several different personality instruments designed to capture personality pathology and, as a result, identified the six broad domains. However, the only reference to any particular dimensional model on the DSM-5 website was with regard to the FFM and this was to indicate how the proposed model was distinguished from this particular dimensional model. More specifically, the Work Group members stated that the domain of schizotypy was not aligned with FFM openness, indicating that "only the 'social and interpersonal deficits' of Schizotypal PD, and not the 'cognitive or perceptual distortions and eccentricities of behavior' is tapped by FFM traits" (Clark & Krueger, 2010). They further stated that their domain of compulsivity was not aligned with FFM conscientiousness, indicating that "meta-analyses indicate that Obsessive-Compulsive Personality Disorder is not well-covered by the FFM (Saulsman & Page, 2004)" (Clark & Krueger, 2010). Widiger (2011b) subsequently questioned these claims, summarizing empirical support for considering the DSM-5 schizotypy domain to be a maladaptive variant of FFM openness and DSM-5 compulsivity a maladaptive variant of FFM conscientiousness.

Three rounds of self-report data on the 37 traits were collected with a community sample reporting a history of mental health treatment, yielding over 1,000 participants. Unpublished analyses, including a factor analysis and item response theory modeling, reduced the 37 traits to 25 (Krueger, Eaton, Derringer, et al., 2011). Table 2 provides the current dimensional model. Note that the names for some domains were modified (i.e., negative emotionality became negative affectivity, introversion became detachment, and schizotypy became psychoticism). A more significant change was the deletion of the domain of compulsivity (Krueger, Eaton, Derringer, et al., 2011). However, it is also suggested that it has in fact been retained, opposite

now to disinhibition (APA, 2011), consistent with the FFM (Trull, in press; Widiger, 2011b), albeit now represented by only one underlying trait (i.e., rigid perfectionism). In addition, some of the underlying traits that were retained shifted in location (e.g., depressivity shifted from negative emotionality to detachment).

Table 2

DSM-5 25-Trait Dimensional Model

I. Negative Affectivity	1. Anxiousness 2. Emotional lability 3. Hostility 4. Perseveration 5. (Lack of) restricted affectivity 6. Separation insecurity 7. Submissiveness
II. Detachment	8. Anhedonia 9. Depressivity 10. Intimacy avoidance 11. Suspiciousness 12. Withdrawal
III. Antagonism	13. Attention seeking 14. Callousness 15. Deceitfulness 16. Grandiosity 17. Manipulativeness
IV. Disinhibition	18. Distractibility 19. Impulsivity 20. Irresponsibility 21. (Lack of) rigid perfectionism 22. Risk taking
V. Psychoticism	23. Eccentricity 24. Perceptual dysregulation 25. Unusual beliefs and experiences

Note. Krueger, Eaton, Derringer et al., 2011

Although the domain of compulsivity is perhaps now retained in a manner more consistent with the FFM, the rationale for the current model still states that '"openness to experience' is a major domain of normal-range personality variation, but an extensive literature shows essentially no relationship between this domain and DSM-IV PDs" (APA, 2011). It is true that the relationship between FFM openness and schizotypal PD has been inconsistently confirmed, particularly when the FFM has been assessed with the NEO Personality Inventory-Revised (NEO PI-R; Costa & McCrae, 1992). However, it has been confirmed more consistently through the use of a semi-structured interview to assess FFM openness (Samuel & Widiger, 2008). Additionally, Haigler and Widiger (2001) revised NEO PI-R openness items to assess maladaptive variants of the same domain and confirmed a positive relationship between experimentally manipulated NEO PI-R openness and schizotypy.

In addition, there are other instruments, such as the HEXACO Personality Inventory (Lee & Ashton, 2004), the 5-Dimensional Personality Test (5DPT; Van Kampen, 2012), and the Inventory of Personal Characteristics (IPC-5; Tellegen & Waller, 1987), that include domains that correspond empirically and conceptually with FFM openness. For example, the IPC-5 includes a scale titled Conventionality which "corresponds to the Big Five dimension of … (reversed) Openness" (Almagor, Tellegen, & Waller, 1995, p. 301). The 5DPT includes a scale, Absorption, which similarly aligns with FFM openness. Van Kampen (2012) reported "convergent correlations between 5DPT A and the NEO-FFI and HEXACO-PI-R Openness to Experience scales" (p. 97). Most importantly, the authors of these instruments suggest that their respective "openness" scales are associated with oddity, peculiarity, eccentricity, and/or cognitive-perceptual aberrations (Almagor et al., 1995; Lee & Ashton, 2004; van Kampen, 2012). Included within this thesis was the 5DPT and the IPC-5.

The locations of some of the traits within the original 6 domain, 37-trait model were also inconsistent with their placement within the FFM (see Table 1). For example, in the original 37-trait proposal, suspiciousness was included within negative affectivity albeit in the FFM it would be included within antagonism (Widiger, Costa, & McCrae, 2002). Similarly, histrionism was placed within antagonism whereas in the FFM it would be placed within extraversion. Millon et al. (1996) has long referred to histrionic personality disorder as "the gregarious pattern" (p. xiii), as histrionic persons tend to be "popular, extroverted, attractive, and sociable" (p. 366). Gore, Tomiatti, and Widiger (2011) demonstrated that histrionic traits include a substantial degree of extraversion as well as some degree of antagonism and concluded that histrionic traits "should not be understood solely as a variant of antagonism" (p. 70).

The subsequently revised five domain, 25-trait model, did not necessarily shift traits in a manner that was more consistent with the FFM. Consider, for example, the DSM-5 domain of negative affectivity. Perseveration, designed to assess a component of obsessive-compulsive personality disorder, was shifted out of compulsivity into negative affectivity. However, a strong positive relationship between obsessive-compulsive personality traits and conscientiousness has been reported by Samuel and Widiger (2011). Submissiveness is also included by Krueger, Eaton, Derringer, et al. (2011) within the domain of negative emotionality, inconsistent with the FFM view which conceptualizes submissiveness as including aspects of both maladaptive agreeableness (Gore & Pincus, 2012; Lowe, Edmundson, & Widiger, 2009), as well as neuroticism. In addition, submissiveness has long been considered an aspect of interpersonal relatedness as conceptualized within the interpersonal circumplex, rather than being part of negative emotionality (Wiggins & Pincus, 2002). Finally, restricted affectivity was previously within the introversion domain of the 37-trait model (consistent with the FFM) but was

transferred to the negativity affectivity domain in the 25-trait model. The original placement of restricted affectivity within introversion aligns with the FFM conceptualization (i.e., low positive emotionality and low warmth). For example, McCrae, Löckenhoff, and Costa (2005) have conceptualized the extraversion facet of low warmth as associated with problems in living such as "difficulty expressing feelings" and being "detached or indifferent" (p. 279).

With respect to the DSM-5 domain of detachment, suspiciousness was shifted out of negative affectivity into this domain, rather than into antagonism (Krueger, Eaton, Derringer, et al., 2011). However, based on the FFM view of personality, suspiciousness should be aligned with antagonism as evidenced by Costa and McCrae's (1992) placement of the NEO PI-R facet of trust within the domain of agreeableness. Additionally, Mullins-Sweatt and Widiger (2010) found a positive significant correlation between the related construct paranoia and FFM antagonism. Depressivity was similarly shifted out of negative affectivity into detachment. Costa and McCrae (1992), however, place the NEO PI-R facet of Depression within the domain of neuroticism which aligns with negative affectivity. Mullins-Sweatt and Widiger (2010) found a significant positive relationship between depression and neuroticism.

Attention seeking was added to the 25-trait model in place of histrionism and placed within the domain of antagonism. As noted above, histrionic traits have been consistently placed within the domain of extraversion (Lynam & Widiger, 2001; Millon et al., 1996; Samuel & Widiger, 2008; Saulsman & Page, 2004). In a study devoted to this question, Gore, Tomiatti, and Widiger (2011) indicated that the trait of attention-seeking does contain a degree of antagonism (e.g., to the extent that it reflects a self-centered manipulation) but is more strongly related to extraversion. However, Krueger, Eaton, Derringer, et al. (2011) could not place it within extraversion because extraversion is not currently included in the DSM-5 trait model.

Table 2 provides the 25-trait model and the location of the traits specified by Krueger, Eaton, Derringer, et al. (2011). Krueger et al. (2011) state that instead of placing facets in domains based on prior theory, the facets were instead placed within "the domain where they had their strongest loading" (p. 327). However, this assertion cannot be evaluated because the results of this factor analysis have not been published. Table 3 provides the location of the 25 traits from the perspective the FFM (Widiger, 2011a).

The purpose of this proposed thesis was to test empirically whether the proposed DSM-5 model aligns with the FFM as suggested by Trull (in press) and Widiger (2011a, 2011b). More specifically, it is predicted that: (1) DSM-5 psychoticism will align with FFM openness; and (2) the 25 traits will be located within domains consistent with the FFM (i.e., Table 3).

Table 3

DSM-5 25-Trait Dimensional Model from the FFM Perspective

Low	High
Neuroticism	
	Anxiousness
	Emotional lability
	Hostility
	Separation insecurity
	Depressivity
Extraversion	
Intimacy avoidance	Attention seeking
Withdrawal	
Restricted affectivity	
Anhedonia	
Openness	
	Perceptual dysregulation
	Unusual beliefs and experiences
	Eccentricity
Agreeableness	
Suspiciousness	Submissiveness
Grandiosity	
Deceitfulness	
Manipulativeness	
Callousness	
Conscientiousness	
Irresponsibility	Perseveration
Distractibility	Rigid perfectionism
Impulsivity	
Risk taking	

Chapter Two: Method

Participants and Procedure

The participants in this study consisted of 585 undergraduate introductory psychology students from the University of Kentucky who received class credit for their participation. More than half of the participants were female (67%) and their mean age was 19.23 years. Fifty-eight participants did not report their age. Eighty-three percent of the participants identified themselves as Caucasian, 10% as African American, 2% as Asian, 1% as Hispanic and 3% identified as Other.

Participants completed all questionnaires via SurveyMonkey, a secure online survey tool. Each participant consented to participate by choosing the *agree* option in response to an informed consent form administered through SurveyMonkey and then proceeded to complete the battery of questionnaires. Those who did not consent and therefore chose the *disagree* option were automatically exited from the study. The order of administration was standardized across participants. Participants were allowed as much time as necessary to complete the materials (which required approximately 2 hours), and could temporarily suspend participation whenever they felt tired or distracted. At the end of the study, participants were provided with a printable debriefing document.

Due to the online administration of the current study, a conservative threshold was set for exclusion of participants. One hundred participants (17%) were deleted because they did not adequately complete the administered measures. Forty participants (7%) were deleted because they received elevated scores on a validity scale (described later). Some of the remaining 445 participants failed to respond to a few scattered items. Estimated values were obtained for these. Missing data were imputed using the expectation maximization (EM) procedure, which has been

shown to produce more accurate estimates of population parameters than other methods, such as deletion of missing cases or mean substitution (Enders, 2006).

Materials

Validity scale. A five-item validity scale previously developed for Glover, Miller, Lynam, Crego and Widiger (2011) will be used. Each item describes a behavior that is very unlikely to be true (e.g., "I am currently in the Guinness Book of World Records," and "I do not own more than one book"). An endorsement of items on this scale would suggest the participant was not attending sufficiently well to item content. Items are rated on a Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) and will be dispersed among items from other measures.

Personality Inventory for DSM-5 (PID-5; Krueger, Eaton, Derringer, et al., 2011). The PID-5 is the measure of the proposed 25-trait dimensional model for DSM-5. It consists of 220 items rated on a Likert scale ranging from 0 (*very false or often false*) to 3 (*very true or often true*). This instrument contains scales for the 25 traits included within the model. Each scale is assessed by 4 to 14 items. This measure is included as a representation of the DSM-5 trait model. The 25 traits are organized into five domains referred to as Negative Affectivity, Detachment, Psychoticism, Antagonism, and Disinhibition. In order to calculate each of the five domains of the PID-5, all the facet scales listed under each domain in Table 2 were added together in order to yield summary scale scores.

NEO Personality Inventory – Revised (NEO PI-R; Costa and McCrae, 1992). The NEO PI-R is a measure of the FFM of personality and contains 240 items rated on a Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). This instrument contains five broad domain scales (Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness)

which are in turn assessed by six underlying facet scales. There are 48 items for each of the FFM domain scales. Internal consistency coefficients ranged from 0.86 (Agreeableness) to 0.92 (Neuroticism), and 7-year test-retest reliability coefficients ranged from 0.63 to 0.81 (Costa & McCrae, 1992).

5 Dimensional Personality Test (5DPT; Van Kampen, 2012). The 5DPT is a dichotomous 100-item measure of five dimensions: Neuroticism, Extraversion, Absorption, Insensitivity, and Orderliness. Items were either coded as *Yes* (2) or *No* (1). Cronbach's alphas range from .82 (Insensitivity) to .92 (Neuroticism).

Inventory of Personal Characteristics (IPC-5; Tellegen & Waller, 1987). The IPC-5 is a self-report inventory designed to measure Tellegen's seven-factor model of personality, which includes five factors that align with the FFM domains (Negative Emotionality, Positive Emotionality, Conventionality, Agreeability, and Dependability) and two additional factors representing positive and negative evaluation. The measure uses a 4-point Likert scale ranging from *definitely false* to *definitely true.* The present study administered only the 120 items assessing the five factors that align with the five FFM domains.

Factor Analytic Procedures

Due to the a priori hypothesis that the DSM-5 dimensional trait model would align with five factor models of personality, a traditional confirmatory factor analysis (CFA) using the maximum likelihood estimator (MLR) of M*plus 6.12* (Muthen & Muthen, 2011) was considered. However, the use of CFA in replicating personality structure is often considered inappropriate. For example, Hopwood and Donnellan (2010) noted that the standards of CFA are often too stringent for multi-scale personality measures, even those that are factor analytically based. For example, CFA includes a stringent assumption of simple structure wherein scales will be

unrelated to any other factor (Hopwood & Donnellan, 2010; Smith, McCarthy, & Zapolski, 2009). In none of the studies to date with the PID-5, a factor analytically-based measure of the DSM-5 dimensional trait model, has there been an attempt to confirm its factor structure via CFA. All studies to date have used simply exploratory factor analysis (De Fruyt et al., 2012; Krueger et al., in press; Thomas et al., in press; Wright et al., in press), perhaps in large part because there is the expectation and occurrence of considerable cross-loading. Even well established multi-scale personality measures, such as the NEO PI-R, have failed to replicate the specified five factor structure (McCrae, Zonderman, Costa, Bond, & Paunonen, 1996; Vassend & Skrondal, 1997).

Therefore, exploratory structural equation modeling (ESEM), as recommended by Hopwood and Donnellan (2010), was implemented instead, a procedure which combines elements of confirmatory factor analysis with exploratory factor analysis (e.g., Marsh et al., 2010; Rosselini & Brown, 2011; Samuel, Mullins-Sweatt, & Widiger, in press). The MLR estimation procedure for the ESEM analyses was conducted in M*plus 6.12*, with an oblique geomin rotation method because this method allows orthogonal factors to form if the model is indeed orthogonal rather than oblique (Brown, 2001). In line with Marsh et al. (2010), multiple fit indices were used, including the Tucker-Lewis index (TLI) and the comparative fit index (CFI). With respect to the TLI and CFI, values of .90 and .95, respectively, are indicative of acceptable and excellent fit to the data (Hu & Bentler, 1999). Also examined were the root-mean-square error of approximation (RMSEA) for which values less than .05 and .08 indicate a close or reasonable fit to the data, respectively, and the standardized root mean square residual (SRMR), wherein values less than .05 are indicative of good fit (Marsh, Hua, & Wen, 2004).

Chapter Three: Results

Descriptive Statistics

Table 4 presents the means and standard deviations for each of the scales at the domain level. No past studies have reported the means and standard deviations for the IPC-5 or the 5DPT. The PID-5 means were relatively consistent with prior research in a clinical sample (Krueger, Derringer, Markon, Watson, & Skodol, in press) with approximate absolute differences between means ranging from as little as 0.89 to as much as 9.97. The means and standard deviations for the NEO PI-R domains were consistent with past research in a college sample (Costa & McCrae, 1992) with absolute differences between means ranging from as little as .10 to as much as 5.25. The standard deviations were also remarkably consistent ranging from an absolute difference as little as .02 to as much as 1.92.

Table 4

Means and Standard Deviations for Domain-Level Scales

	M	*SD*
PID-5		
Negative Affectivity	60.59	19.33
Detachment	38.63	19.96
Psychoticism	28.09	17.83
Antagonism	37.92	19.06
Disinhibition	43.99	14.00
NEO PI-R		
Neuroticism	92.86	20.19
Extraversion	120.18	18.86
Openness	111.55	17.49
Agreeableness	113.42	16.58
Conscientiousness	113.26	19.18
IPC-5		
Negative Emotionality	59.32	9.61
Positive Emotionality	72.80	10.15
Conventionality	62.47	7.48
Agreeability	65.28	8.23
Dependability	70.29	8.91
5DPT		
Neuroticism	28.55	5.57
Extraversion	34.80	4.35
Absorption	28.80	5.13
Insensitivity	28.01	4.41
Orderliness	32.18	4.39

Note. PID-5 = Personality Inventory for DSM-5 (Krueger, Eaton, Derringer, et al., 2011), NEO PI-R= NEO Personality Inventory-Revised (Costa & McCrae, 1992), IPC-5 = Inventory of Personal Characteristics (Tellegen & Waller, 1987), 5DPT = 5 Dimensional Personality Test (van Kampen, 2012).

Convergent Validity of the PID-5 with other Five Factor Scales

NEO PI-R. Significant convergent validity correlations were obtained across all five domains predicted to be aligned with PID-5 domains (i.e., Neuroticism with Negative Affectivity, Extraversion with Detachment, Openness with Psychoticism, Agreeableness with Antagonism, and Conscientiousness with Disinhibition; see Table 5). Four out of five convergent validity correlations may be considered large ($r > .50$) according to Cohen (1992) with the exception of NEO PI-R Openness with PID-5 Psychoticism which, consistent with expectations, obtained only a small to medium convergence.

Also reported in Table 5 are the correlations with PID-5 domain scales constructed on the basis of the FFM (see Table 3). The correlation between NEO PI-R Extraversion and revised Detachment was found to be significantly stronger than the correlation between Extraversion and Detachment according to the existing DSM-5 placements (t (442) = 7.69, $p < .01$). Similarly, the correlation between NEO PI-R Agreeableness and revised Antagonism was also significantly stronger than the correlation between Agreeableness and Antagonism according to the existing DSM-5 placements (t (442) = 5.23, $p < .01$). However, contrary to expectations, the correlation between NEO PI-R Conscientiousness and revised DSM-5 Disinhibition was weaker than the correlation between Conscientiousness and DSM-5 Disinhibition (t (442) = -4.60, $p < .01$).

Table 5

Correlations Among NEO PI-R Domains and PID-5 Domains

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Negative Affectivity	.64**	-.09	.00	-.19**	-.33**
	(.63**)[a]				
Detachment	.45**	-.47**	-.05	-.38**	-.43**
		(-.62**)			
Psychoticism	.32**	-.19**	.21**	-.29**	-.39**
Antagonism	.13**	-.02	-.03	-.58**	-.31**
				(-.64**)	
Disinhibition	.19**	.02	.17**	-.33**	-.69**
					(-.64**)

Note. NEO PI-R = NEO Personality Inventory-Revised (Costa & McCrae, 1992); PID-5 = Personality Inventory for DSM-5 (Krueger, Eaton, Derringer, et al., 2011).

[a] Correlations in parentheses represent the correlations between each PID-5 domain calculated according to our corrected placements and the corresponding NEO PI-R domain.

Table 6 provides the correlations of the 25 PID-5 subscales (organized according to FFM hypotheses) with the domain scales of the NEO PI-R. Most of the correlations reported in Table 6 align predictably with the correlations reported in Table 5 (e.g., all of the scales in the first grouping align strongly with FFM neuroticism as predicted). Consistent with the FFM (but inconsistent with DSM-5) Depressivity does appear to align more closely with neuroticism than with introversion, Restricted Affectivity appears to align more closely with introversion than it does with neuroticism, and Suspiciousness aligns more closely with antagonism than it does with neuroticism. Attention-Seeking correlated as highly with extraversion as it did with antagonism, Perseveration correlated as highly with neuroticism as it did with conscientiousness. Inconsistent with expectations, Submissiveness failed to correlate with Agreeableness, but did correlate with neuroticism. Note as well the weak correlations of the PID-5 Psychoticism subscales with NEO PI-R Openness (correlating instead with the domains of neuroticism, antagonism, and low conscientiousness).

Table 6

Correlations Among NEO PI-R Domains and PID-5 Scales

	N	E	O	A	C
Anxiousness[a]	.65**	-.16**	.03	-.12*	-.25**
Emotional lability	.54**	-.05	.07	-.13**	-.34**
Hostility	.43**	-.17**	-.08	-.53**	-.31**
Separation insecurity	.42**	.02	-.04	-.07	-.16**
Depressivity	.50**	-.34**	.00	-.29**	-.46**
Attention seeking	.06	.31**	.13**	-.30**	-.17**
Intimacy Avoidance	.13**	-.29**	-.03	-.25**	-.28**
Withdrawal	.34**	-.55**	-.03	-.33**	-.35**
Restricted affectivity	.02	-.26**	-.08	-.33**	-.17**
Anhedonia	.44**	-.54**	-.12*	-.36**	-.40**
Perceptual dysregulation	.34**	-.21**	.14**	-.31**	-.38**
Unusual beliefs and experiences	.16**	-.12*	.10*	-.30**	-.25**
Eccentricity	.32**	-.17**	.28**	-.21**	-.38**
Submissiveness	.31**	-.07	-.09	.07	-.13**
Suspiciousness	.39**	-.25**	-.07	-.43**	-.30**
Grandiosity	-.02	-.02	-.09	-.43**	-.05
Deceitfulness	.26**	-.09	.01	-.55**	-.41**
Manipulativeness	.07	.10*	.05	-.47**	-.18**
Callousness	.10*	-.23**	-.15**	-.56**	-.31**
Perseveration	.43**	-.14**	.03	-.20**	-.35**
Rigid Perfectionism	.16**	.03	-.06	-.12*	.27**
Irresponsibility	.30**	-.19**	.00	-.40**	-.56**
Distractibility	.42**	-.16**	.10*	-.20**	-.58**
Impulsivity	.23**	.08	.17**	-.32**	-.53**
Risk taking	-.09	.28**	.15**	-.28**	-.24**

Note. NEO PI-R = NEO Personality Inventory-Revised (Costa & McCrae, 1992); PID-5 = Personality Inventory for DSM-5 (Krueger, Eaton, Derringer, et al., 2011).

[a]PID-5 scales are grouped by our corrected placements stated in Table 3. For example, the first grouping matches to the scales we predict to be aligned with FFM neuroticism.

IPC-5 scales. Table 7 provides the correlations of the IPD-5 domain scales with the PID-5 domain scales. As predicted, the IPC-5 domains aligned significantly with each of the corresponding PID-5 domains (i.e., IPC -5 Negative Emotionality with PID-5 Negative Affectivity, Positive Emotionality with Detachment, Conventionality with Psychoticism, Agreeability with Antagonism, and Dependability with Disinhibition). All convergent validity correlations would be considered strong ($r > .50$) by Cohen's (1992) standards. The correlation between Conventionality (i.e., the IPC-5 scale that aligns with FFM openness) and Psychoticism was stronger than the correlation between NEO PI-R Openness and Psychoticism. Also reported in Table 7 is the significant convergence of NEO PI-R Openness with IPC-5 Conventionality.

Table 7 also provides the correlations of the revised PID-5 domain scales according to FFM hypothesized placements. The revised placements performed more strongly in two cases: IPC-5 Positive Emotionality became more strongly correlated with PID-5 Detachment (t (442) = 4.15, $p < .01$) and IPC-5 Agreeability became more strongly correlated with PID-5 Antagonism (t (442) = 6.61, $p < .01$). However, IPC-5 Dependability became less strongly correlated with PID-5 Disinhibition (t (442) = -5.28, $p < .01$).

Table 7

Correlations Between IPC-5 Domains with PID-5 Domains and NEO PI-R Openness

	Negative Emotionality	Positive Emotionality	Conventionality	Agreeability	Dependability
Negative Affectivity	.58**	-.23**	-.12*	-.18**	-.34**
	(.57**)[a]				
Detachment	.43**	-.67**	-.33**	-.45**	-.53**
		(-.74**)			
Psychoticism	.26**	-.40**	-.51**	-.36**	-.51**
Antagonism	.13**	-.30**	-.32**	-.49**	-.43**
				(-.57**)	
Disinhibition	.08	-.16**	-.49**	-.35**	-.65**
					(-.59**)
NEO PI-R Openness	-.11*	.13**	-.45**	.10*	-.10*

Note. IPC-5 = Inventory of Personal Characteristics (Tellegen & Waller, 1987); PID-5 = Personality Inventory for DSM-5 (Krueger, Eaton, Derringer, et al., 2011); NEO PI-R = NEO Personality Inventory – Revised (Costa & McCrae, 1992).

[a] Correlations in parentheses represent the correlations between each PID-5 domain calculated according to our corrected placements and the corresponding IPC-5 domain.

5DPT scales. Table 8 provides the correlations of the 5DPT domain scales with the PID-5 domains scales. The 5DPT domains aligned significantly with each of the corresponding PID-5 domains (i.e., 5DPT Neuroticism with PID-5 Negative Affectivity, Extraversion with Detachment, Absorption with Psychoticism, Insensitivity with Antagonism, and Orderliness with Disinhibition). All convergent validity correlations approached or were higher than .50, which Cohen (1992) considered strong. The correlation between Absorption (i.e., the 5DPT scale that aligns with FFM openness) and Psychoticism was stronger than the correlation between NEO PI-R Openness and Psychoticism. Table 8 also provides the significant convergence of NEO PI-R Openness with 5DPT Absorption.

Finally, Table 8 also provides the convergence of the 5DPT domain scales with the revised versions of the PID-5 scales. The revised placements again performed more strongly in two cases: 5DPT Extraversion was more strongly correlated with the revised PID-5 Detachment (t (442) = 6.44, $p < .01$) and Insensitivity was more strongly correlated with the revised PID-5 Antagonism (t (442) = 2.43, $p < .05$).

Table 8

Correlations Between 5DPT Domains with PID-5 Domains and NEO PI-R Openness

	Neuroticism	Extraversion	Absorption	Insensitivity	Orderliness
Negative Affectivity	.62**	-.12*	.23**	.30**	-.08
	(.62**)				
Detachment	.48**	-.46**	.31**	.42**	-.22**
		(-.59**)			
Psychoticism	.31**	-.21**	.46**	.38**	-.26**
Antagonism	.20**	-.05	.22**	.54**	-.19**
				(.57**)	
Disinhibition	.09	.04	.21**	.29**	-.57**
					(-.59**)
NEO PI-R Openness	-.10*	.13**	.39**	-.08	-.16**

Note. 5DPT = 5 Dimensional Personality Test (Van Kampen, 2012); PID-5 = Personality Inventory for DSM-5 (Krueger, Eaton, Derringer, et al., 2011); NEO PI-R = NEO Personality Inventory – Revised (Costa & McCrae, 1992).

[a] Correlations in parentheses represent the correlations between each PID-5 domain calculated according to our corrected placements and the corresponding IPC-5 domain.

Factor Analytic Analyses

First examined was the factor structure of the four five factor measures, using CFA and specifying a five factor model. Consistent with expectations, the model did not result in an adequate fit to the data (CFI = .607, TLI = .534, RMSEA = .182, SRMR = .129). An ESEM analysis was then conducted which resulted in a much closer fit, albeit still not an adequate fit (CFI = .843, TLI = .701, RMSEA = .154, SRMR = .050). However, when evaluating these initial ESEM analyses, it is noteworthy that there is a very high intercorrelation among domain scales within the same measures (e.g., note the high correlations across domains for the PID-5 in Table 9). These high correlations are likely due to measure variance. In order to account for this measurement variance and provide a clearer test of the model, an ESEM analysis specifying the high intercorrelations across domain scales of the same measure was implemented. This subsequent ESEM analysis yielded a model of adequate to excellent fit depending upon the index (CFI = .980, TLI = .939, RMSEA = .070, SRMR = .017).

Table 9

Correlations Among NEO Domains, IPC Domains, DPT Domains, and PID Domains

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. NEO A	-																		
2. IPC A	.67*	-																	
3. DPT I	-.54*	-.48*	-																
4. PID A	-.58*	-.49*	.54*	-															
5. NEO N	-.18*	-.19*	.26*	.13*	-														
6. IPC NE	-.09	-.19*	.28*	.13*	.69*	-													
7. DPT N	-.14*	-.19*	.48*	.17*	.71*	.74*	-												
8. PID NA	-.19*	-.18*	.30*	.51*	.64*	.58*	.62*	-											
9. NEO E	.22*	.20*	-.10	-.02	-.27*	-.17*	-.25*	-.09	-										
10. IPC PE	.31*	.46*	-.25*	-.30*	-.28*	-.21*	-.28*	-.23*	.69*	-									
11. DPT E	.10	.19*	-.02	-.05	-.21*	-.15*	-.19*	-.12	.71*	.67*	-								
12. PID De	-.38*	-.45*	.42*	.65*	.45*	.43*	.48*	.63*	-.47*	-.67*	-.46*	-							
13. NEO O	.13*	.10	-.08	-.03	.04	-.11	-.10	.00	.22*	.13*	.13*	-.05	-						
14. IPC C	.23*	.41*	-.25*	-.32*	-.09	.01	-.07	-.12	.11	.23*	.06	-.33*	-.45*	-					
15. DPT A	-.05	-.14*	.46*	-.22*	.18*	.26*	.39*	.23*	-.02	-.10	.00	.31*	.39*	-.37*	-				
16. PID P	-.29*	-.36*	.38*	.69*	.32*	.26*	.31*	.61*	-.19*	-.40*	-.21*	.76*	.21*	-.51*	.46*	-			
17. NEO C	.27*	.27*	-.23*	-.31*	-.44*	-.26*	-.26*	-.33*	.31*	.32*	.18*	-.43*	-.08	.39*	-.14*	-.39*	-		
18. IPC D	.29*	.47*	-.26*	-.43*	-.32*	-.20*	-.24*	-.34*	.24*	.55*	-.21*	-.53*	-.10	.53*	-.18*	-.51*	.74*	-	
19. DPT O	.11	.17*	.04	-.19*	-.07	.01	.08	-.08	.08	.17*	-.16*	-.22*	-.16*	.39*	.05	-.26*	.62*	.60*	-
20. PID Di	-.33*	-.35*	.29*	.53*	.19*	.08	.09	.33*	.02	-.16*	.04	.43*	.17*	-.49*	.21*	.56*	-.69*	-.65*	-.57*

Note. *$p < .01$, NEO = NEO Personality Inventory-Revised (Costa & McCrae, 1992); NEO A, NEO Agreeableness; NEO N, NEO Neuroticism; NEO E, NEO Extraversion; NEO O, NEO Openness; NEO C, NEO Conscientiousness; IPC = Inventory of Personal Characteristics (Tellegen & Waller, 1987); IPC A, IPC Agreeability; IPC NE, IPC Negative Emotionality; IPC PE, IPC Positive Emotionality; IPC C, IPC Conventionality; IPC D, IPC Dependability; DPT = 5 Dimensional Personality Test (van Kampen, 2012); DPT I, DPT Insensitivity; DPT N, DPT Neuroticism; DPT E, DPT Extraversion; DPT A, DPT Absorption; DPT O, DPT Orderliness; PID = Personality Inventory for DSM-5 (Krueger, Eaton, Derringer, et al., 2011); PID A, PID Antagonism; PID NA, PID Negative Affectivity; PID De, PID Detachment; PID P, PID Psychoticism; PID Di, PID Disinhibition.

Table 10 presents the parameter estimates based on the ESEM solution. The estimates show that the ESEM five factor model both provides an adequate to excellent fit to the data and that the expected domains do align, consistent with a priori hypotheses. The first factor was comprised mainly by the domains convergent with antagonism (i.e., NEO PI-R Agreeableness, IPC-5 Agreeability, 5DPT Insensitivity, PID-5 Antagonism) and also included a moderate loading from NEO PI-R Openness. Factor 1 loadings from convergent factors ranged from .63 (5DPT Insensitivity) to -.93 (NEO PI-R Agreeableness). The second factor was comprised of mostly domains convergent with neuroticism (i.e., NEO PI-R Neuroticism, IPC-5 Negative Emotionality, 5DPT Neuroticism, and PID-5 Negative Affectivity) but included a sizeable loading (.30) for PID-5 Detachment. Convergent factor loadings ranged from .72 (PID-5 Negative Affectivity) to .86 (IPC-5 Negative Emotionality and 5DPT Neuroticism). Factor 3 was comprised of mostly domains convergent with extraversion (i.e., NEO PI-R Extraversion, IPC-5 Positive Emotionality, 5DPT Extraversion, and PID-5 Detachment) with factor loadings ranging from a negative loading from PID-5 Detachment (-.45) to .86 (NEO PI-R Extraversion). Factor 4 is comprised of domains convergent with conscientiousness (NEO PI-R Conscientiousness, IPC-5 Dependability, 5DPT Order, and PID-5 Disinhibition) with factor loadings ranging from .71 (IPC-5 Dependability) to .89 (NEO PI-R Conscientiousness). Factor 5 was comprised mainly of the domains convergent with openness (i.e., NEO PI-R Openness, IPC-5 Conventionality, 5DPT Absorption, and PID-5 Psychoticism) with factor loadings ranging from .45 (PID-5 Psychoticism) to .76 (NEO PI-R Openness).

Table 10

Exploratory Structural Equation Model of the Domain Scales of the NEO PI-R, the PID-5, the IPC-5, and the 5DPT

	Factor 1		Factor 2		Factor 3		Factor 4		Factor 5	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
NEO Agreeableness	**-.93**	.03	.06	.03	.00	.02	-.01	.03	.20	.05
IPC Agreeability	**-.74**	.03	.00	.03	.14	.04	.01	.03	.03	.04
DPT Insensitivity	**.63**	.04	.20	.05	.05	.03	.07	.05	.05	.04
PID Antagonism	**.67**	.04	.01	.03	.06	.04	-.14	.05	.04	.04
NEO Neuroticism	-.05	.03	**.83**	.02	-.02	.02	-.09	.04	-.06	.04
IPC Negative Emo.	-.02	.03	**.86**	.02	.01	.03	.05	.03	-.01	.03
DPT Neuroticism	.01	.02	**.86**	.02	-.06	.03	.09	.03	.01	.03
PID Negative Aff.	.07	.04	**.72**	.03	.08	.04	-.09	.05	.00	.04
NEO Extraversion	.03	.03	.01	.03	**.86**	.02	-.03	.03	.03	.03
IPC Positive Emo.	-.23	.05	-.02	.02	**.80**	.03	.01	.02	-.02	.02
DPT Extraversion	.04	.03	.03	.03	**.85**	.02	-.03	.03	.03	.03
PID Detachment	.28	.05	**.30**	.04	**-.45**	.04	-.10	.05	.12	.04
NEO Conscient.	.04	.02	-.16	.05	.01	.02	**.89**	.03	.11	.04
IPC Dependability	-.09	.04	-.10	.04	.10	.04	**.71**	.03	-.05	.03
DPT Order	.10	.05	.14	.05	.01	.02	**.82**	.03	.00	.02
PID Disinhibition	.20	.05	-.01	.01	.20	.04	**-.74**	.04	.08	.04
NEO Openness	**-.36**	.06	-.04	.02	.11	.05	.00	.01	**.76**	.04
IPC Conventional.	-.08	.05	.05	.03	.07	.04	.22	.06	**-.62**	.05
DPT Absorption	-.03	.02	.26	.05	.00	.02	.16	.06	**.67**	.05
PID Psychoticism	.20	.06	.21	.04	-.15	.05	-.11	.06	**.45**	.05

Note. Factor loadings ≥ |.30| are in boldface. NEO = NEO Personality Inventory-Revised (Costa & McCrae, 1992); NEO Conscient., NEO Conscientiousness; IPC = Inventory of Personal Characteristics (Tellegen & Waller, 1987); IPC Negative Emo., IPC Negative Emotionality; IPC Positive Emo., IPC Positive Emotionality; IPC Conventional., IPC Conventionality; DPT = 5 Dimensional Personality Test (van Kampen, 2012); PID = Personality Inventory for DSM-5 (Krueger, Eaton, Derringer, et al., 2011); PID Negative Aff., PID Negative Affectivity.

Also examined was an ESEM with the same scales but this time using the revised PID-5 scales according to the FFM specified placements (see Table 3). The fit indices for this model, however, did not significantly improve with the revised PID-5 scale placements. Another ESEM was conducted in order to further test proposed trait placements including the 25 PID-5 traits. Table 11 presents the parameter estimates for a five-factor specified ESEM solution of the PID-5 model. The fit indices for this final ESEM analysis ranged from unacceptable (TLI = .877, RMSEA = .090) to acceptable (CFI = .924) and good (SRMR = .027). However, the solution does not replicate well the results obtained with prior exploratory factor analyses. There were a few replications. Factor 1 represents well negative affectivity (including five out of seven proposed traits), Factor 2 representing detachment (including all proposed traits with loadings above .30), and Factor 3 representing antagonism (including all proposed traits with loadings above .30). However, Factor 4, to a lesser extent replicates disinhibition (including three out of five proposed traits with loadings above .30); many of the scales that should load on antagonism loaded as highly on the detachment factor (Callousness in fact loaded above .80); Factor 5 appears poorly defined, with the main loadings on Factor 5 including traits from negative affectivity (i.e., emotional lability, separation insecurity, and restricted affectivity); no factor representing psychoticism was obtained.

Table 11

Exploratory Structural Equation Model of the PID-5 Trait Scales

	Factor 1		Factor 2		Factor 3		Factor 4		Factor 5	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Anxiousness[a]	**.77**	.04	-.01	.04	-.03	.04	.08	.07	-.10	.06
Emotional lability	**.64**	.05	.05	.04	.01	.02	.22	.06	**-.34**	.05
Hostility	.28	.05	**.44**	.05	.29	.05	.09	.08	-.08	.04
Separation insec.	**.63**	.05	-.01	.03	.21	.06	-.02	.04	**-.31**	.07
Depressivity	**.36**	.06	**.69**	.04	-.11	.04	.01	.03	-.17	.04
Attention seeking	.06	.05	.01	.02	**.54**	.08	.31	.15	-.17	.06
Intimacy avoidance	-.05	.04	**.71**	.05	-.05	.04	.05	.04	.20	.06
Withdrawal	.29	.05	**.72**	.06	-.03	.03	-.09	.06	.25	.04
Restricted aff.	.01	.03	**.52**	.07	.19	.07	.08	.09	**.46**	.05
Anhedonia	**.32**	.07	**.78**	.06	-.06	.04	-.24	.05	.02	.03
Perceptual dys.	.28	.05	**.49**	.05	.03	.04	**.30**	.06	.05	.04
Un. bel. and exp.	.17	.05	**.45**	.06	.21	.06	.23	.10	.12	.05
Eccentricity	**.35**	.09	.10	.07	-.03	.05	**.55**	.10	.24	.06
Submissiveness	**.59**	.06	-.14	.06	.13	.06	.05	.07	.00	.04
Suspiciousness	**.30**	.05	**.51**	.05	.13	.04	-.01	.05	-.03	.04
Grandiosity	-.03	.03	**.54**	.06	**.59**	.06	-.14	.12	.01	.03
Deceitfulness	.03	.03	**.52**	.05	**.39**	.08	.22	.11	-.06	.04
Manipulativeness	-.01	.03	**.31**	.07	**.59**	.09	.14	.15	-.01	.04
Callousness	-.17	.04	**.86**	.04	**.30**	.06	.03	.05	.02	.03
Perseveration	**.64**	.07	.01	.02	.09	.05	**.40**	.11	.09	.05
Rigid perfectionism	**.53**	.06	-.02	.02	**.46**	.05	-.16	.14	.10	.08
Irresponsibility	-.01	.03	**.73**	.04	.05	.05	.22	.05	-.16	.05
Distractibility	**.39**	.07	.13	.06	-.15	.05	**.59**	.07	-.02	.03
Impulsivity	.01	.06	.07	.06	-.01	.08	**.77**	.06	-.07	.05
Risk taking	-.22	.10	-.14	.08	.17	.11	**.70**	.10	.02	.03

Note. Factor loadings ≥ |.30| are in boldface. PID = Personality Inventory for DSM-5 (Krueger, Eaton, Derringer, et al., 2011); Separation insec., Separation insecurity; Restricted aff., Restricted affectivity; Perceptual dys., Perceptual dysregulation; Un. bel. and exp., Unusual beliefs and experiences.
[a]PID-5 scales are grouped by our corrected placements stated in Table 3. For example, the first grouping matches to the scales we predict to be aligned with FFM neuroticism.

Chapter Four: Discussion

The purpose of the present study was to investigate the relationship between the DSM-5 dimensional trait model and five factor models of general personality structure. It was the hypothesis of this study that the domains of the DSM-5 model would align in expected ways with FFM domains (i.e., negative affectivity with FFM neuroticism, detachment with FFM introversion, antagonism with FFM antagonism, disinhibition with low FFM conscientiousness and openness with psychoticism). In addition, it was also predicted that there would be better fit with FFM domains when the 25 PID-5 trait placements were revised to be more consistent with their placement within the FFM; more specifically, shifting lack of restricted affectivity and submissiveness from negative affectivity into detachment and low antagonism (respectively); shifting depressivity and suspiciousness from detachment into negative affectivity and antagonism (respectively); shifting perseveration from negative affectivity into low disinhibition; and shifting attention seeking from antagonism into low detachment.

Trait Placements

The current study found mixed support for the alternative FFM placements of the PID5 trait scales. Convergence of PID-5 Detachment with FFM introversion did improve when PID-5 Depressivity and Suspiciousness were removed, and Restricted Affectivity was added. PID-5 Depressivity and Suspiciousness did correlate with NEO PI-R Introversion, but they did appear to correlate more highly with neuroticism and antagonism, respectively. This improved convergence was also evident (albeit to a lesser extent) with the 5DPT and IPC-5.

However, there was no improved convergence with the NEO PI-R, 5DPT and IPC-5 assessments of neuroticism and/or negative affectivity when PID-5 Lack of Restricted Affectivity and Submissiveness were removed and Depressivity was added to this domain. This

was somewhat surprising given that PID-5 Depressivity correlated more highly with neuroticism than it did with introversion; PID-5 Restricted Affectivity did not correlate at all with neuroticism (and did correlate with introversion); and PID-5 Suspiciousness correlated as highly with antagonism as it did with neuroticism. In the ESEM analyses, Depressivity did align with Factor 1, which appeared to tap into negative affectivity. Submissiveness loaded highly on this factor (contrary to the hypothesis in Table 3) and Restricted Affectivity did not load on this factor (consistent with Table 3). The findings for PID-5 Suspiciousness were not replicated; Suspiciousness loaded on Factor 1, measuring negative affectivity, and Factor 2, measuring detachment.

There was only a modest improvement in convergence of PID-5 Antagonism with FFM antagonism when PID-5 Submissiveness, Suspiciousness, and Attention Seeking were added to this domain. Suspiciousness correlated appreciably with NEO PI-R Antagonism, but adding it to this domain is unlikely to improve substantially its convergence with FFM antagonism given that it is only one five (or six) scales, and its correlation with NEO PI-R Antagonism was no higher than obtained by any other PID-5 scale. In the ESEM analyses, Suspiciousness loaded highly on Factor 2, representing detachment (inconsistent with the hypothesis in Table 3) and Submissiveness only loaded highly on Factor 1, measuring negative affectivity (inconsistent with the hypothesis in Table 3). In the ESEM analyses, Attention Seeking loaded only on Factor 3, the antagonism factor consistent with prior research indicating that attention seeking does involve a degree of antagonism (Gore, Tomiatti, & Widiger, 2011).

In addition, PID-5 Submissiveness did not correlate at all with NEO PI-R Agreeableness. This likely reflects in part to the lack of maladaptive agreeableness within the NEO PI-R assessment of this domain (Lowe et al., 2009; Gore & Pincus, 2012). Haigler and Widiger (2001)

reported that 83% of the NEO PI-R agreeableness items were measuring adaptive rather than maladaptive agreeableness. They created an experimentally altered version of the NEO PI-R by inserting words in the test items to change the direction of the maladaptivity without changing the content of the items. For example, the NEO PI–R altruism items "I try to be courteous to everyone I meet," "Some people think of me as cold and calculating" (reverse keyed), "I think of myself as a charitable person," "Some people think I'm selfish and egotistical" (reverse keyed), and "I go out of my way to help others if I can" (Costa & McCrae, 1992, p. 72) all describe behavior for which it would be preferable (or adaptive) to endorse the item in the altruistic direction. The experimentally altered versions were "I am overly courteous to everyone I meet," "I can be cold and calculating when it's necessary," "I am so charitable that I give more than I can afford," "Most people think that I take good care of my own needs," and "I have sacrificed my own needs to help others" (respectively). Experimentally altering these items meant that 83% of the items contained within the experimentally altered version of the NEO PI-R described maladaptive, dysfunctional variants of agreeableness. NEO PI-R agreeableness correlated .04, .17, and .04 with three independent measures of dependent personality disorder. These correlations increased to .57, .66, and .45 (respectively) with the experimentally altered version. Lowe et al. (2009) subsequently replicated and extended these findings with additional measures of dependency.

In sum, only mixed support was obtained for the alternative placements of the PID-5. Nevertheless, it should also be noted that in the most current version of the DSM-5 dimensional trait model posted on the APA website, alternative trait placements more consistent with the hypotheses of this study are now posted. More specifically, some of the traits are provided with alternative or multiple placements. For example, depressivity is still included within detachment,

but it is also now included within negative affectivity; and lack of restricted affectivity is still included with negative affectivity, but it is also now included as well within detachment (as restricted affectivity). No explanation is provided for these dual placements but it likely reflects more recent PID-5 findings, and the dual placement for depressivity is consistent with the current findings.

There is no dual placement, however, for submissiveness or perseveration. There is a dual placement for suspiciousness, but both are inconsistent with the FFM placement of this trait. Suspiciousness remains within detachment but it is also now included within negative affectivity. It is unclear whether these dual placements will remain in the final version of the DSM-5 dimensional trait model. Existing studies with the PID-5 have not included these dual placements and have consistently used the original placements as indicated in Table 2.

Prior research has replicated the five-factor structure of the PID-5 across clinical (Krueger et al., in press) and student samples (Wright et al., in press) using exploratory factor analyses. The current results using exploratory structural equation modeling, however, only partially replicated the prior research. Most of the negative affectivity traits loaded on Factor 1; all of the traits from detachment loaded on Factor 2; all of the traits from antagonism loaded on Factor 3; and most of the traits from disinhibition loaded on Factor 4. However, contrary to past research, the present study did not confirm a fifth domain of psychoticism. In fact, none of the traits from psychoticism loaded above .30 on Factor 5. Instead, all three of the traits from psychoticism loaded onto Factor 2, the detachment domain.

An additional primary focus of the current study was the convergence of PID-5 psychoticism with FFM openness. Initial and recent DSM-5 Work Group presentations of the DSM-5 dimensional trait model have adamantly rejected any relationship of PID-5 psychoticism

with FFM openness (Clark & Krueger, 2010; Krueger et al., 2011, in press). This relationship has been weak and/or inconsistently reported, but there is nevertheless support for this association. For example, Watson, Clark, and Chmielewski (2008) reported a separation of adaptive openness from maladaptive peculiarity in their particular factor analysis but four other factor analytic studies by Camisa et al. (2005), Kwapil, Barrantes-Vidal, and Silvia (2008), McCrae et al. (1986), and Wiggins and Pincus (1989) reported that cognitive-perceptual aberrations and/or schizotypal symptoms clearly load on the FFM openness factor.

One potential explanation for the relatively weak relationship of FFM openness with oddity, eccentricity, and/or psychoticism is again the absence of much representation of maladaptive openness within the NEO PI-R, the predominant measure used in most FFM personality disorder studies. In fact, the NEO PI-R Openness scale was constructed prior to any knowledge of Costa or McCrae with respect to the lexical Big Five. Costa and McCrae (1980) began with just a three-factor model, assessed by the NEO Inventory (Costa & McCrae, 1980; McCrae & Costa, 1983). A primary focus for them at that time was the distinctions between their three-factor model and that of Eysenck (Eysenck & Eysenck, 1975). The principle distinction was their inclusion of a scale concerning openness to experience that they argued was a fundamentally important domain of general personality. Their reference points for the construct of openness was the writing of Rogers (1961) concerning self-actualization and self-realization, the work of Coan (1981) on the optimal personality, and Rokeach (1960) on the open mind (e.g., McCrae & Costa, 1980). Of relevance to the current study, they did not conceptualize this domain as having a clear maladaptive variant. On the contrary, they considered persons high in openness to evidence indications of ideal mental health, being highly open-minded, self-actualizing, and evidencing the optimal personality.

Soon after the development of the NEO Inventory, however, Costa and McCrae became more fully aware and/or appreciative of the Big Five model (Costa & McCrae, 1986; McCrae, 1990). The work of Goldberg (1980) was particularly influential. They eventually extended their three-factor model to include agreeableness and conscientiousness (Costa & McCrae, 1985). However, they did not revise their NEO Inventory Neuroticism, Extraversion, or Openness scales to ensure that they would be fully commensurate with the Big Five. This does not appear to have been a particularly difficult problem for their assessment of neuroticism or extraversion, but it has perhaps been somewhat problematic for their assessment of openness. As they acknowledged, openness to values, feelings, aesthetics, fantasy, and actions were not well represented within the trait lexicon that informed the lexical Big Five (McCrae, 1990).

It was partly for this reason that the current study included alternative measures of this domain of personality, notably the 5DPT (Van Kampen, 2012) and the (IPC-5 (Tellegen & Waller, 1987), which include subscales and/or items that are more suggestive of unconventionality, eccentricity, and peculiarity that are hypothesized to be maladaptive variants of FFM openness (Widiger, 2011). The results of the ESEM did support a common five-factor structure for the PID-5, NEO PI-R, 5DPT, and IPC-5. The loading of PID-5 Psychoticism on the fifth factor was lower than was obtained for the NEO PI-R, 5DPT, and IPC-5. This may again reflect that the NEO PI-R, 5DPT, and IPC-5 are all measures of general personality whereas the PID-5 is confined to abnormal personality. The PID-5 loaded as strongly as the NEO PI-R, 5DPT, and IPC-5 on three other factors; however, in all three of these cases the items for are keyed largely in the same maladaptive direction as the PID-5. For example, over 80% of the NEO PI-R items assessing neuroticism, antagonism, and low conscientiousness also concern maladaptive traits (Haigler & Widiger, 2001), consistent with the focus of the PID-5.

The psychoticism domain of the DSM-5 dimensional trait proposal was originally titled "schizotypy." The Watson et al. (2008) term for this domain was "oddity." It is unclear why the name was changed to psychoticism, but this may now reflect a severity of cognitive-perceptual aberrations that is indeed outside of the domain of general personality structure. Psychoticism can imply the presence of psychotic delusions and/or hallucinations, and some of the items on the PID-5 may in fact suggest this severity of cognitive or perceptual aberration (e.g., "I have some unusual abilities, like sometimes knowing exactly what someone is thinking," "Sometimes I feel 'controlled' by thoughts that belong to someone else," and "Sometimes I think someone else is removing thoughts from my head"). Items that suggest Schneiderian delusions (Schneider, 1959), such as thought control and thought broadcasting, are perhaps best understood as part of a psychotic disorder rather than reflecting the magical thinking and perceptual confusions that would be evident in persons who are just odd, peculiar, and/or eccentric in a schizotypic manner (Ashton & Lee, 2012).

It is perhaps no coincidence that a proposal of DSM-5 likely to be approved is to shift the schizotypal personality disorder out of the personality disorder section and into a new section concerning schizophrenia-spectrum disorders, along with schizophrenia and brief psychotic disorder (APA, 2012; Skodol, 2012). This proposal does have empirical support (Krueger, 2005; Siever & Davis, 1991). Schizotypal is already classified as a form of schizophrenia in the World Health Organization's (WHO) International Classification of Diseases (ICD-10; WHO, 1992). It is genetically related to schizophrenia, most of its neurobiological risk factors and psychophysiological correlates are shared with schizophrenia (e.g., eye tracking, orienting, startle blink, and neurodevelopmental abnormalities), and the treatments that are effective in

ameliorating schizotypal symptoms overlap with treatments used for persons with schizophrenia (Krueger, 2005; Lenzenweger, 2006).

There are some arguments for continuing to conceptualize schizotypic thinking as a maladaptive personality trait rather than as a form of schizophrenia. Schizotypal personality disorder is far more comorbid with other personality disorders than it is with other schizophrenia-spectrum disorders, persons with schizotypal personality disorder rarely go on to develop schizophrenia, and schizotypal traits are seen in quite a number of persons who lack a genetic association with schizophrenia and would not be at all well described as being schizophrenic (Links & Eynan, in press; Raine, 2006; Widiger, 2012). Nevertheless, to the extent that the schizotypic or psychotic "traits" do refer to delusions and/or hallucinations, it may indeed be more appropriate to classify them as a form of psychotic rather than personality disorder.

It is perhaps also worth noting that PID-5 Detachment also loaded relatively lower on the third factor than the NEO PI-R, 5DPT, and IPC-5, similar to the relatively lower loading for Psychoticism on the fourth factor. This finding was unexpected, as there is no dispute that PID-5 Detachment aligns with FFM introversion (Krueger et al., 2011). It may reflect in part that PID-5 Detachment includes Depressivity and Suspiciousness that perhaps are more appropriately placed within the domains of neuroticism and antagonism, respectively. PID-5 Detachment did obtain a secondary loading within the second factor, defined by the scales assessing neuroticism and negatively emotionality (due in large part perhaps by the inclusion of depressivity) and a marginal secondary loading of .28 within the first factor, defined by the scales assessing antagonism (due in large part perhaps by the inclusion of suspiciousness). None of the other PID-5 scales obtained as much secondary loading, including Psychoticism.

In any case, the ESEM analysis did support the presence of a common five-factor structure, including psychoticism within the same domain as FFM openness. This is consistent with some recent PID-5 studies. For example, Thomas et al. (in press) reported an exploratory factor analysis involving the PID-5 and the Five Factor Model Rating Form (FFMRF: Mullins-Sweatt et al., 2006). They suggested that a five factor solution best explained the covariation between the PID-5 and the FFMRF, and concluded that "the structure of the DSM-5 personality traits corresponds to the structure of the FFM" (Thomas et al., in press, p. 6), including an alignment of psychoticism with openness. The same finding and conclusion was reached by De Fruyt, De Clerq, De Bolle, Markon, and Krueger (2012) in a joint factor analysis of the PID-5 with the NEO PI-R. Wright et al. (in press) likewise reported the results of an exploratory factor analysis of the PID-5, and concluded that "the five-factor structure is easily recognizable and best interpreted as maladaptive variants or pathological forms of the Big Five factors" (p. 4). In sum, although the earlier presentations of the DSM-5 dimensional trait model has emphasized a lack of congruence of psychoticism with FFM openness (Clark & Krueger, 2010; Krueger et al., 2011), this position might indeed be shifting.

Limitations

A strength of the current study was the inclusion of three alternative measures of general personality functioning. Prior studies testing empirically the convergence of the PID-5 with general personality functioning have included only one such measure (e.g., De Fruyt et al., 2012; Thomas et al., in press). Nevertheless concerns could be raised with respect to the choice of measures; more specifically, that the 5DPT and IPC-5 are not actually direct measures of the FFM, as described by Costa and McCrae (1992). Both have been presented as alternatives to the FFM (Almagor et al., 1987; van Kampen, 2012). However, the authors of each instrument do

state explicitly that their respective domains do align with the FFM domains of neuroticism, extraversion, openness, agreeableness, and conscientiousness (some of the scales even share the same names as the NEO PI-R scales). Almagor et al. (1987) stated that their scale titled Conventionality "corresponds to the Big Five dimension of … (reversed) Openness" (p. 301). Van Kampen (2012) has also reported "convergent correlations between 5DPT [Absorption] and the NEO-FFI and HEXACO-PI-R Openness to Experience scales" (p. 97). Nevertheless, it would be useful for future studies to consider additional measures of the FFM (de Raad & Perugini, 2002) and/or closely related dimensional models of general personality, such as the HEXACO Personality Inventory (Lee & Ashton, 2004).

An additional potential limitation of the current study was the sampling of an undergraduate student population. Prior research has indicated that the structure of the PID-5 is congruent across clinical (Krueger et al., in press) and student samples (Wright et al., in press). Nevertheless, the bulk of the existing PID-5 research has been confined largely to college samples (e.g., Hopwood, Thomas, Markon, Wright, & Krueger, in press; Thomas et al., in press: Wright et al., in press) and it would be useful to extend this research into a clinical population wherein there would be an improved range of maladaptive personality functioning.

Conclusions

In conclusion, the present findings support the hypothesis that the dimensional trait model proposed for DSM-5 is aligned with five factor models of general personality. More generally speaking, the findings also support hypothesis that personality disorder traits are maladaptive variants of FFM traits (Clark, 2012; Widiger & Trull, 2007). The present study also connects the PID-5 with the broader nomological network of personality research by examining how it relates to pre-existing measures.

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HONORS & AWARDS

2010-2011	Kentucky Opportunity Fellowship
2009	James Miller Award, for poster on Cognitive schemas, personality disorders and the five-factor model
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PUBLICATIONS

Widiger, T. A., & **Gore, W. L.** (in press). Dimensions vs. categorical models of psychopathology. In R. Cautin & S. Lilienfeld (Eds.), *The encyclopedia of clinical psychology*. NY: Wiley-Blackwell.

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PROFESSIONAL POSITIONS

2011-Present	**Department of Psychology, University of Kentucky** *Teaching Assistant*
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