

Capturing the *DSM-5* Alternative Personality Disorder Model Traits in the Five-Factor Model's Nomological Net

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Abstract

Several studies have shown structural and statistical similarities between the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*) alternative personality disorder model and the Five-Factor Model (FFM). However, no study to date has evaluated the nomological network similarities between the two models. The relations of the Revised NEO Personality Inventory (NEO PI-R) and the Personality Inventory for *DSM-5* (PID-5) with relevant criterion variables were examined in a sample of 336 undergraduate students ($M_{\text{age}} = 19.4$; 59.8% female). The resulting profiles for each instrument were statistically compared for similarity. Four of the five domains of the two models have highly similar nomological networks, with the exception being FFM Openness to Experience and PID-5 Psychoticism. Further probing of that pair suggested that the NEO PI-R domain scores obscured meaningful similarity between PID-5 Psychoticism and specific aspects and lower-order facets of Openness. The results support the notion that the *DSM-5* alternative personality disorder model trait domains represent variants of the FFM domains. Similarities of Openness and Psychoticism domains were supported when the lower-order aspects and facets of Openness domain were considered. The findings support the view that the *DSM-5* trait model represents an instantiation of the FFM.

Over the past two decades, a growing chorus of discontent with the traditional conceptualization of personality disorders (PDs) in the American Psychiatric Association's (APA's) *Diagnostic and Statistical Manual of Mental Disorders* (*DSM*) has been expressed by researchers and clinicians. Concerns with these categorical constructs are many and varied, but chief among them are the lack of compelling scientific support and a disconnection from theories of normal personality functioning (Clark, 2007; Skodol, 2014; Trull & Durrett, 2005). For these reasons, a number of scholars have advanced the hypothesis that the same five trait domains that describe general personality (John, Naumann, & Soto, 2008) might also be used to conceptualize pathological aspects of personality (e.g., Widiger & Trull, 2007).

Research has suggested that general personality functioning can be well described by the Five-Factor Model (FFM), or the Big Five. The FFM is an integrative model consisting of five broad dimensions: Extraversion versus Introversion, Agreeableness versus Antagonism, Conscientiousness versus Disinhibition, Neuroticism versus Emotional Stability, and Openness to Experience versus Closedness to Experience. Although alternatives to the FFM exist (Ashton, Lee, & Goldberg, 2004), it has garnered impressive validity support, including universality

across cultures (McCrae & Terracciano, 2005), temporal stability coefficients ranging between .50 and .80 (Ferguson, 2010; Roberts & Mroczek, 2008), and heritability estimates around .50 (Yamagata et al., 2006). Thus, conceptualizing PD in terms of the FFM has the substantial benefit of addressing those concerns about the traditional PD categories by applying this vast literature supporting the validity of the FFM to the classification of mental illness.

The FFM approach to PD has also achieved a great deal of empirical support (Clark, 2007; Widiger & Mullins-Sweatt, 2009). This includes evidence for a shared hierarchical structure between normative and maladaptive traits (Markon, Krueger, & Watson, 2005), consistent and predictable relations with PD constructs (Lynam & Widiger, 2001; Samuel & Widiger, 2008; Saulsman & Page, 2004), and complementary assessment ranges (Samuel, Carroll, Rounsaville, & Ball, 2013; Samuel, Simms, Clark, Livesley, & Widiger, 2010; Walton, Roberts, Krueger, Blonigen, & Hicks, 2008). In fact, a recent special issue of this journal dealt specifically with the advantages and

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empirical support for integrating normal and abnormal personality structure using the FFM (Widiger & Costa, 2012).

Thus, the fifth edition of the *DSM* (i.e., *DSM-5*; APA, 2013) took a sizable and important step by incorporating a dimensional model of PD in Section III (Emerging Measures and Models). This alternative PD model consists of 25 specific trait facets that are hierarchically organized under five broader trait domains—Negative Affectivity, Antagonism, Detachment, Disinhibition, and Psychoticism—that correspond conceptually with the FFM. In fact, the *DSM-5* states explicitly that these five domains are “maladaptive variants of the extensively validated and replicated personality model known as the ‘Big Five,’ or the Five-Factor Model of Personality” (p. 773). Thus, it is crucial to understand the similarities of these models and determine the link between the *DSM-5* alternative trait model and the FFM. Existing research has suggested correlational and structural similarities between the models, but it is not yet known if the *DSM-5* trait model fits into the well-understood nomological network of the FFM.

The *DSM-5* Alternative PD Model Traits as an Instantiation of the Five-Factor Model

It is important to note that the *DSM-5* trait model was developed from the bottom-up as a part of that process, rather than top-down based on an extant model of personality. The *DSM-5* process aimed to develop a model that comprehensively captured the universe of personality pathology and began with the 10 members of the work group nominating trait terms that they felt were important for inclusion. This point of departure is crucial in that the degree to which the resulting model matches the FFM then reflects the true overlap of these systems and not the reification of the FFM of PD hypothesis (Krueger et al., 2011). Utilizing iterative item and scale selection procedures, they ultimately determined that these could be sorted into 25 lower-order facets that were operationalized in a self-report personality measure: the Personality Inventory for the *DSM-5* (PID-5; Krueger, Derringer, Markon, Watson, & Skodol, 2012). Structurally, these 25 traits arrange themselves into five higher-order domains, whether assessed by self-report (Krueger et al., 2012), informant report (Markon, Quilty, Bagby, & Krueger, 2013), or ratings by treating clinicians (Morey, Krueger, & Skodol, 2013). Although there have been some exceptions (e.g., Ashton, Lee, de Vries, Hendrickse, & Born, 2012), these five domains have emerged consistently for the PID-5 alone (Wright et al., 2012) and when it has been analyzed jointly with other measures (e.g., Griffin & Samuel, 2014; Wright & Simms, 2014). Within these structural analyses, the *DSM-5* domains corresponded to the familiar FFM domains in predicted ways for four of the five domains. Specifically, *DSM-5* Negative Affectivity corresponds to FFM Neuroticism, *DSM-5* Antagonism to reversed FFM Agreeableness, *DSM-5* Detachment to reversed FFM Extraversion, and *DSM-5* Disinhibition to reversed FFM Conscientiousness.

DSM-5 Psychoticism is conceptually linked with FFM Openness to Experience, although this connection has not been sup-

ported as clearly as the other four domains in the empirical literature. There are several studies that have supported the link between the two (e.g., Gore & Widiger, 2013; Griffin & Samuel, 2014; Thomas et al., 2013), but also a number that did not support the link through zero-order correlations (Markon et al., 2013; Watson, Stasik, Ro, & Clark, 2013; Zimmermann et al., 2014) or factor analysis (Ashton et al., 2012). Still others were more equivocal (De Fruyt et al., 2013), including a study from Quilty, Ayeart, Chmielewski, Pollock, and Bagby (2013) that reported a negligible zero-order correlation between PID-5 Psychoticism and the domain of FFM Openness, but found that the facet of Openness to Fantasy was a significant predictor of Psychoticism. This mirrors the broader literature that has found an inconsistent link between FFM Openness and schizotypal PD (e.g., Ross, Lutz, & Bailey, 2002; Samuel & Widiger, 2008; Watson, Clark, & Chmielewski, 2008).

Indeed, the strength of the link of Openness with schizotypy/psychoticism depends largely on the measures that are employed (Chmielewski, Bagby, Markon, Ring, & Ryder, 2014; DeYoung, Grazioplene, & Peterson, 2012; Edmundson, Lynam, Miller, Gore, & Widiger, 2011; Haigler & Widiger, 2001). Specifically, DeYoung, Quilty, and Peterson (2007) proposed that the Openness domain comprises two related aspects: intellect and openness. (For readability, the overarching domain will be capitalized, and DeYoung’s aspect will be presented in lowercase.) Within this model, DeYoung and colleagues (2012) hypothesize that the two aspects form a paradoxical simplex whereby they are negatively related to one another, but both positively load on the overall Openness domain. DeYoung’s openness aspect is proposed to relate to schizotypy or apophenia, and the intellect aspect is proposed to relate to intelligence. Therefore, according to this model, the openness aspect will relate to PID-5 Psychoticism whereas intellect will not, thus obscuring domain-level findings. In sum, as noted by Krueger and Markon in their review of the literature,

the empirical structure of the 25 elements of maladaptive personality measured by the PID-5 appeared to represent maladaptive extremes of the five-factor model (FFM) of personality that has usefully framed extensive research in the field of personality and individual differences (Widiger & Costa, 2012, 2013). Even though some members of the Personality and Personality Disorder work group were not interested in the FFM or deemed it irrelevant to understanding PDs, their own ideas about fundamental underlying elements of PD appeared to organize empirically into domains that closely resembled those of the FFM. (2014, p. 478)

Scores on the PID-5 scales have already demonstrated their ability to account for the *DSM-IV* PD criteria (APA, 1994; Few et al., 2013; Hopwood, Thomas, Markon, Wright, & Krueger, 2012; Samuel, Hopwood, Krueger, Thomas, & Ruggero, 2013). Thus, it appears that the PID-5 has validity for its intended purpose as a measure of personality pathology, yet important questions remain about the extent to which it covers the normal

ranges of these traits (Krueger & Markon, 2014). More recently, this work has been extended beyond structural models to investigate the respective ranges of the PID-5 and an existing measure of the FFM using item response theory (Suzuki, Samuel, Pahlen, & Krueger, 2015) within a large community sample to compare the measurement precision of the PID-5 to the International Personality Items Pool-NEO (IPIP-NEO; Goldberg et al., 2006). They found that the scales from these two measures could be combined to form unidimensional latent traits (with the exception of the PID-5 Psychoticism and IPIP-NEO Openness to Experience domain). Further, they reported that the two measures were largely overlapping, but “differences that did emerge suggested that the PID-5 scales generally had higher thresholds and provided more information at the upper levels, whereas the IPIP-NEO generally had an advantage at the lower levels” (Suzuki et al., 2015, p. 343). This provided support for the dimensional hypothesis that PD pathology generally represents a more extreme manifestation of the same traits that are largely adaptive at more moderate levels.

Although this initial evidence supports the conclusion, important questions remain before determining that the *DSM-5* alternative traits are an instantiation of the FFM. These include the replicability of creating and using measures of the *DSM-5* alternative traits other than the PID-5, replicability when using different sources of information (e.g., informant) and samples, and similarities in behavior predictability in prospective studies. The current article addresses whether the *DSM-5* traits demonstrate similar temporal consistency and reproduce the nomological network that has been well demonstrated by the FFM (John et al., 2008).

The Nomological Network of the FFM Domains

The FFM domains have evidenced meaningful empirical associations with a number of consequential criteria, including individual, societal, and interpersonal outcomes (Ozer & Benet-Martínez, 2006). Specifically, the review by Ozer and Benet-Martínez (2006) indicated that the FFM traits of Extraversion and Neuroticism have predictable relations to subjective well-being, Agreeableness relates to religiosity, and Extraversion and Conscientiousness relate to physical health behaviors and ultimately longevity. It has also been repeatedly demonstrated that personality traits have important links with psychopathology (Kotov, Gamez, Schmidt, & Watson, 2010; Samuel & Widiger, 2008).

The FFM domains also have demonstrated links with interpersonal and social functioning. There are particularly strong positive relations for Agreeableness and Extraversion with social outcomes such as popularity, dating frequency, and self-rated attractiveness (Paunonen & Ashton, 2001). Further links have been demonstrated between the FFM domains and relationship satisfaction and functioning with family, friends, and romantic partners (Hopwood et al., 2009; Mullins-Sweatt &

Widiger, 2010; Ozer & Benet-Martínez, 2006). In addition, the FFM domains have important links to societally consequential outcomes. For example, the domain of Conscientiousness has a well-established link to scholastic and occupational successes, as well as the degree to which individuals follow laws (e.g., traffic tickets and criminality; Ozer and Benet-Martínez, 2006). Openness is a more nuanced and internal domain. High scores on this domain generally relate to artistic interests, creativity, years of education, specific aspects of spirituality (e.g., mystical experiences, paranormal beliefs), and substance use disorders, whereas low levels of Openness predict poor identity development (i.e., foreclosure) and social/political conservatism (Ozer & Benet-Martínez, 2006). Given these relationships, we should expect the *DSM-5* PD trait domains to manifest similar relations with these variables if they are variants of the FFM.

In addition, the FFM is generally well understood to be reasonably stable across brief and longer time intervals (Ferguson, 2010; Roberts & DelVecchio, 2000). Specifically, the domains of the Revised NEO Personality Inventory (NEO PI-R; Costa & McCrae, 1992) have been shown to be highly stable over periods of 1 week ($Mdn = .92$; McCrae, Kurtz, Yamagata, & Terracciano, 2011) and have evinced very high correlations ($Mdn = .81$) even over 6 years (Terracciano, Costa, & McCrae, 2006). A recent study by Wright and colleagues (2015) is the first we are aware of to report on the test-retest stability of the PID-5 and revealed comparable, albeit slightly lower, test-retest correlations for the domains ($Mdn = .73$) over a year. Their results suggest that the stability of the *DSM-5* traits is similar to that of the FFM. Further, the values from Wright et al. (2015) show comparable consistency to other self-report measures of pathological personality traits (Samuel et al., 2011), although higher stability than interview-based PD measures (Hopwood et al., 2013). Nonetheless, it would be helpful to evaluate the consistency of the NEO PI-R and PID-5 within the same sample over the same intervals to provide a direct comparison.

The Present Study

Although there seems to be consensus that the *DSM-5* alternative PD model traits and the FFM share a structure at the broad domain level, it is still unclear how the domains' nomological networks converge and differ (Cronbach & Meehl, 1955). The aim of the present study was to assess both the PID-5 and a predominant measure of the FFM (i.e., the NEO PI-R) at repeated intervals and compare their relations with a number of consequential outcomes. These included indicators such as subjective well-being, social and interpersonal functioning, scholastic performance, and a variety of more specific behavioral outcomes (e.g., playing musical instruments, smoking cigarettes, traffic violations, donating blood) drawn from the Behavioral Rating Form (BRF) developed by Paunonen and Ashton (2001). These indicators were chosen because they were used in a previous similar study (Paunonen & Ashton, 2001) and were known to have links to the FFM (Ozer & Benet-Martínez, 2006). We then

compared patterns of correlations with those outcomes manifested by the NEO PI-R and the PID-5. The comparability of the nomological networks for domains from each measure was evaluated using profile similarity coefficients that have been previously employed by several researchers to compare different measures (e.g., Miller & Campbell, 2008).

METHOD

Sample and Procedure

The present study was administered online in three identical parts. The second part (Time 2) was administered 2 weeks after the completion of the first part (Time 1), and the third part (Time 3) was administered approximately 1 year later. Students enrolled in the introductory psychology class at Purdue University were recruited as participants and were compensated with course credit at the completion of the first and second parts of the study. A total of 388 students participated at Time 1; validity analyses of the data, particularly focusing on lack of attention (e.g., strings of the same response, long strings of missing data), eliminated 52 participants, resulting in a total of 336 participants with valid data at Time 1 ($M_{\text{age}} = 19.4$, $SD = 1.9$; 59.8% female; 69.6% White, 24.1% Asian, 4.8% Black, 1.2% other). Participants who completed the first part of the study were invited through email to complete the second part of the study. A total of 323 students participated at Time 2; validity analyses eliminated 48 participants, resulting in a total of 275 participants with valid data at Time 2. This resulted in 266 participants with valid data at both times. Participants who completed the second part and agreed to future contact were invited via email to complete the third part and were informed that participants would be entered into a drawing for one of three Apple iPad devices (or cash equivalent of \$399). A total of 106 students participated at Time 3.

All available valid data were used at each time point for the analyses that are confined only to that collection period (i.e., $N = 336$ at Time 1 and $N = 275$ at Time 2). For analyses that involve data from both collections, analyses were conducted using only data from participants that were valid at both times (i.e., $N = 266$).

Measures

Predictor Variables

Personality Inventory for DSM-5 (PID-5). The PID-5 (Krueger et al., 2012) is a 220-item self-report questionnaire that measures the *DSM-5* alternative PD model traits. The 25 facet traits are assessed by items ranging from 4 to 14, and the facet traits can be further organized into the five domain traits, each domain calculated using three nonoverlapping facets. The internal consistencies (Cronbach's alphas) for the facets in the present sample ranged from .69 to .95 ($Mdn = .86$) at Time 1 and .76 to .96 ($Mdn = .88$) at Time 2. Alpha values for the domains ranged from .91 to .95 ($Mdn = .92$) at Time 1 and .92 to .96 ($Mdn = .93$) at Time 2.

Revised NEO Personality Inventory (NEO PI-R). The NEO PI-R (Costa & McCrae, 1992) is a 240-item self-report questionnaire that measures the FFM. Each of the five domains subsamples six facets that are assessed by eight items. The internal consistencies for the facets in the present sample ranged from .50 to .81 ($Mdn = .74$) and .52 to .87 ($Mdn = .77$) at Times 1 and 2, respectively. Values for the domains ranged from .87 to .92 ($Mdn = .89$) at Time 1 and .89 to .93 ($Mdn = .91$) at Time 2.

Criterion Variables

Behavior Rating Form (BRF). The BRF (Paunonen & Ashton, 2001) is a self-report questionnaire that assesses various behavioral aspects of an individual. Some examples of the variables assessed by the BRF are perceived attractiveness, smoking and drinking habits, and grades. Some variables on the BRF were excluded from the nomological network analysis if they were hard to reconcile as centrally relevant to personality (e.g., whether one wears contact lenses), were redundant (e.g., fraternity/sorority membership vs. interest in joining), or were null values for more than half of the sample (e.g., the number of cigarettes smoked per day).

Social Adjustment Scale (SAS-SR). The SAS-SR (Weissman, 1999) is a 54-item self-report questionnaire that measures adjustment in eight social roles. As the participants were college students, some variables were not rated by most participants (e.g., most were not parents, so they did not rate their performance in the parental role); thus, only the scales with more than half of the respondents (i.e., $N > 168$ at Time 1) were included. The internal consistencies of the three SAS-SR roles retained in the final analysis (i.e., Full-Time Student, Social and Leisure, and Extended Family) for the present data were .63, .54, and .67 at Time 1 and .59, .58, and .60 at Time 2.

Satisfaction With Life Scale (SWLS). The SWLS (Diener, Emmons, Larsen, & Griffin, 1985) is a five-item self-report questionnaire that measures satisfaction with life. The internal consistencies were .83 at Time 1 and .87 at Time 2.

Participation in the One-Year Follow-Up. Participation at Time 3 (i.e., 1 year follow-up) was employed as a behavioral marker of personality. Specifically, we hypothesized that because this portion was completely voluntary, choosing to participate might reflect Agreeableness (i.e., agreeing to the request) and/or Conscientiousness (i.e., completing something one started).

RESULTS

Temporal Consistency

To examine the temporal consistency of the PID-5 and NEO PI-R domains and facets, the test-retest dependability over a 2-week period (i.e., Time 1 to Time 2) for all facets and domains

Table 1 The Test-Retest and Cronbach's Alphas at Time 1 and Time 2 of NEO PI-R and PID-5 Domains and Facets

	Test-Retest	T1 Alpha	T2 Alpha		Test-Retest	T1 Alpha	T2 Alpha
NEO PI-R Domains				PID-5 Domains			
Neuroticism	.86	.90	.91	Negative Affectivity	.83	.91	.92
Extraversion	.91	.89	.90	Detachment	.81	.91	.93
Openness to Experience	.90	.87	.89	Psychoticism	.83	.95	.96
Agreeableness	.87	.89	.91	Antagonism	.83	.93	.94
Conscientiousness	.91	.92	.93	Disinhibition	.83	.92	.93
NEO PI-R Facets				PID-5 Facets			
N1: Anxiety	.76	.74	.77	Anhedonia	.78	.81	.85
N2: Angry Hostility	.78	.76	.80	Anxiousness	.81	.87	.89
N3: Depression	.73	.77	.80	Attention Seeking	.83	.88	.89
N4: Self-Consciousness	.77	.66	.68	Callousness	.74	.89	.93
N5: Impulsiveness	.77	.63	.59	Deceitfulness	.80	.89	.90
N6: Vulnerability	.78	.73	.78	Depressivity	.78	.93	.94
E1: Warmth	.84	.79	.79	Distractibility	.80	.89	.89
E2: Gregariousness	.85	.78	.77	Eccentricity	.85	.95	.96
E3: Assertiveness	.85	.77	.79	Emotional Lability	.78	.86	.89
E4: Activity	.73	.56	.52	Grandiosity	.78	.82	.87
E5: Excitement Seeking	.82	.68	.70	Hostility	.81	.85	.88
E6: Positive Emotions	.79	.74	.76	Impulsivity	.77	.86	.87
O1: Fantasy	.77	.77	.81	Intimacy Avoidance	.75	.81	.84
O2: Aesthetics	.87	.79	.81	Irresponsibility	.75	.83	.84
O3: Feelings	.74	.70	.69	Manipulativeness	.80	.83	.88
O4: Actions	.76	.50	.56	Perceptual Dysregulation	.76	.87	.90
O5: Ideas	.84	.81	.83	Perseveration	.74	.83	.85
O6: Values	.79	.66	.72	Restricted Affectivity	.78	.79	.84
A1: Trust	.79	.80	.87	Rigid Perfectionism	.80	.88	.91
A2: Straightforwardness	.78	.73	.76	Risk Taking	.86	.88	.88
A3: Altruism	.77	.76	.80	Separation Insecurity	.78	.80	.82
A4: Compliance	.81	.69	.66	Submissiveness	.66	.75	.80
A5: Modesty	.84	.75	.80	Suspiciousness	.76	.69	.76
A6: Tender-Mindedness	.65	.57	.65	Unusual Beliefs and Experiences	.76	.81	.84
				Withdrawal	.81	.88	.90
C1: Competence	.73	.69	.70				
C2: Order	.80	.69	.72				
C3: Dutifulness	.77	.64	.70				
C4: Achievement Striving	.84	.77	.77				
C5: Self-Discipline	.82	.80	.81				
C6: Deliberation	.82	.77	.79				
Intellect/Openness Aspects							
Intellect	.82	.76	.78				
Openness	.87	.83	.85				

Note. T1 = Time 1; T2 = Time 2; NEO PI-R = Revised NEO Personality Inventory; PID-5 = Personality Inventory for DSM-5.

was analyzed (Table 1). The test-retest dependability correlations of NEO PI-R facets ranged from .65 to .87 ($Mdn = .79$), and domains ranged from .86 to .91 ($Mdn = .90$). The test-retest correlations of PID-5 facets ranged from .66 to .86 ($Mdn = .78$), and domains ranged from .81 to .83 ($Mdn = .83$).

Correlations With Criterion Variables

First, NEO PI-R Extraversion, Agreeableness, and Conscientiousness scores were reversed to facilitate direct comparison of their nomological networks to their theoretically matching counterparts on the PID-5 (e.g., PID-5 Detachment

and reversed NEO PI-R Extraversion). Concurrent correlations of the NEO PI-R and PID-5 domains with the criterion variables at Time 1 are presented in Table 2. For example, within Table 2, the first column indicates the correlation of the baseline score for NEO PI-R Neuroticism with the baseline scores for the criterion variables. The next set of columns presents the correlations of the PID-5 domain scores with the same criterion variables. The values derived from the concurrent relationships between the NEO PI-R and PID-5 domains with the criterion variables at Time 2 and the predictive relations (e.g., Time 1 NEO PI-R predicting Time 2 criterion variables) were also calculated. As these large

Table 2 Concurrent Correlations Between the Predictor (NEO PI-R and PID-5) and Criterion Variables and Correlation Differences Between the Theoretically Matched NEO PI-R and PID-5 Domains at Time 1

Criterion Variables	NEO PI-R					PID-5					Differences				
	N	E	O	A	C	NA	De	P	An	Di	N vs. NA	E vs. De	O vs. P	A vs. An	C vs. Di
BRF Physical Attractiveness	-.29	-.31	.09	.03	-.25	-.27	-.32	-.20	-.01	-.18	-.02	.01	.29	.04	-.07
BRF General Intelligence	-.19	-.14	.23	.00	-.28	-.19	-.16	-.09	.09	-.21	.00	.02	.32	-.08	-.07
BRF Popularity	-.20	-.50	.09	-.03	-.13	-.11	-.28	-.07	.09	.00	-.09	-.22	.15	-.12	-.13
BRF Religiosity	-.02	-.14	-.07	-.39	-.17	-.01	-.14	-.12	-.23	-.14	-.01	-.01	.05	-.16	-.03
BRF Honesty	-.12	-.27	.06	-.26	-.25	-.10	-.26	-.16	-.23	-.21	-.02	.00	.21	-.02	-.04
BRF Last Year Grade	-.11	-.06	-.01	-.15	-.22	-.13	-.14	-.23	-.16	-.29	.02	.08	.22	.02	.07
BRF Smoker Level	.10	.01	-.01	.20	.19	.04	.07	.10	.19	.21	.06	-.06	-.11	.01	-.02
BRF Drinker Level	.05	-.32	-.05	.21	.11	-.01	-.22	-.04	.09	.11	.07	-.09	-.01	.12	.01
BRF Fraternity/Sorority Member	.06	-.26	-.02	-.02	-.01	.03	-.12	.05	.03	.06	.02	-.14	-.06	-.05	-.07
BRF Fastest Driven	-.14	-.24	.06	-.05	-.10	-.19	-.32	-.15	-.13	-.14	.06	.08	.21	.08	.03
BRF High School GPA	-.03	-.07	.01	-.08	-.18	-.10	-.12	-.15	-.06	-.17	.07	.05	.17	-.01	-.01
BRF Money Spent on Lottery	.13	.05	.04	.01	.10	.07	.08	.10	.04	.10	.05	-.03	-.06	-.03	.01
BRF Parties per Month	.02	-.37	-.04	.11	.06	-.03	-.18	-.05	.05	.14	.05	-.19	.01	.06	-.08
BRF Long-Term Diet	-.01	-.13	.03	.05	-.06	-.01	-.05	.02	.08	.03	.00	-.08	.01	-.02	-.09
BRF Hold a Job	.00	-.08	.01	-.05	.02	-.04	-.13	-.09	-.14	-.09	.03	.05	.10	.09	.11
BRF Musical Instrument	.00	.04	.25	-.03	.05	.10	.08	.22	.15	.16	-.10	-.04	.03	-.18	-.11
BRF Exercise Regularly	-.17	-.24	.04	.05	-.13	-.11	-.18	-.10	.02	-.05	-.06	-.06	.14	.02	-.09
BRF Donate Blood	-.13	-.10	.16	-.03	-.04	-.16	-.08	-.01	-.08	-.08	.03	-.02	.18	.05	.04
BRF Driving Violations per Year	.04	-.03	.03	.08	.16	.03	.08	.08	.14	.20	.01	-.11	-.05	-.07	-.04
SAS Full-Time Student	.30	.07	-.05	.17	.34	.25	.18	.21	.22	.32	.05	-.12	-.26	-.05	.02
SAS Social and Leisure	.30	.30	-.10	.19	.09	.23	.45	.14	.14	.10	.07	-.15	-.24	.05	-.02
SAS Extended Family	.33	.14	.07	.16	.28	.29	.31	.33	.26	.32	.04	-.17	-.26	-.10	-.04
SAS Overall Functioning	.40	.28	-.02	.22	.31	.34	.48	.31	.27	.33	.07	-.20	-.33	-.05	-.02
Satisfaction With Life	-.30	-.28	-.04	-.21	-.26	-.25	-.39	-.28	-.18	-.25	-.05	.11	.24	-.02	-.01
Time 3 Participation	-.06	.07	.10	-.06	-.15	-.09	.01	.02	-.06	-.10	.04	.06	.08	.00	-.05

Note. NEO PI-R = Revised NEO Personality Inventory; PID-5 = Personality Inventory for DSM-5; N = Neuroticism, E = Extraversion (reversed); O = Openness to Experience; A = Agreeableness (reversed); C = Conscientiousness (reversed); NA = Negative Affectivity; De = Detachment; P = Psychoticism; An = Antagonism; Di = Disinhibition; BRF = Behavior Rating Form; SAS = Social Adjustment Scale.

tables reveal values that were highly similar to those in Table 2, they are included as online appendices Tables S1 and S2, respectively.

Nomological Network Analyses

In order to provide a statistical index of similarity between the nomological networks of the PID-5 and NEO PI-R domains, the profiles of correlations for paired domains were compared using methods proposed in Westen and Rosenthal (2003): $r_{alerting-CV}$ and $r_{contrast-CV}$. These summary coefficients were used to quantify the similarities between the profiles of observed correlations between two predictor variables and a number of criterion variables. For example, we computed the similarity between the correlational profiles for NEO PI-R Neuroticism and PID-5 Negative Affectivity. These coefficients are variations of correlations, and Westen and Rosenthal (2003) suggest that the effect sizes of these coefficients be interpreted as zero-order correlations. Therefore, we followed the guideline proposed by Cohen

(1992) when interpreting these coefficients (e.g., $r \geq .30$ as a medium effect size, $r \geq .50$ as a large effect size). Given concerns (e.g., Smith, 2005) that these summary coefficients could be misleading, we also calculated the raw differences between the correlations for each criterion variable, as has been previously done by other researchers (e.g., Thomas, Wright, Lukowitsky, Donnellan, & Hopwood, 2012). These differences in correlations are presented in the final columns of Table 2.

Table 3 presents the $r_{alerting-CV}$, the $r_{contrast-CV}$, and the ranges of the correlational differences for each time point comparison. For example, Table 3 shows that the profile of correlations for NEO PI-R Neuroticism and PID-5 Negative Affectivity are highly similar at Time 1, with $r_{alerting-CV}$ and $r_{contrast-CV}$ values of .97 and .68, respectively. These values also indicated substantially similar nomological networks for NEO PI-R Extraversion and PID-5 Detachment; NEO PI-R Agreeableness and PID-5 Antagonism; and NEO PI-R Conscientiousness and PID-5 Disinhibition. The exception was for the NEO PI-R Openness to Experience and PID-5 Psychoticism domains, which obtained

Table 3 The Nomological Network Similarity Coefficients ($r_{alerting-CV}$ and $r_{contrast-CV}$) and Minimum and Maximum Correlation Differences Between the Two Measures

T1-T1	N vs. NA	E vs. De	O vs. P	A vs. An	C vs. Di
$r_{alerting-CV}$	.97	.91	.04	.87	.96
$r_{contrast-CV}$	.68	.82	.03	.59	.74
Min difference	-.10	-.22	-.33	-.18	-.13
Max difference	.07	.11	.32	.12	.11

T2-T2	N vs. NA	E vs. De	O vs. P	A vs. An	C vs. Di
$r_{alerting-CV}$	.97	.90	-.12	.92	.98
$r_{contrast-CV}$	.83	.82	.11	.65	.83
Min difference	-.06	-.19	-.40	-.15	-.15
Max difference	.14	.14	.37	.09	.06

T1-T2	N vs. NA	E vs. De	O vs. P	A vs. An	C vs. Di
$r_{alerting-CV}$	.96	.91	.20	.92	.96
$r_{contrast-CV}$	.76	.85	.15	.63	.73
Min difference	-.08	-.20	-.32	-.20	-.13
Max difference	.14	.14	.25	.06	.08

Note. T1-T1 = from Time 1 concurrent correlations between predictor and criterion variables; T2-T2 = from Time 2 concurrent correlations between predictor and criterion variables; T1-T2 = from predictive correlations between predictor and criterion variables; N = Neuroticism; E = Extraversion (reversed); O = Openness to Experience; A = Agreeableness (reversed); C = Conscientiousness (reversed); NA = Negative Affectivity; De = Detachment; P = Psychoticism; An = Antagonism; Di = Disinhibition; Min = minimum; Max = maximum.

$r_{alerting-CV}$ and $r_{contrast-CV}$ values that were quite low (e.g., .04 and .03 at Time 1), suggesting the nomological networks for these scales did not overlap appreciably.

The ranges of the differences in correlations between the FFM and PID-5 domains to criterion variables tell a similar story: The four domains with higher $r_{alerting-CV}$ and $r_{contrast-CV}$ coefficients tend to have less differences (range = -.22 to .14), and NEO PI-R Openness to Experience versus PID-5 Psychoticism has a wide range of differences (-.40 to .37) in correlations. Furthermore, these patterns of similarity are also remarkably robust within the Time 2 comparison and across Times 1 and 2, providing replication of these effects (see online appendices S1 and S2) and demonstrating that the nomological networks are similar within and across time.

PID-5 Psychoticism. Although the nomological networks of NEO PI-R Openness to Experience and PID-5 Psychoticism were not similar, prior work suggests that this may be due to differences in the strength of relations with Psychoticism across different aspects or facets that compose the broad domain (Chmielewski et al., 2014; DeYoung et al., 2012). Thus, we conducted further analyses examining the nomological networks of the six facets of NEO PI-R Openness to Experience to compare them to the profiles obtained by the PID-5 Psychoticism domain and its three facets. In this regard, we sought to answer the question “Where on the PID-5 must one look to find the best matches for NEO PI-R Openness?” Table 4 presents the results of these analyses of concurrent relationships at Time 1. In order to provide a context for interpreting these convergent similarity val-

ues, we also calculated the similarity coefficients for the facets and aspects of Openness with all *other* domains and facets of the PID-5 (i.e., the discriminant validity) and report the median values in Table 4. These facet-level analyses revealed a more nuanced pattern of relations such that the NEO PI-R facets showed notable variability in regard to their similarity with aspects of PID-5 Psychoticism. Specifically, the NEO PI-R facets of Openness to Fantasy (O1) and Aesthetics (O2) obtained $r_{alerting-CV}$ values of .50 and .53, respectively, demonstrating that they moderately shared nomological networks with PID-5 Psychoticism. In both cases, these values were higher than the similarity with all other domains (*Mdn* discriminant values were .28 and .34, respectively). In contrast, the NEO PI-R Openness to Feelings (O3) profile obtained a negative $r_{alerting-CV}$ with PID-5 Psychoticism (-.44), suggesting notable *dissimilarity*. The other three NEO PI-R Openness to Experience facets obtained profiles that were unrelated to the nomological networks for the PID-5 Psychoticism domain or facets, and, in fact, two were much more related to other PID-5 domains. Similar findings emerged when the NEO PI-R Openness facets were compared to the PID-5 Psychoticism facets. There was even more specificity for facet-to-facet comparisons such as the PID-5 facet of Eccentricity, which obtained a strong correlation ($r_{alerting-CV} = .63$) with NEO PI-R Fantasy (O1). Overall, the NEO PI-R Openness to

Table 4 The Concurrent Nomological Network Similarity Coefficients ($r_{alerting-CV}$ and $r_{contrast-CV}$) for Openness to Experience Facets, Openness/Intellect Aspects, and Psychoticism Domain and Facets at Time 1

$r_{alerting-CV}$	O1	O2	O3	O4	O5	O6	Int	Ope
Psychoticism	.50	.53	-.44	-.17	-.05	-.12	-.18	.63
Unusual Beliefs and Experiences	.42	.54	-.35	-.24	-.05	-.20	-.16	.64
Eccentricity	.63	.54	-.46	-.09	.13	.10	-.01	.67
Perceptual Dysregulation	.38	.44	-.44	-.18	-.22	-.25	-.34	.53
Median domain discriminant	.28	.34	-.45	-.16	-.21	-.19	-.33	.42
Median facet discriminant	.29	.34	-.46	-.27	-.17	-.12	-.29	.43

$r_{contrast-CV}$	O1	O2	O3	O4	O5	O6	Int	Ope
Psychoticism	.39	.41	.35	.14	.04	.10	.14	.48
Unusual Beliefs and Experiences	.30	.38	.25	.17	.04	.15	.12	.44
Eccentricity	.39	.34	.29	.06	.08	.07	.00	.41
Perceptual Dysregulation	.32	.37	.37	.15	.20	.21	.29	.44
Median domain discriminant	.25	.28	.38	.19	.21	.19	.33	.34
Median facet discriminant	.20	.22	.35	.23	.15	.15	.24	.28

Note. O1 = Openness to Experience facet 1 (Fantasy); O2 = Openness to Experience facet 2 (Aesthetics); O3 = Openness to Experience facet 3 (Feelings); O4 = Openness to Experience facet 4 (Actions); O5 = Openness to Experience facet 5 (Ideas); O6 = Openness to Experience facet 6 (Values); Int = Intellect aspect; Ope = Openness aspect.

Fantasy (O1) and Aesthetics (O2) facets were more similar to the three PID-5 Psychoticism facets (*Mdn* convergent $r_{\text{alerting-CV}}$ values were .42 and .54, respectively) than any other facet of the PID-5 (*Mdn* discriminant $r_{\text{alerting-CV}}$ values were .29 and .34, respectively).

We used the same procedure to examine the nomological network similarities between PID-5 Psychoticism and the two aspects of the Openness domain proposed by DeYoung and colleagues (2012), and the results were even more revealing of the split within Openness. The aspects of openness and intellect were scored using NEO PI-R items assigned by Ross and DeYoung (2015). The results demonstrated that the openness aspect's nomological network evinced a large correlation with PID-5 Psychoticism ($r_{\text{alerting-CV}} = .63$, $r_{\text{contrast-CV}} = .48$), whereas the median domain discriminant values were .42 for $r_{\text{alerting-CV}}$ and .34 for $r_{\text{contrast-CV}}$. As noted in Table 4, this pattern for the aspect of openness was robust across the three PID-5 Psychoticism facets (e.g., *Mdn* $r_{\text{alerting-CV}}$ value of .64, compared to a median facet discriminant value of .43). In contrast, the intellect aspect evinced dissimilarity with PID-5 Psychoticism, with a $r_{\text{alerting-CV}}$ value of $-.18$ with the domain (*Mdn* discriminant value = $-.33$) and a median $r_{\text{alerting-CV}}$ value of $-.16$ with the PID-5 facets (*Mdn* discriminant value = $-.29$).

DISCUSSION

The *DSM-5* alternative PD system includes a trait model sorted into five higher-order domains that are thought to reflect maladaptive variants of the FFM (APA, 2013). A rapidly emerging body of evidence has provided strong support for this view for four of the five domains (Krueger & Markon, 2014), including correlations with established measures of the FFM (Watson et al., 2013), a shared hierarchical structure (De Fruyt et al., 2013; Gore & Widiger, 2013; Griffin & Samuel, 2014), and an overlapping but complementary assessment range (Suzuki et al., 2015). Nonetheless, the present study is the first to provide evidence that goes beyond structural similarity to compare the nomological networks of the PID-5 and the most commonly used measure of the FFM, the NEO PI-R. Moreover, this approach provides an avenue for investigating the more nuanced and complex relation between the fifth domains of Openness and Psychoticism.

A cardinal feature of the FFM is its considerable rank-order consistency across time. Prior research has noted that the nature of trait (general vs. pathological) does not appreciably affect stability (Ferguson, 2010), particularly when they are assessed using the same method (Samuel et al., 2011). Thus, relatively similar stability should be expected in this nonclinical sample for the PID-5 and NEO PI-R even if they are assessing different ranges of the same traits. Indeed, this was our finding, as the 2-week dependability values of the facets and domains were nearly identical. This, combined with data suggesting appreciable stability over even longer periods (Wright et al., 2015), suggests the *DSM-5* traits evince temporal consistency similar to

existing measures of the FFM. As noted by Watson (2004), dependability of a measure can be considered an indicator of measurement error (as personality would not be expected to change over 2 weeks) and employed as a correction for unreliability. It should be noted that this is the first study to report on the dependability of scores on the PID-5 and that a study by McCrae et al. (2011), which reported on the test-retest reliability over a 1-week period with 132 undergraduates, is the only other study that provides an estimate of the dependability of the NEO PI-R. Although the 2-week test-retest sample of 275 employed here is slightly smaller than Watson's (2004) suggestion of 300, it is above the threshold where Monte Carlo simulations indicate correlation coefficients stabilize ($n = 250$; Schönbrodt & Perugini, 2013), more than double the sample size of the current best estimate of the NEO PI-R's dependability, and higher than 95 of the 100 test-retest studies summarized by Watson (2004). Taken together, we would suggest the dependability values reported here for the PID-5 and NEO PI-R have considerable value for estimating measurement error in these instruments within future studies.

In addition to the comparable dependability, the present study also demonstrated that four of the five domains from the PID-5 well replicated the NEO PI-R's pattern of the correlations with external criteria. For example, self-reported honesty correlated $-.23$ with PID-5 Antagonism and $-.26$ with NEO PI-R Agreeableness; alcohol consumption correlated $-.22$ with PID-5 Detachment and $-.32$ with NEO PI-R Extraversion; and PID-5 Disinhibition correlations with college GPA ($r = -.29$) and functioning as a student ($r = .32$) were quite similar to the values for NEO PI-R Conscientiousness ($-.22$ and $.34$, respectively). Moreover, systematic comparisons of the entire profile of correlations indicated substantial similarity between the nomological networks for these four domains. In each case, the nomological network similarity coefficients were near, and routinely above, $.90$, supporting the conclusions that those four domains on the PID-5 function as would be expected from a measure of the FFM.

The results were much more nuanced for the link between NEO PI-R Openness to Experience and PID-5 Psychoticism. The results did not support the link between these two at the domain level. There were certain variables that supported the link, such as the correlations of NEO PI-R Openness to Experience and PID-5 Psychoticism with playing a musical instrument ($r = .22$ and $.25$, respectively). Nonetheless, the overall nomological networks for these two domain scales were not similar in any of our comparisons. However, the analyses of lower-order facets and aspects shed light upon the complicated relationship between NEO PI-R Openness to Experience and PID-5 Psychoticism. The most supportive results for this link were the analyses of the two aspects of the larger Openness domain (DeYoung et al., 2012). The openness aspect exhibited much greater similarity to the nomological network of the PID-5 Psychoticism domain, although even still the similarities for the openness aspect were not as strong as the links for the other domains. The results continue to suggest the lower-order aspects and facets are

a promising avenue for unifying personality pathology and the well-established structure of general personality.

In many regards, the results for the aspect of openness even might be considered surprising, given it was scored from the NEO PI-R. Items for the Openness to Experience domain on the NEO PI-R focus heavily on the adaptive range of personality-related behaviors (Coker, Samuel, & Widiger, 2002), which limits their correlations with the pathological openness. Haigler and Widiger (2001) found that altering the NEO PI-R items to be more extreme increased the relationship between FFM traits and *DSM-IV-TR* (APA, 2000) PDs, including between Openness to Experience and Schizotypal PD. In this regard, studies employing alternative measures such as De Young's Big Five Aspects Scale (BFAS; DeYoung et al., 2007), Openness scales from recently developed Five-Factor Model of PD instruments (Widiger, Lynam, Miller, & Oltmanns (2012), or those of related concepts, such as Tellegen's Absorption (Tellegen, 1982), might yield even stronger results.

LIMITATIONS

The present study provided the first explicit examination of how the PID-5 domain's nomological networks compared to those from a traditional measure of the FFM. Results indicated that four of the five domains were highly similar, suggesting those domains function as maladaptive variants of the FFM. The final domain was more complex, with PID-5 Psychoticism closely linked with DeYoung's openness aspect and specific NEO PI-R facets, but unrelated to the overarching domain. Nonetheless, this effort was not without limitations. Most notably, we employed a sample of university undergraduates, whereas it would be a much stronger test to explore the nomological networks in a more diverse sample. In addition, the predictor and nearly all of the criterion variables were self-reported. It would be valuable to replicate these findings using other methods or sources. Finally, the similarity coefficients reflect two specific instruments. Although the NEO PI-R and PID-5 are well validated, no single instrument should be considered an infallible indicator, and as noted above, it is quite possible—and even likely—that other instruments would obtain somewhat different results.

Although we chose the criterion variables due to their use in previous studies and relevance to the FFM domains, we also acknowledge that our findings suggested that only a few of the criterion variables employed in this study were directly relevant to Openness to Experience. In fact, only five of the criterion variables correlated more than .10 at Time 1. One of these (playing a musical instrument), which is directly relevant to the openness aspect and the Openness to Aesthetics facet, correlated comparably with both instruments. Nonetheless, there were very few others that were well positioned to detect the overlap among the fifth domains of the NEO PI-R and PID-5. Given so many of the relations used to compute the similarity coefficients for NEO PI-R Openness to Experience were near zero, the lower similarity

coefficients might be due to restriction of range and/or random fluctuations around that zero point. Future research that utilizes criterion variables that relate more robustly with Openness to Experience, with particular emphasis on variables such as creativity and objectively measured intelligence, would be helpful for testing this possibility.

CONCLUSIONS AND IMPLICATIONS

Within the *DSM-5* (APA, 2013), the Section III trait model is said to be a maladaptive variant of the FFM, and the present results support this statement. Thus, a primary conclusion that can be drawn from this study is that the PID-5 performs as would be expected for a measure of the FFM for at least four of the five domains. The exception is for the NEO PI-R Openness to Experience domain. Although the PID-5, or the *DSM-5* trait model, does not appear to be a strong marker of Openness to Experience as assessed by extant FFM inventories, it does suggest that the lower-order openness aspect and two of the NEO PI-R facets are most directly linked with PID-5 Psychoticism. Taken together, these findings suggest that the broad literature supporting the FFM is generally applicable to the *DSM-5* Section III traits and the PID-5 can be reasonably considered a measure of the FFM, but that additional work remains to understand the complex connections between Psychoticism and portions of Openness to Experience. Also, future work that addresses the limitations of the present study—by using alternate inventories, sampling a diverse population, and employing variables relevant to Openness to Experience—would be helpful in continuing to understand its link with Psychoticism.

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Note

1. Values for the comparisons at Time 2 and longitudinally were again remarkably similar for the Time 1 comparison and are not presented here to conserve space, but they are available as online appendices (Tables S3 and S4).

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1. Concurrent correlations between the predictor (NEO PI-R and PID-5) and criterion variables and correlation differences between the theoretically matched NEO PI-R and PID-5 domains at Time 2

Table S2. Predictive correlations between the predictor (NEO PI-R and PID-5) and criterion variables and correlation differences between the theoretically matched NEO PI-R and PID-5 domains

Table S3. The concurrent nomological network similarity coefficients ($r_{alerting-CV}$ and $r_{contrast-CV}$) for Openness to Experience facets, Openness/Intellect aspects, and Psychoticism domain and facets at Time 2.

Table S4. The predictive nomological network similarity coefficients ($r_{alerting-CV}$ and $r_{contrast-CV}$) for Openness to Experience facets, Openness/Intellect aspects, and Psychoticism domain and facets.