ARE PERSONALITY DISORDERS EXTREME VARIANTS OF NORMAL PERSONALITY?: QUERIES ABOUT THE VALIDITY OF THE FIVE-FACTOR MODEL OF PERSONALITY TO DIAGNOSE PERSONALITY DISORDER

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The validity of the Five-Factor Model (FFM) of personality for diagnosing personality disorder (PD) was examined in two equivalent PD groups, one with dimensional criteria ($N = 246$) and the other with categorical criteria ($N = 165$), selected from 1,088 university students. Both equivalent PD groups did not exhibit specific profiles for each PD on FFM scales of the NEO Personality Inventory-Revised (NEO-PI-R), and multiple regression analyses showed that FFM scores only partly predicted PD, although it was improved by the prototype-matching method. The comorbidity was not different in dimensional and categorical measures of PD. The results suggest that the FFM of personality is useful for providing information about the personality in each individual, but is not very helpful for diagnosing PDs, because each PD does not necessarily exhibit a specific homogeneous trait constellation on FFM based on the NEO-PI-R. Personality trait description and diagnosis of PD are not the same issues. It is necessary to integrate dimensional and categorical approaches to PDs for a more precise classification and diagnosis.

**Key words:** personality disorder (PD), personality trait, Five-Factor Model (FFM) of personality, NEO Personality Inventory-Revised (NEO-PI-R), dimensional approach, categorical approach

**INTRODUCTION**

*The Concept of Personality Disorder*

Personality disorder (PD) is regarded as a group of mental disorders characterized by enduring maladaptive personality that is exhibited across various contexts, significantly affects an individual’s life, and may cause harm to others. Is “personality disorder” disorder of personality? This is not a sort of tautology. This naïve question contains fundamental issues for PD. Since there have long been controversies regarding this issue, it has attracted considerable interest in connection with the revision of the Diagnostic and Statistical Manual of Mental Disorders Fifth edition (DSM-5; American Psychiatric Association [APA], 2013) in recent decades.

Disorders of personality were described in the nineteenth century (Berrios, 1993), and the concept of PD was debated as a nosological entity from the beginning. Schneider
(1950) provided the basis for the current PD concept. He proposed 10 categorical classifications of abnormal personalities and his classification of PDs influenced the PD diagnostic system in the DSM. He also proposed the view that personality traits are continuously distributed, and the extreme deviations of a trait being pathological. This perspective on PD was inherited in the DSM-5.

Although the definition of PD itself has been changed since its concept appeared, in the DSM-5, PD is defined as “a way of thinking, feeling, and behaving (i.e., personality) that deviates from the expectations of the culture” (APA, 2013). That is, PD is conceptualized as an impairment in both identity and interpersonal relationships caused by extreme personality traits.

Since the early description by Schneider, an implicit view exists that PD is a sort of extreme or variant of normal personality styles. Most psychiatrists and psychologists would agree with the idea that abnormal personality traits exist in milder forms in normal individuals, and if one’s traits are shown as inflexible responses to a broad range of personal and social situations and result in considerable personal distress or social disruption, s/he is called PD. According to this view, PDs are thus only quantitatively and not qualitatively different from normal personality. The problem is that the border between normal and abnormal personalities is difficult to ascertain.

Diagnosis of Personality Disorder

The DSM-5 adopted a categorical classification system for PD and other major mental disorders. In a categorical diagnosis, PD is diagnosed based on whether the number of symptomatic criteria (maladaptive cognition and/or behavior) of each PD exceeds a certain criterion of respective PD. For example, any five of nine optional criteria are required for the diagnosis of borderline PD (APA, 2013). In this method of diagnoses, a single diagnostic category includes various combinations of symptoms of abnormal cognition and/or behaviors. Also, many people receive a diagnosis of several PDs at the same time. This diagnostic overlap (comorbidity) creates problems in defining homogeneous groups in psychiatric research/practice. Although this is challenging, relatively typical signs and/or symptoms are observed in each PD, and most clinicians use them to diagnose PDs.

Another approach for PDs was proposed in 1990. This method conceptualizes PDs dimensionally rather than categorically and positions patients along a set of dimensions. This approach is based on the perspective that PD is an extreme variant of normal personality, as suggested by Schneider in early stage of PD history, and it came to be insisted that PDs were well conceptualized as comprising extreme variants of general personality traits (Costa & Widiger, 1994, 2002). The dimensional model has certain advantages: (a) it is consistent with fuzzy boundaries between disorders and normality; (b) the dimensional measure can be converted into categorical criterion such as a cutoff point; (c) the inter-rater reliability of assessment is improved; (d) and comorbidity ceases to be a problem because an individual can be defined based on their combined characteristics of traits (Esbec & Echeburúa, 2015).
The Five-Factor Model of Personality and Personality Disorders

Although several studies applied the dimensional approach for PDs, most used the Five-Factor Model (FFM) of personality, with the NEO Personality Inventory-Revised (NEO-PI-R; Costa & McCrae, 1992), to describe and classify PDs. This research trend may be derived from studies by Costa and McCrae (1990, 1992) who suggested the relationship between the five major personality domains and PDs. From approximately 2000, the number of researchers who applied the FFM to PD increased and became a major force to revise the section of PD in DSM.

It is important which model of personality structure is applied for profiling PD if it can be described as a variant of normal personality. From the beginning of the history of personality psychology models of personality structure have been investigated, and in the mid-1980s a consensus on personality structure began to emerge based on the results of that personality traits can be summarized in terms of five independent dimensions (McCrae & John, 1992). These five dimensions were called the “Big Five” (Goldberg, 1990). These factors became the basis for personality research using a questionnaire by McCrae and Costa (1985), who modified and expanded the NEO personality model to include the Big Five factors. They designated their personality structure model as the FFM, and it was very similar, but not quite identical to, the Big Five model. The dimensions in this model are called Extraversion, Neuroticism, Agreeableness, Conscientiousness, and Openness to Experience. Costa and McCrae (1992) introduced the NEO-PI-R, and a significant amount of research has confirmed the psychometric quality of these instruments (e.g., Costa & McCrae, 1995). Strictly speaking, the five factors of the Big Five and those of the Five-Factor models are not exactly the same, but because much research uses the NEO-PI-R to measure fundamental personality traits, both are commonly called FFM in general.

A dimensional conceptualization of PD with FFM, based on the NEO-PI-R, became a relative academic agreement, because the view that PD was a variant of normal personality was shared by many psychiatrists. Indeed, in a survey of members of the International Society for the Study of Personality Disorders (ISSPD) and the Association for Research on Personality Disorders (ARPD), 80% of respondents indicated that they felt that “personality disorders are better understood as variants of normal personality than as categorical disease entities” (Bernstein et al., 2007). A number of studies have been published based on this understanding of PDs (e.g., Hopwood et al., 2012; Widiger, Samuel, et al., 2012).

The Profile of PD on FFM

Several studies reported the utility and validity of FFM for classifying and diagnosing PDs (Widiger, Lynam, et al., 2012; Widiger & Mullins-Sweatt, 2010; Widiger & Samuel, 2005; Widiger & Trull, 2007). Based on the view that PDs are best conceptualized as comprising either extreme variants of general personality traits (Costa & Widiger, 1994, 2002), Lynam and Widiger (2001) developed a prototype-matching technique in which FFM-PD prototypes are generated through the use of expert ratings for DSM-IV PDs. These expert-generated prototypes, which use all 30 FFM facets, can
then be matched to PD individual’s FFM profiles as assessed by the NEO-PI-R through the use of an intraclass correlation. This correlation can be used as an index of similarity to the patient PD constructs. These prototypes of all 10 PDs have been tested, and the results supported the convergent, discriminant, and predictive validity and temporal stability of the FFM-PD prototypes (Miller, Pilkonis, & Morse, 2004; Miller, Reynolds, & Pilkonis, 2004; Reynolds & Clark, 2001).

The simple prototype-matching technique is as follows: to identify which facets were considered prototypically high or low for each PD (Lynam & Widiger, 2001, Table 1) and sum the scores in the same direction. Research using this scoring technique showed that this method is effective in various samples (Miller et al., 2005). In line with this technique, some prototypical profiles of PDs from the perspective of the FFM are proposed (e.g., Widiger & Costa, 2012). Although there are certain differences in these PD profiles, they are relatively common in general (the most matched profiles in three prototype tables are those for Antisocial PD, 89.5%, while the least matched profile is for Histrionic PD, 35.3%, average = 65.3%). PD scoring techniques using the FFM (the FFM-PD scores) were also proposed (Miller et al., 2005) in which a profile of every PD prototype and a simple additive scoring technique only require the accumulation of relevant facet scores for each prototype. The FFM-PD scores represent a suitable method for PD estimation, providing a high degree of concordance with the prototype-matching technique (Colodro et al., 2018; Miller et al., 2005).

The Five-Factor Model of Personality Disorder

The Five-Factor Model of Personality Disorder (FFM of PD) is based on an assumption that PDs are readily understood as maladaptive and/or extreme variants of the domain and facets (profile) of the FFM (Widiger & Costa, 2012). The result of factor analyses of the several scales of normal and abnormal personality inventories closely replicated the FFM factors (Livesley, 2001; O’Connor, 2002). Livesley (2001) concluded that all categorical diagnoses of DSM can be accommodated within the Five-Factor framework. Meta-analytic and exploratory hierarchical factor analytic research of numerous measures of normal and abnormal personality functioning consistently yielded a five-factor solution that strongly resembles the Five-Factor structure (Markon et al., 2005).

In response to these results, in the general definition of PD, a conceptual change was proposed in the DSM-5. PD is conceptualized as impairment in both identity and interpersonal relating caused by pathological (extreme) personality traits (APA, 2013). Also, the DSM-5 states that “A personality disorder is a way of thinking, feeling, and behaving that deviates from the expectations of the culture.” These statements mean that PD is defined from two aspects, deviated traits and their malfunction.

However, despite its conceptual change, the DSM-5 opts for a categorical approach to PDs and maintains the same classification scheme as the DSM-IV-TR (APA, 2000) for 10 PDs with additional other specified and unspecified PDs. In the remaining categorical diagnosis, the categorical judgment consists of “PD or not PD” if matching one-half plus one of symptoms (diagnostic criteria), although a new hybrid model of PD has been
added as section III as an appendix.

A simple question arises as to why FFM of PD was ultimately rejected, and the
categorical diagnostic criteria for PD remained in the DSM-5, despite much research
reporting certain utility of the dimensional approach for PD based on FFM.

The reason a categorical diagnostic system was left in the DSM-5 could be that the
detailed description of personality traits does not always lead to an accurate diagnosis of
PD. It is true that a dimensional trait model of PD provides a more precise, individualized
description and useful and richer clinical information, while a categorical (dichotomous)
diagnosis of PD signals only that the individual passed one or more arbitrary thresholds.
However, if the PD categories were replaced with a dimensional trait system, a method is
necessary to translate the trait information into a diagnosis. A simple way would be to
place cutoffs on the dimensions of FFM. However, it is impossible if each PD does not
exhibit any common specific profile.

The problem is that a multidimensional trait profile of each PD does not converge
into a single specific pattern. For example, the data do represent the personality trait
profiles of six specific persons who were carefully interviewed and diagnosed, although
they met the criteria for DSM-IV Borderline PD, they had quite different trait profiles
(Krueger & Eaton, 2010, Fig. 1).

There is also an indication that the empirical structure of maladaptive personality
facets could not necessarily be isomorphic with the structure of general personality
domains, like FFM. Krueger and Eaton (2010) reported that PD constructs do not map
perfectly onto the broad domains of FFM. The problem with the dimensional approach
to PD is that it equates trait extremity with disorder. Many would agree that the concept
of PD contains elements that are distinct from trait extremity. For example, is being
highly introverted a disorder per se? Probably not, except to the extent that the person
also shows hallmark features of disorder that are connected to the introversion (Krueger,
2010). Recent papers on the concept of PD tend to agree that PD is a construct
distinguishable from personality traits (Parker et al., 2004). Krueger et al. (2007)
emphasized three qualities to define PD: (a) interpersonal functioning, (b) occupational
functioning, and (c) having coherent and adaptive working models of the self and others.
Clinically salient PD constructs may be somewhat aligned with the major domains of
empirically based personality models, but not perfectly (Krueger & Eaton, 2010).
However, as a matter of the measurement domain, the “qualities of PD” are harder to
measure with questionnaire items, relative to general personality traits, in which PD
features do not overlap completely with personality traits (e.g., Krueger et al., 2007;
Verheul et al., 2008).

Finally, the fundamental issue has been overlooked in a series of controversies on
the conceptualization of PD. An accurate description of personality does not necessarily
lead to an accurate diagnosis of PD. To diagnose PD using personality trait profiles, each
PD requires a specific profile, then cutoffs must be set on the respective dimensions. No
answer has been given to this issue. Thus, for an overview of the issues about PD of
FFM, the utility of a dimensional approach to PD is not definitive.

This study examined the following: 1) if each PD exhibits a specific extreme trait
profile on the domains/facets of FFM based on the NEO-PI-R, 2) if the domain and facet scores predict each PD, 3) if the prototype-matching method proposed predicts each PD, and 4) if a dimensional approach and categorical approach for PD are contradictions.

**METHOD**

**Participants and Procedures**

First, 1,088 undergraduates (mean age = 20.1) from a large national university in Japan completed the NEO-PI-R (Costa & McCrae, 1992; Japanese version; Shimonaka et al., 1998) and the Personality Diagnostic Questionnaire (PDQ-4; Hyler, 1994; Japanese version; Wakabayashi & Aobayashi, 2007), with an interval of approximately two months. They received course credit for their participation. Two sample groups were then selected to be equivalent of PDs by the PDQ-4 score. The first group consisted of the participants who scored higher than ±1.96 on a z-score in any of the PD scales of the PDQ-4 (dimensional equivalent of PDs: N = 246; 140 males, 106 females). The second group consisted of the participants who scored higher than the number of diagnostic criteria (items) in any of the PD scales (categorical equivalent of PDs: N = 165; 95 males, 70 females). 124 participants were in common. The numbers of the participants who matched each PD were from 27 (2.5% in total sample = 1,088) to 59 (5.4%) in the dimensional equivalent PD group, and from 13 (1.3%) to 50 (4.6%) in the categorical equivalent PD group (each N is shown in the corresponding tables).

**Measures**

The NEO-PI-R (Costa & McCrae, 1992) is a 240-item self-reported inventory designed to assess fundamental personality domains according to the Five-Factor model. It uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). This study used the standardized Japanese version of the NEO-PI-R (Shimonaka et al., 1998).

The PDQ-4 (Hyler, 1994) is a 99-item true-false self-reported inventory that assesses 12 DSM-IV PDs according to the PD criteria (Bagby & Farvolden, 2004). The PDQ-4 is one of the most commonly used self-reported measures of PD in clinical research ( Widiger & Boyd, 2009). In this study, a Japanese version (Wakabayashi & Aobayashi, 2007) was used with a modified 4-point Likert scale format ranging from 1 (not at all) to 4 (almost/always). This modification of the response format was due to the following reasons: there is a possibility that false-positives would increase in the true-false format, because if respondents are required to judge whether or not they agree with the item descriptions (PD diagnostic criteria), the agree response may include from “almost/always” to “often/sometimes.” In a true-false format, adding up the number of true responses may cause a high score on some PD scales, even if it does not necessarily match the PD criterion (false-positive). However, in a 4-point Likert scale, the choice “almost/always” could be considered as having a PD sign/symptom. In the DSM-5, since any four or five of seven to nine criteria are required for the diagnosis of each PD, the number of “almost/always” responses in each PD scale could be an appropriate equivalent criterion for the categorical conceptualization of PDs.

**Results**

Cronbach’s alpha coefficients of two measures obtained from the total sample were as follows: the NEO-PI-R ranged from 0.92 (N) to 0.84 (O) (mean = 0.88) on the domains, and ranged from 0.52 (O6) to 0.85 (N1) (mean = 0.69) on the facets. In the PDQ-4, these ranged from 0.49 to 0.71 (mean = 0.61).

Table 1 shows the correlations between the domain and facet scores of the NEO-PI-R and the PDQ-4 scales, with the facet-level PD prediction by Widiger and Mullins-
Table 1. Zero-Order Correlations Between the NEO-PI-R (Factors and Facets) and PDQ-4 Personality Diagnostic Scales (N = 246)

| NEO-PI-R scales | Paranoid | Schizoid | Schizotypal | Antisocial | Borderline | Histrionic | Narcissistic | Avoidant | Dependent | Obsessive | Pred. | r | Pred. | r | Pred. | r | Pred. | r | Pred. | r | Pred. | r | Pred. | r |
|----------------|----------|----------|-------------|------------|------------|------------|--------------|-----------|------------|-----------|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|-------|---|
| Neuroticism    | 16*      | -16*     | 18**        | -06        | 17**       | 03         | 04           | 15*       | 16*        | 11       |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| N1: Anxiety    | 12       | -10      | H           | 21**       | L          | -11        | H            | 12        | 01         | 01       | H     | 18**  | H | 13*   | H | 16*   |   |       |   |       |   |       |   |       |   |
| N2: Angry hostility | H 22** | -15*     | 13*         | H          | 07         | 27**       | 08           | H         | 16*        | 08       | H     | H     | 11 | H     | 08 | H     | 07 | H     | 08 |       |   |       |   |       |   |
| N3: Depressiveness | 12      | -10      | 14*         | -12        | H          | 15         | -05          | -02       | H          | 11       | H     | 11    | H | 08    |   |       |   |       |   |       |   |       |   |       |   |
| N4: Self-consciousness | 16*     | -15*     | H           | 18**       | L          | -15*       | H            | 06        | 02         | L/H       | 01     | H     | 22**  | H | 13*   | 11 | H     | 11 | H     | 08 | H     | 07 |       |   |       |   |
| N5: Impulsivity | 06       | -15*     | 09          | H          | 12         | H          | 15*          | 06        | 03         | L         | -01    | 17**  | 10 |       |   |       |   |       |   |       |   |       |   |       |   |
| N6: Vulnerability | 11       | -15*     | 13*         | L          | -09        | H          | 11           | H         | 07         | H         | 00     | H     | 15*   | H | 15*   | 01 | H     | 15 | H     | 15 |       |   |       |   |       |   |
| Extraversion   | -03      | -17**    | 02          | 12         | 10         | 26**        | 16*          | -11       | 21**       | 12       |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| E1: Warmth     | L 02     | L -17**  | L 08        | -02        | 04         | H           | 17**         | 06        | -04        | H         | 20**   | L | 14*   |   |       |   |       |   |       |   |       |   |       |   |
| E2: Gregariousness | L -08    | L -19**  | L -04       | 06         | 03         | H           | 27**         | H         | 13*        | L 00      |       | 23**  | 05 |       |   |       |   |       |   |       |   |       |   |       |   |
| E3: Assertiveness | 02       | L -10    | -02         | H          | 13*        | 13*         | 21**         | H         | 19**       | L -17**   | L 06    | 09 |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| E4: Activity   | 02       | L -01    | 04          | H          | 09         | 13*         | 08           | 07        | L -07      | 08        | 08     | 10    |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| E5: Excitement-seeking | -04      | L -08    | -02         | H          | 19**       | 10          | H           | 20**       | H         | 17**      | L -10   | 16*   | L | 10    |   |       |   |       |   |       |   |       |   |       |   |       |   |
| E6: Positive emotions | L -07    | L -19**  | L 05        | 10         | 03         | 19**         | 09           | -12       | 17**       | 07       |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| Openness       | 00       | -09      | 09          | -01        | 10         | 02          | -01          | -08       | 05         | 17**      |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| O1: Fantasy    | 00       | -14*     | H 02        | 05         | H          | 10          | H            | 13*       | H 06       | -04       | 11     | 12    |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| O2: Aesthetics | 04       | -15*     | 12          | -05        | 08         | 06          | -03          | -06       | 03         | 15*       |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| O3: Feelings   | 01       | L -11    | 11          | -05        | 02         | H 02        | 04           | -05       | 10         | L 14*     |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| O4: Actions    | L -10    | L 02     | H 01        | H 10       | 16*        | 10          | 00           | L -10     | -03       | L 00      |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| O5: Ideas      | 03       | 03       | H 10        | -01        | 03         | -15*        | -05          | -04       | -04        | 17**      |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| O6: Values     | L 01     | 04       | -08         | -08        | -01        | -09         | -08          | 02        | 00         | L -01     |       |   |       |   |       |   |       |   |       |   |       |   |       |   |       |   |
| Agreeableness | -13* | -01 | 02 | -24** | -16* | 11 | -08 | -02 | -02 | 12 |
|---------------|------|-----|----|--------|------|----|-----|-----|-----|----|
| A1: Trust     | L    | -14* | -09 | L     | -06 | L  | -15* | H   | 16*  | L   | 01 | -07 | H   | -02 | 13* |
| A2: Straightforwardness | L | -06 | 00 | -01 | L  | -24** | L  | -08 | L   | 08 | -04 | 03 | -07 | 09 |
| A3: Altruism  | L    | -07 | -02 | 06   | L  | -10 | 15  | 14* | L   | 02 | -05 | H   | 10  | 20** |
| A4: Compliance| L    | -12 | 09  | -01 | L  | -11 | L   | -21** | 01 | -10 | -11 | H   | -12 | -06 |
| A5: Modesty   | -10  | 16* | -06 | L   | -22** | -13* | L   | -12 | L  | -19** | H | -01 | H   | -07 | -08 |
| A6: Tender-mindedness | L | 03 | -16* | 16* | L | -14* | -01 | 11  | L   | -01 | 11 | 10  | 16* |
| Conscientiousness | 08 | 12  | 10  | -24** | -04 | c  | -13* | -08 | 02 | -15* | 21** |
| C1: Competence | 04  | 08  | 09  | -10 | 06 | -11 | 01  | 01  | L   | -12 | H  | 17** |
| C2: Order     | 08  | 08  | 03  | -16* | -03 | L  | -13* | -10 | 00  | -12 | H  | 10  |
| C3: Dutifulness | 10  | 10  | 13* | L  | -33** | -09 | -22** | -14* | 07  | -14* | H  | 22** |
| C4: Achievement-striving | 02  | 00  | 11  | -04 | 12  | 07  | H  | 04  | -03 | 03  | H  | 24** |
| C5: Self-discipline | -02 | 11  | 01  | L  | -09 | 00 | -04 | 01  | 01  | L   | -10 | H  | 09  |
| C6: Deliberation | 08  | 10  | 06  | L  | -26** | L | -18** | L  | -11 | -12 | 05  | -15* | H  | 07  |

*Note. Pred.: Five Factor Model facet traits predicted to be associated with DSM-IV PDs. L = low score on facet and H = high score on facet. Letters refer to Widiger and Mullins-Sweatt (2009).

**p < 0.01, *p < 0.05.
Sweatt (2009) obtained from 246 *dimensional* equivalent PDs (who scored higher than *dimensional* criteria of PDs). Although most of the correlations were not substantially strong, the highest correlation was $r = -0.33$ (C3: Dutifulness with Antisocial PD), and a relatively strong domain-facet for PD support emerged for four PDs: Antisocial, Histrionic, Dependent, and Obsessive-Compulsive PD. Antisocial PD correlated negatively with Agreeableness and Conscientiousness in the domain level, and with two facets of those, respectively. Histrionic PD correlated with the Extraversion domain and its five facets. Dependent PD correlated with the Extraversion domain and its four facets. Obsessive-Compulsive PD correlated with the Consciousness domain and its three facets. The relationships between the personality traits and the PD scales mostly corresponded to the predictive description by Widiger and Millins-Sweatt (2009) as adopted from surveys of researchers (Lynam & Widiger, 2001) and clinicians (Samuel & Widiger, 2004). However, the correlation coefficients obtained in the present study were weak compared to those by Bagby et al. (2005) who reported a similar analysis.

*The FFM Profiles of 10 Equivalent PD Groups*

Table 2 presents the mean $z$-scores and $SD$s of the NEO-PI-R domains and facets for each *dimensional* equivalent PD. In general, there were few noticeable features in any PDs. The highest absolute $z$-score was $-0.72$ for A1 (Trust) with Avoidant PD, and the next scores were $-0.61$ for A4 (Compliance) with Avoidant and Dependent PDs, C3 (Dutifulness) with Schizoid PD, and $-0.60$ for C4 (Achievement-striving) on Obsessive-Compulsive PD. Only 14 (4.7%) of the $z$-scores were higher than $+0.5$ or lower than $-0.5$, meaning that almost no extreme personality traits were shown in any of the *dimensional* equivalent PDs. A similar analysis was then conducted for the *categorical* equivalent PDs. The results are shown in Table 3. On average, the $z$-scores for each PD had higher values than those in Table 2. The most stand-out $z$-score reached almost $+1.0$ (0.95) for C1 (Competence) with Paranoid PD, and the next scores were $0.80$ for A3 (Altruism) and $-0.77$ for E2 (Gregariousness) with Schizoid PD, $0.78$ for N2 (Angry hostility) with Borderline PD, and $-0.76$ for A4 (Compliance) with Narcissistic PD. The number of $z$-scores higher than $+0.5$ or lower than $-0.5$ was 26 (8.7%), nearly twice that of the *dimensional* equivalent PDs, although the $z$-score profiles for each PD were not extreme. In sum, each PD did not exhibit a specific extreme trait profile in the domains/facets of FFM.

*Multiple Regression Analyses of Equivalent PDs*

Table 4 provides the results of multiple regression analyses using the 30 facet scores of the NEO-PI-R as the predictor variables and the PDQ-4 scores for each PD as the predicted variables in the *dimensional* equivalent PDs. The facet scores of the NEO-PI-R were statistically significant predictors for each of the PDQ-4 scores, suggesting that FFM personality traits can account for the variance in the degree of PDs to some extent. Antisocial PD and Histrionic PD were the most predicted by the 30 facet scores. The results also showed sex differences in some PDs, and the most predicted by the facet scores were Histrionic PD in males and Paranoid PD in females. However, as is obvious
Table 2. The Mean Z-Scores (SDs) of the NEO-PI-R Domains and Facets for the 10 Dimensional Equivalent PD Groups

| Domains/Facets       | PRN (N = 48) | SZD (N = 50) | SZT (N = 48) | ATS (N = 59) | BDL (N = 54) | HST (N = 36) | NCS (N = 43) | AVD (N = 32) | DPD (N = 28) | OCP (N = 27) |
|----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Neuroticism          | 0.32 (1.38) | –0.33 (1.01) | 0.49 (1.26) | 0.05 (1.09) | 0.44 (1.33) | 0.12 (1.25) | –0.11 (1.18) | 0.34 (1.24) | 0.32 (1.44) | 0.40 (1.12) |
| N1: Anxiety          | 0.23 (1.20) | –0.22 (0.99) | 0.55 (1.16) | –0.05 (0.87) | 0.37 (1.12) | 0.12 (1.06) | –0.12 (0.99) | 0.40 (1.15) | 0.26 (1.15) | 0.30 (1.00) |
| N2: Angry hostility   | 0.41 (1.19) | –0.21 (1.00) | 0.32 (1.17) | 0.22 (1.16) | 0.58 (1.27) | 0.15 (1.07) | 0.13 (1.05) | 0.30 (1.04) | 0.35 (1.12) | 0.47 (1.15) |
| N3: Depressiveness    | 0.38 (1.31) | –0.13 (1.05) | 0.46 (1.10) | 0.06 (0.99) | 0.40 (1.24) | 0.15 (0.95) | –0.04 (1.06) | 0.41 (1.29) | 0.21 (1.34) | 0.37 (1.18) |
| N4: Self-consciousness| 0.18 (1.22) | –0.28 (0.98) | 0.47 (1.17) | –0.20 (0.87) | 0.20 (1.19) | 0.11 (1.16) | –0.02 (1.13) | 0.27 (1.23) | 0.16 (1.24) | 0.24 (1.08) |
| N5: Impulsivity       | 0.11 (1.21) | –0.31 (1.07) | 0.28 (1.10) | 0.27 (1.44) | 0.36 (1.22) | –0.01 (1.39) | –0.08 (1.26) | –0.09 (1.10) | 0.40 (1.41) | 0.37 (1.16) |
| N6: Vulnerability     | 0.17 (1.23) | –0.39 (1.07) | 0.11 (1.20) | –0.10 (0.96) | 0.04 (1.16) | –0.01 (1.23) | –0.39 (1.02) | 0.24 (1.27) | 0.05 (1.44) | 0.05 (1.13) |
| Extraversion          | –0.33 (1.02) | –0.32 (1.34) | –0.02 (1.08) | 0.16 (0.96) | 0.06 (1.04) | 0.13 (1.12) | 0.13 (1.05) | –0.50 (1.43) | 0.39 (1.1) | 0.23 (1.33) |
| E1: Warmth            | –0.32 (1.05) | –0.35 (1.11) | 0.11 (0.90) | –0.11 (1.03) | 0.02 (0.79) | –0.04 (1.13) | –0.09 (1.04) | –0.36 (1.05) | 0.17 (1.26) | 0.16 (1.17) |
| E2: Gregariousness    | –0.44 (1.00) | –0.39 (1.36) | –0.28 (1.14) | 0.00 (1.02) | –0.20 (1.02) | –0.02 (1.13) | 0.00 (0.98) | –0.38 (1.41) | 0.34 (1.17) | –0.31 (1.36) |
| E3: Assertiveness     | 0.00 (0.99) | –0.03 (1.24) | 0.00 (1.06) | 0.24 (0.84) | 0.21 (1.05) | 0.37 (0.90) | 0.31 (0.97) | –0.33 (1.36) | 0.13 (1.04) | 0.39 (1.17) |
| E4: Activity          | –0.10 (1.15) | 0.00 (1.18) | 0.07 (1.21) | 0.13 (0.99) | 0.18 (1.15) | 0.00 (1.12) | –0.02 (0.96) | –0.24 (1.29) | 0.35 (1.08) | 0.26 (1.15) |
| E5: Excitement-seeking| –0.24 (1.11) | –0.10 (1.21) | 0.01 (1.24) | 0.40 (1.03) | 0.11 (1.19) | 0.14 (0.97) | 0.30 (1.19) | –0.43 (1.17) | 0.38 (0.83) | 0.34 (1.09) |
| E6: Positive emotions | –0.41 (1.03) | –0.42 (1.00) | 0.05 (1.02) | 0.03 (0.95) | –0.05 (1.04) | 0.07 (1.22) | 0.04 (1.07) | –0.37 (0.99) | 0.31 (1.2) | 0.14 (1.09) |
| Openness              | –0.02 (1.20) | –0.18 (1.06) | 0.31 (1.15) | 0.00 (1.20) | 0.12 (1.12) | 0.02 (1.22) | 0.05 (1.14) | –0.30 (0.96) | 0.32 (0.89) | 0.37 (1.07) |
| O1: Fantasy           | –0.11 (1.27) | –0.40 (1.09) | 0.06 (1.33) | –0.04 (1.02) | 0.07 (1.09) | 0.14 (1.10) | –0.01 (1.24) | –0.33 (1.32) | 0.28 (0.98) | 0.13 (1.18) |
| O2: Aesthetics        | 0.02 (1.12) | –0.30 (1.13) | 0.23 (1.12) | –0.03 (1.04) | –0.03 (1.05) | 0.02 (1.05) | 0.12 (0.93) | –0.09 (1.11) | 0.12 (0.94) | 0.56 (1.07) |
| O3: Feelings          | –0.07 (1.14) | –0.22 (0.99) | 0.29 (1.03) | –0.06 (1.10) | 0.11 (1.10) | 0.03 (1.20) | 0.01 (1.17) | –0.31 (1.15) | 0.29 (1.08) | 0.35 (1.00) |
| O4: Actions           | –0.15 (1.14) | 0.19 (1.32) | –0.04 (1.45) | 0.07 (1.21) | 0.00 (1.31) | 0.04 (1.09) | 0.03 (1.07) | –0.28 (1.47) | 0.06 (1.06) | –0.16 (1.40) |
| O5: Ideas             | 0.16 (1.24) | 0.09 (1.04) | 0.48 (1.14) | 0.09 (1.11) | 0.17 (1.20) | –0.11 (1.14) | 0.09 (1.06) | –0.02 (1.09) | 0.33 (0.89) | 0.46 (1.08) |
| O6: Values            | 0.03 (0.85) | 0.04 (1.11) | –0.04 (0.96) | –0.14 (1.04) | 0.08 (1.00) | –0.06 (0.97) | –0.10 (0.96) | –0.10 (0.89) | –0.04 (1.18) | –0.21 (1.15) |
| Agreeableness  | $-0.45 (0.93)$ | $-0.24 (1.00)$ | $-0.18 (1.08)$ | $-0.45 (0.96)$ | $-0.38 (0.97)$ | $0.07 (0.90)$ | $-0.25 (0.94)$ | $-0.50 (0.79)$ | $-0.53 (0.95)$ | $-0.18 (0.97)$ |
|---------------|----------------|----------------|----------------|----------------|----------------|--------------|----------------|----------------|----------------|----------------|
| A1: Trust     | $-0.58 (1.08)$ | $-0.26 (1.11)$ | $-0.39 (1.17)$ | $-0.20 (0.97)$ | $-0.25 (1.04)$ | $0.18 (1.14)$ | $0.02 (1.07)$  | $-0.72 (1.15)$ | $-0.52 (1.12)$ | $-0.09 (1.21)$ |
| A2: Straightforwardness | $-0.28 (1.09)$ | $-0.24 (1.08)$ | $-0.23 (1.25)$ | $-0.49 (1.08)$ | $-0.34 (1.16)$ | $0.01 (0.97)$  | $-0.23 (1.17)$ | $-0.33 (1.16)$ | $-0.58 (1.15)$ | $-0.06 (1.04)$ |
| A3: Altruism  | $-0.41 (0.83)$ | $-0.18 (1.04)$ | $-0.05 (0.98)$ | $-0.30 (0.85)$ | $-0.05 (0.92)$ | $0.08 (1.04)$  | $-0.24 (1.06)$ | $-0.44 (0.92)$ | $-0.18 (0.99)$ | $0.01 (1.12)$  |
| A4: Compliance  | $-0.43 (1.09)$ | $0.02 (1.04)$  | $-0.22 (1.23)$ | $-0.27 (1.11)$ | $-0.52 (1.10)$ | $0.00 (0.91)$  | $-0.24 (1.12)$ | $-0.61 (0.94)$ | $-0.61 (0.90)$ | $-0.54 (1.12)$ |
| A5: Modesty   | $0.13 (1.09)$  | $0.22 (1.19)$  | $0.10 (1.08)$  | $-0.26 (1.15)$ | $-0.30 (1.17)$ | $-0.08 (1.24)$ | $-0.07 (1.22)$ | $0.11 (1.04)$  | $-0.09 (1.11)$ | $-0.27 (1.10)$ |
| A6: Tender-mindedness | $-0.19 (1.08)$ | $-0.53 (1.00)$ | $0.14 (1.10)$  | $-0.30 (0.83)$ | $-0.08 (1.05)$ | $0.07 (1.02)$  | $-0.30 (0.98)$ | $0.05 (1.07)$  | $-0.11 (1.27)$ | $0.24 (1.18)$  |
| Conscientiousness  | $0.14 (1.12)$  | $0.10 (1.04)$  | $0.37 (1.12)$  | $-0.47 (1.13)$ | $-0.05 (1.29)$ | $0.02 (0.91)$  | $0.01 (1.18)$  | $-0.06 (1.03)$ | $-0.18 (1.22)$ | $0.34 (1.15)$  |
| C1: Competence | $0.09 (1.18)$  | $0.03 (0.96)$  | $0.24 (1.23)$  | $-0.18 (1.14)$ | $0.15 (1.16)$  | $-0.04 (1.01)$ | $0.14 (1.12)$  | $0.13 (0.99)$  | $-0.14 (1.16)$ | $0.26 (1.07)$  |
| C2: Order     | $0.00 (1.11)$  | $-0.02 (1.14)$ | $0.12 (1.24)$  | $-0.32 (1.15)$ | $-0.13 (1.28)$ | $-0.11 (1.10)$ | $-0.25 (1.08)$ | $-0.22 (1.20)$ | $-0.21 (1.19)$ | $0.03 (1.20)$  |
| C3: Dutifulness | $0.18 (1.25)$  | $-0.06 (1.06)$ | $0.36 (1.01)$  | $-0.61 (0.89)$ | $-0.09 (1.22)$ | $-0.21 (0.94)$ | $-0.21 (1.09)$ | $0.07 (1.05)$  | $-0.21 (1.04)$ | $0.23 (1.18)$  |
| C4: Achievement-striving | $0.02 (1.02)$  | $-0.02 (1.03)$ | $0.33 (0.95)$  | $-0.15 (1.13)$ | $0.09 (1.10)$  | $0.12 (0.92)$  | $0.17 (1.00)$  | $-0.16 (1.06)$ | $0.09 (0.92)$  | $0.60 (1.04)$  |
| C5: Self-discipline | $-0.02 (1.06)$ | $0.25 (1.19)$  | $0.20 (1.24)$  | $-0.19 (1.13)$ | $0.02 (1.27)$  | $0.12 (0.93)$  | $0.29 (1.23)$  | $-0.02 (1.22)$ | $0.04 (1.37)$  | $0.28 (1.21)$  |
| C6: Deliberation | $0.31 (1.13)$  | $0.23 (1.12)$  | $0.28 (1.10)$  | $-0.45 (1.13)$ | $-0.16 (1.12)$ | $0.19 (1.09)$  | $-0.03 (1.13)$ | $0.00 (1.07)$  | $-0.29 (0.95)$ | $0.03 (1.21)$  |

Each PDQ-4 scale

|              | $2.33 (0.29)$ | $2.56 (0.51)$ | $2.33 (0.34)$ | $2.91 (0.57)$ | $2.34 (0.45)$ | $2.34 (0.32)$ | $2.47 (0.35)$ | $2.22 (0.28)$ | $2.27 (0.33)$ | $2.67 (0.38)$ |

*Note.* PRD: Paranoid PD, SZD: Schizoid PD, SZT: Schizotypal PD, ATS: Antisocial PD, BDL: Borderline PD, HST: Histrionic PD, NCS: Narcissistic PD, AVD: Avoidant PD, DPD: Dependent PD, OCP: Obsessive-Compulsive PD, z-scores more than +0.5 and less than −0.5 were underlined, z-scores between −0.1 and +0.1 were in italic.
| Domain                      | PRN (N = 38) | SZD (N = 13) | SZT (N = 40) | ATS (N = 22) | BDL (N = 36) | HST (N = 21) | NCS (N = 17) | AVD (N = 50) | DPD (N = 30) | OCP (N = 41) |
|-----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Neuroticism                 |              |              |              |              |              |              |              |              |              |              |
| N1: Anxiety                 | 0.26 (1.38)  | 0.09 (1.18)  | 0.65 (1.12)  | 0.01 (1.06)  | 0.75 (1.27)  | 0.33 (1.33)  | 0.05 (1.27)  | 0.45 (1.25)  | 0.49 (1.37)  | 0.37 (1.26)  |
| N2: Angry hostility         | 0.24 (1.19)  | 0.33 (1.02)  | 0.56 (1.03)  | -0.07 (0.95) | 0.58 (1.06)  | 0.12 (1.00)  | -0.01 (1.04) | 0.44 (1.14)  | 0.40 (1.02)  | 0.36 (1.18)  |
| N3: Depressiveness          | 0.30 (1.22)  | 0.01 (1.37)  | 0.52 (0.96)  | 0.18 (1.14)  | 0.78 (1.27)  | 0.66 (1.18)  | 0.30 (1.03)  | 0.27 (1.02)  | 0.36 (1.20)  | 0.28 (1.11)  |
| N4: Self-consciousness     | 0.36 (1.30)  | 0.43 (1.24)  | 0.65 (1.08)  | 0.03 (1.08)  | 0.68 (1.19)  | 0.24 (1.07)  | 0.02 (1.28)  | 0.44 (1.30)  | 0.50 (1.24)  | 0.48 (1.30)  |
| N5: Impulsivity             | 0.05 (1.29)  | -0.26 (1.29) | 0.47 (1.10)  | -0.36 (0.68) | 0.35 (1.24)  | 0.07 (1.18)  | 0.02 (1.08)  | 0.45 (1.25)  | 0.26 (1.36)  | 0.28 (1.31)  |
| N6: Vulnerability           | 0.10 (1.26)  | -0.03 (1.23) | 0.47 (1.15)  | 0.55 (1.43)  | 0.70 (1.18)  | 0.39 (1.67)  | 0.28 (1.38)  | 0.05 (1.09)  | 0.51 (1.42)  | 0.22 (1.15)  |
| Extraversion                |              |              |              |              |              |              |              |              |              |              |
| E1: Warmth                  | -0.08 (1.09) | 0.03 (1.11)  | -0.03 (1.02) | -0.16 (1.29) | 0.07 (0.95)  | 0.01 (1.37)  | -0.01 (1.11) | -0.34 (0.96) | 0.20 (1.16)  | 0.06 (1.08)  |
| E2: Gregariousness          | -0.18 (1.17) | -0.77 (1.25) | -0.38 (1.10) | -0.31 (1.09) | -0.35 (1.03) | -0.01 (1.28) | -0.05 (1.19) | -0.47 (1.19) | -0.03 (1.24) | -0.21 (1.23) |
| E3: Assertiveness           | 0.18 (1.06)  | -0.31 (1.23) | -0.04 (1.05) | 0.39 (0.98)  | 0.24 (1.05)  | 0.43 (1.09)  | 0.26 (1.10)  | -0.45 (1.11) | 0.06 (1.05)  | 0.10 (1.18)  |
| E4: Activity                | 0.33 (1.28)  | 0.29 (1.41)  | -0.12 (1.14) | 0.18 (1.29)  | 0.19 (1.17)  | -0.02 (1.35) | 0.11 (1.22)  | -0.50 (1.06) | 0.30 (1.26)  | 0.13 (1.23)  |
| E5: Excitement-seeking      | 0.06 (1.07)  | -0.44 (1.26) | 0.14 (1.25)  | 0.52 (0.83)  | 0.28 (1.12)  | 0.20 (1.09)  | 0.39 (1.34)  | -0.42 (0.95) | 0.15 (0.94)  | 0.26 (1.21)  |
| E6: Positive emotions       | -0.15 (1.10) | -0.03 (1.38) | 0.03 (1.11)  | 0.16 (1.08)  | 0.35 (1.01)  | 0.37 (1.51)  | 0.15 (1.17)  | -0.31 (0.82) | 0.40 (1.24)  | 0.04 (1.02)  |
| Openness                    |              |              |              |              |              |              |              |              |              |              |
| O1: Fantasy                 | 0.17 (1.27)  | 0.17 (1.28)  | 0.39 (1.21)  | 0.33 (1.28)  | 0.30 (1.14)  | -0.11 (1.35) | 0.06 (1.45)  | -0.06 (0.94) | 0.51 (1.05)  | 0.29 (1.06)  |
| O2: Aesthetics              | -0.12 (1.38) | -0.30 (1.52) | 0.15 (1.27)  | 0.28 (1.14)  | 0.21 (1.19)  | -0.09 (1.29) | 0.30 (1.49)  | -0.04 (1.17) | 0.29 (1.25)  | 0.14 (1.24)  |
| O3: Feelings                | 0.20 (1.10)  | -0.13 (1.18) | 0.37 (1.16)  | -0.10 (1.26) | 0.15 (1.17)  | 0.00 (1.16)  | -0.04 (1.09) | -0.12 (1.02) | 0.43 (1.06)  | 0.24 (1.04)  |
| O4: Actions                 | 0.07 (1.26)  | 0.20 (1.11)  | 0.37 (1.00)  | 0.27 (1.09)  | 0.25 (0.99)  | 0.14 (1.32)  | 0.11 (1.05)  | 0.01 (1.06)  | 0.36 (1.11)  | 0.26 (1.05)  |
| O5: Ideas                   | 0.06 (1.27)  | 0.36 (1.34)  | 0.02 (1.46)  | 0.08 (1.42)  | -0.13 (1.25) | -0.15 (0.99) | -0.03 (1.05) | -0.20 (1.30) | 0.00 (1.12)  | 0.14 (1.34)  |
| O6: Values                  | 0.30 (1.20)  | 0.38 (1.37)  | 0.09 (1.33)  | 0.38 (2.12)  | 0.37 (1.07)  | -0.32 (1.23) | -0.07 (1.34) | 0.04 (1.03)  | 0.50 (0.97)  | 0.33 (1.23)  |
| Agreeableness | 0.37 (1.00) | 0.58 (0.89) | -0.31 (1.07) | -0.49 (1.18) | -0.30 (1.07) | -0.14 (1.01) | -0.37 (1.07) | -0.34 (1.05) | -0.38 (1.12) | -0.10 (0.98) |
|---------------|-------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| A1: Trust     | -0.26 (1.20) | 0.18 (1.46) | -0.47 (1.18) | -0.23 (1.27) | -0.22 (1.21) | -0.01 (1.44) | 0.33 (1.29)  | -0.41 (1.11) | -0.40 (1.27) | -0.03 (1.17) |
| A2: Straightforwardness | -0.25 (1.22) | 0.58 (0.95) | -0.30 (1.25) | -0.72 (1.25) | -0.27 (1.21) | -0.04 (1.06) | -0.22 (1.42) | -0.16 (1.23) | -0.49 (1.2)  | -0.09 (1.12) |
| A3: Altruism  | -0.28 (0.91) | 0.80 (0.76) | -0.15 (1.07) | 0.01 (0.96)  | 0.06 (0.88)  | -0.22 (1.12) | -0.13 (1.15) | -0.37 (1.00) | 0.02 (1.21)  | 0.15 (1.07)  |
| A4: Compliance | -0.36 (1.32) | 0.23 (1.04) | -0.35 (1.10) | -0.32 (1.24) | -0.75 (1.15) | -0.38 (1.07) | -0.76 (1.05) | -0.41 (1.01) | -0.50 (1.08) | -0.37 (1.11) |
| A5: Modesty   | -0.21 (1.24) | 0.43 (1.35) | -0.05 (1.25) | -0.39 (1.41) | -0.08 (1.20) | 0.11 (1.36)  | -0.29 (1.54) | 0.03 (1.08)  | -0.01 (1.20) | -0.08 (1.09) |
| A6: Tender-mindedness | -0.12 (1.16) | 0.12 (1.35) | 0.13 (1.21)  | -0.36 (1.00) | 0.04 (1.19)  | -0.01 (1.26) | -0.59 (0.96) | -0.02 (1.14) | -0.14 (1.34) | 0.02 (1.25)  |
| Conscientiousness | 0.23 (1.11) | 0.49 (1.01) | 0.08 (1.16)  | -0.42 (1.32) | -0.17 (1.28) | -0.39 (1.44) | -0.27 (1.29) | -0.12 (1.05) | -0.29 (1.30) | 0.32 (1.16)  |
| C1: Competence | 0.95 (1.20) | 0.37 (1.12) | 0.19 (1.15)  | 0.08 (1.32)  | 0.00 (1.13)  | -0.39 (1.23) | -0.36 (1.32) | -0.02 (1.03) | -0.40 (1.06) | 0.18 (1.11)  |
| C2: Order     | 0.06 (1.18) | 0.03 (1.15) | -0.03 (1.26) | -0.43 (1.25) | -0.16 (1.23) | -0.07 (1.45) | 0.03 (1.26)  | -0.04 (1.16) | -0.25 (1.27) | 0.19 (1.23)  |
| C3: Dutifulness | 0.16 (1.24) | 0.24 (1.17) | 0.15 (1.09)  | -0.47 (1.11) | 0.03 (1.30)  | -0.74 (1.11) | -0.33 (0.97) | 0.14 (1.08)  | -0.10 (1.23) | 0.22 (1.18)  |
| C4: Achievement-striving | 0.15 (1.08) | 0.45 (1.10) | 0.16 (1.11)  | -0.09 (1.18) | 0.08 (1.16)  | -0.13 (1.20) | 0.03 (1.22)  | -0.29 (1.01) | 0.12 (1.13)  | 0.39 (1.17)  |
| C5: Self-discipline | 0.25 (1.07) | 0.61 (1.09) | -0.05 (1.25) | -0.31 (1.25) | -0.28 (1.19) | -0.26 (1.30) | 0.17 (1.51)  | -0.27 (1.11) | -0.24 (1.36) | 0.20 (1.12)  |
| C6: Deliberation | 0.25 (1.11) | 0.36 (1.12) | -0.04 (1.19) | -0.41 (1.43) | -0.32 (1.15) | -0.10 (1.61) | -0.71 (1.36) | 0.01 (1.08)  | -0.32 (1.27) | 0.14 (1.21)  |

Each PDQ-4 scale

| Paranoid PD | 5.42 (0.59) | 4.46 (0.93) | 5.35 (0.57) | 4.59 (0.83) | 5.67 (1.03) | 5.10 (0.29) | 5.35 (0.59) | 5.38 (0.60) | 5.53 (0.76) | 5.59 (0.70) |

Note. PRD: Paranoid PD, SZD: Schizoid PD, SZT: Schizotypal PD, ATS: Antisocial PD, BDL: Borderline PD, HST: Histrionic PD, NCS: Narcissistic PD, AVD: Avoidant PD, DPD: Dependent PD, OCP: Obsessive-Compulsive PD, z-scores more than +0.5 and less than −0.5 were underlined, z-scores between −0.1 and +0.1 were in italic.
Table 4. Multiple Regression Predicting the PDQ-4 Scores With the NEO-PI-R Facet Scores in the Dimensional Equivalent PD Groups

| PDQ-4 PD scales | Predictions |           |           |           |
|-----------------|-------------|-----------|-----------|-----------|
|                 | All sample  | Males     | Females   |
|                 | $R^2$       | $F(30, 245)$ | $R^2$     | $F(30, 139)$ | $R^2$       | $F(30, 105)$ |
| Paranoid        | 0.04        | 1.374     | 0.02      | 1.107     | 0.19        | 1.845*       |
| Schizoid        | 0.08        | 1.713*    | 0.05      | 1.241     | 0.06        | 1.225        |
| Schizotypal     | 0.01        | 1.076     | 0.02      | 1.115     | 0.18        | 1.794*       |
| Antisocial      | 0.17        | 2.640**   | 0.17      | 1.919**   | 0.18        | 1.746*       |
| Borderline      | 0.13        | 2.256**   | 0.13      | 1.694*    | 0.10        | 1.369        |
| Histrionic      | 0.17        | 2.681**   | 0.23      | 2.407**   | 0.10        | 1.387        |
| Narcissistic    | 0.03        | 1.255     | 0.03      | 1.161     | 0.00        | 0.635        |
| Avoidant        | 0.11        | 1.992**   | 0.14      | 1.731*    | 0.15        | 1.639*       |
| Dependent       | 0.08        | 1.704*    | 0.10      | 1.489     | 0.11        | 1.439        |
| Obsessive-Compulsive | 0.08    | 1.692*    | 0.01      | 1.058     | 0.13        | 1.500        |
| Mean $R^2$     | 0.09        | 0.09      | 0.12      |
| Range of $R^2$'s | 0.01–0.17  | 0.01–0.23 | 0.00–0.19 |

**$p < 0.01$, *$p < 0.05$.**

From the $R^2$ values in Table 4, the proportions of prediction from the facet scores were mostly small, $R^2 = 0.09$ on average, suggesting that the personality traits of the FFM do not sufficiently predict PDs.

Other results of multiple regression analyses are shown in Table 5 using the facet scores of the NEO-PI-R as the predictor variables and the PDQ-4 symptom scores for each PD as the predicted variables in the categorical equivalent PDs. Only two PDs were predicted by the NEO-PI-R facets significantly but with small $R^2$. Sex differences were not well observed because almost all of the $R^2$ values were small. These results mean that 30 facets of personality traits barely predicted the PD symptom scores in almost all of the PDs, despite the fact that the samples should have many symptoms of each PD (see the bottom row of Table 3).

The results of multiple regression analyses suggested that the FFM facets could explain only a small part of the PD scores/symptoms. However, there was a possibility that the results of the prediction of the PDs by the FFM did not reflect the FFM of PD hypothesis sufficiently because it contained too many variables (all facets) that were not very relevant as predictors in the analyses. Since the FFM of PD was proposed, several prototypical profiles of each PD in the FFM or a simplified scoring technique for PDs were proposed (Lynam & Widiger, 2001; Miller et al., 2005; Widiger & Mullins-Sweatt, 2009). For example, the PD profiles in the FFM (Widiger & Mullins-Sweatt, 2009) and
Table 5. Multiple Regression Predicting the PDQ-4 Personality Disorder Symptom Counts With the NEO-PI-R Facet Scores in the Categorical Equivalent PD Groups

| PDQ-4 PD scales | All sample | Males | Females |
|-----------------|------------|-------|---------|
|                 | $R^2$      | $F(30, 164)$ | $R^2$ | $F(30, 94)$ | $R^2$ | $F(30, 69)$ |
| Paranoid        | 0.00       | 1.00 | 0.01 | 1.031 | 0.00 | 0.954 |
| Schizoid        | 0.08       | 1.474 | 0.08 | 1.227 | 0.20 | 1.578 |
| Schizotypal     | 0.03       | 1.141 | 0.01 | 1.045 | 0.00 | 0.994 |
| Antisocial      | 0.10       | 1.596* | 0.16 | 1.589 | 0.03 | 1.068 |
| Borderline      | 0.03       | 1.164 | 0.00 | 0.542 | 0.05 | 1.119 |
| Histrionic      | 0.10       | 1.597* | 0.03 | 1.073 | 0.03 | 1.061 |
| Narcissistic    | 0.08       | 1.458 | 0.03 | 1.097 | 0.15 | 1.402 |
| Avoidant        | 0.05       | 1.301 | 0.03 | 1.111 | 0.05 | 1.127 |
| Dependent       | 0.09       | 1.532 | 0.35 | 2.664** | 0.00 | 0.940 |
| Obsessive-Compulsive | 0.00     | 0.747 | 0.03 | 1.094 | 0.00 | 0.981 |

Mean $R^2$ | 0.06 | 0.07 | 0.05 |
Range of scores | 0.00–0.10 | 0.00–0.35 | 0.00–0.20 |

**$p < 0.01$, *$p < 0.05$.**

The FFM-PD scores (Miller et al., 2005) provide specific profiles of each PD on 30 facets. In these methods, the number of facets used for classifying each PD was at most 18 (average = 11.7), suggesting that almost half of the facets are not necessary for predicting PDs.

Table 6 shows the results of multiple regression analyses using the facet scores based on the prototypical profile of each PD by Widiger and Mullins-Sweatt (2009) as the predictor variables and the PDQ-4 scores as the predicted variables in the dimensional equivalent PDs. Compared to the results in Table 4, the predictive power of the FFM for the PDs clearly improved in most of the PDs. This suggests that the FFM of PD has certain validity. However, the prediction power remains small compared to previous research using a similar analysis (Bagby et al., 2005). For example, the mean $R^2$ was 0.31 (range: 0.20–0.54) in predicting PDs with Lynam and Widiger (2001) predicted facets of the NEO-PI-R, while the mean $R^2$ was 0.07 (range: 0.03–0.16) in the current study. Similar multiple regression analyses by Bagby et al. (2005) were applied to the PD symptom scores in the categorical equivalent PDs. As shown in Table 7, the predictions by the FFM facets proposed by Widiger and Mullins-Sweatt (2009) were not very effective (mean $R^2 = 0.05$).

The PD scoring techniques by the FFM (FFM-PD counts; Miller et al., 2005) with a simple additive sum of the relevant facet scores for each prototype were applied to
Table 6. Multiple Regression Predicting PDQ-4 Scale Scores With Widiger and Mullins-Sweatt (2009) Predicted Facets of the NEO-PI-R in the Dimensional Equivalent PDs

| PDQ-4 PD scales | Predictions |          |          |          |          |
|-----------------|-------------|----------|----------|----------|----------|
|                 | All(Male)   |          |          |          |          |
| Paranoid        | 0.06        | 2.435**  | 0.01     | 1.086    | 0.25     | 4.249**  |
| Schizoid        | 0.05        | 2.676**  | 0.01     | 1.133    | 0.07     | 2.045*   |
| Schizotypal     | 0.03        | 1.847    | 0.00     | 1.056    | 0.15     | 3.108**  |
| Antisocial      | 0.16        | 3.644**  | 0.18     | 2.739**  | 0.13     | 1.859*   |
| Borderline      | 0.07        | 2.745**  | 0.06     | 1.863    | 0.09     | 1.888    |
| Histrionic      | 0.11        | 3.792**  | 0.15     | 3.203**  | 0.05     | 1.543    |
| Narcissistic    | 0.03        | 1.593    | 0.04     | 1.406    | 0.00     | 0.627    |
| Avoidant        | 0.07        | 2.781**  | 0.05     | 1.708    | 0.18     | 3.069**  |
| Dependent       | 0.05        | 2.143*   | 0.09     | 2.082*   | 0.09     | 1.824    |
| Obsessive-Compulsive | 0.07   | 2.533**  | 0.04     | 1.519    | 0.09     | 1.863*   |

Mean $R^2$ | 0.07 | 0.06 | 0.11 |
Range of scores | 0.03–0.16 | 0.00–0.18 | 0.00–0.25 |

1 Degree of freedom varies because the number of predictors varied in each PD.

**$p < 0.01$, *$p < 0.05$.

Table 7. Multiple Regression Predicting PDQ-4 Personality Disorder Symptom Counts With Widiger and Mullins-Sweatt (2009) Predicted Facets of the NEO-PI-R Facet Scores in the Categorical Equivalent PDs

| Personality Disorder scales | Predictions |          |          |          |          |
|-----------------------------|-------------|----------|----------|----------|----------|
|                             | All sample  |          |          |          |          |
| Paranoid                    | 0.07        | 0.996    | 0.00     | 0.438    | 0.14     | 1.982*   |
| Schizoid                    | 0.04        | 1.908    | 0.05     | 1.549    | 0.01     | 1.125    |
| Schizotypal                 | 0.01        | 1.248    | 0.00     | 0.944    | 0.05     | 1.431    |
| Antisocial                  | 0.14        | 2.516**  | 0.27     | 2.900**  | 0.16     | 1.746    |
| Borderline                  | 0.09        | 2.396**  | 0.08     | 1.745    | 0.09     | 1.683    |
| Histrionic                  | 0.01        | 1.201    | 0.01     | 1.078    | 0.00     | 0.942    |
| Narcissistic                | 0.00        | 1.053    | 0.00     | 0.603    | 0.00     | 0.803    |
| Avoidant                    | 0.05        | 1.819    | 0.08     | 1.776    | 0.11     | 1.742    |
| Dependent                   | 0.07        | 1.992*   | 0.08     | 1.719    | 0.22     | 2.655**  |
| Obsessive-Compulsive        | 0.02        | 1.267    | 0.06     | 1.502    | 0.00     | 0.528    |

Mean $R^2$ | 0.05 | 0.06 | 0.08 |
Range of scores | 0.00–0.24 | 0.00–0.27 | 0.00–0.22 |

1 Degree of freedom varies because the number of predictors varied in each PD.

**$p < 0.01$, *$p < 0.05$. 


Table 8. The Correlations Between the Mean Z-Score by the FFM-PD Counts and PDQ-4 Scores in 4-Likert Format (N = 246)

| PDQ-4 score ↓ | FFM-PD counts → | PRN | SZD | SZT | ATS | BDL | HST | NCS | AVD | DPD | OCPD |
|---------------|-----------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Paranoid (PRN)| 0.18**          | 0.01| 0.05| 0.15*| 0.12| –0.14*| 0.07| 0.08| –0.03| –0.08|
| Schizoid (SZD)| 0.04            | 0.16*| –0.04| –0.12| –0.13| –0.24**| –0.14*| 0.12| –0.19**| –0.13*|
| Schizotypal (SZT)| 0.11           | 0.07| 0.11| –0.07| 0.04| –0.19**| –0.06| 0.15*| –0.08| 0.02|
| Antisocial (ATS)| 0.03           | –0.08| –0.07| 0.38**| 0.24**| 0.11| 0.18**| –0.12| 0.12| –0.10|
| Borderline (BDL)| 0.11           | –0.18**| 0.15*| 0.06| 0.26**| 0.08| 0.08| 0.08| 0.19**| 0.10|
| Histrionic (HST)| –0.10          | –0.18**| –0.01| 0.20**| 0.13*| 0.24**| 0.13*| –0.14*| 0.20**| 0.10|
| Narcissistic (NCS)| 0.07          | 0.03| –0.07| 0.29**| 0.20**| 0.00| 0.14*| –0.07| –0.01| –0.11|
| Avoidant (AVD)| 0.10           | 0.09| 0.08| –0.24**| –0.09| –0.20**| –0.15*| 0.20**| –0.09| –0.04|
| Dependent (DPD)| 0.01           | –0.04| 0.12| –0.23**| –0.08| –0.01| –0.11| 0.14*| 0.04| 0.05|
| Obsessive-Compulsive (OCPD)| 0.08        | 0.12| 0.08| –0.25**| –0.09| –0.13*| –0.08| 0.10| –0.16*| 0.10|

Note: Correlations in corresponded PDs are in bold, negative correlations are in italics.  
**p < 0.01, *p < 0.05.
dimensional equivalent PDs. The correlations between the mean z-score by the FFM-PD counts and PDQ-4 scores in 4-Likert format in each PD are shown in Table 8. The correlations obtained 246 dimensional equivalent PDs with \( r = 0.18 \) on average, and the strongest correlation was found in Antisocial PD (\( r = 0.38 \)) and the weakest correlation was found in Dependent PD (\( r = 0.04 \)). These correlations suggest that the FFM-PD scoring technique is effective to an extent for some PDs, but not for most PDs.

Finally, to examine the degree of similarity/difference between the dimensional measure and the categorical measure of PDs, we calculated the correlations between the PD scale scores of the PDQ-4 using the 4-point Likert format and the number of symptom scores that were obtained by adding only the “almost/always” response to each PD item in the PDQ-4. The correlations obtained 246 dimensional equivalent PDs with \( r = 0.74 \) on average (between 0.65–0.82). These strong correlations suggest that two measures considerably correspond to one another.

**Discussion**

Historically, controversies have persisted regarding the definition and classification of PDs because the concept and diagnosis of PDs are based on a sort of consensus of the typical phenotype of abnormal personalities, which obviously inherited the idea of abnormal personality by Schneider (1950) who coined the concept of PD. Then a question arises whether PDs are clinical conditions related to general personality or if they can only be distinguished as a difference in degree. This issue is firmly connected to the categorical or dimensional concept of PDs. Although PDs are considered personality disorders, the relationship between personality and PDs remains unclear. The dimensional view is that PDs can be described in the framework of the FFM of personality, and several empirical studies have reported a strong relationship between PDs and FFM personality traits. Three meta-analyses including clinical and non-clinical populations concluded that PDs can be adequately understood as constellations of extreme scores on the FFM (Ostendorf, 2000; Samuel & Widiger, 2008; Saulsman & Page, 2004).

The current study examined the fundamental issues of the FFM of PD. The first question was whether each PD exhibited extreme profiles on the FFM domain and facet scales. If PD is considered an extreme variant of normal personality, then each PD should exhibit its specific profile in the fundamental personality traits. This specific profile of each PD is needed for the conceptualization of PDs using the dimensional approach.

The results obtained from two (dimensional and categorical) equivalent PD groups were negative. In both groups, only weak features were observed in a few facets. The distances from the average of each mean PD score were very small in most facets, and even if some features were seen, the z-score was only approximately \(+/-0.5\). Given that all of the \( SDs \) were approximately 1.0+, suggesting that many individual differences exist within each PD group, each PD barely exhibited a specific profile in the FFM. Similar results were obtained in previous research in which the profiles of six persons who met
the criteria for DSM Borderline PD were very diverse (Krueger & Eaton, 2010). In sum, the results suggested that not only most equivalent PDs were not so extreme variants of normal personality but also they do not exhibit a profile specific to each PD on the NEO-PI-R domains and facets.

The second question was whether the FFM predicts PDs. As several studies suggested that PDs were explained by the FFM scores, it is insisted that the FFM can predict PDs (Miller et al., 2005; Widiger & Mullins-Sweatt, 2009). However, the results of multiple regression analyses did not show convincing predictions in both equivalent PD groups when all of the facets of the NEO-PI-R were used as predictors.

The third question was whether the FFM’s prototype-matching method can predict each PD. Although the prediction results improved when it was applied by the predicting model by Widiger and Mullins-Sweatt (2009), the FFM’s prediction power for PD remains unsatisfactory. FFM-PD scores were also applied to dimensional equivalent PD groups, but the results demonstrated only partial utility. In sum, the FFM of PD, based on the NEO-PI-R, might have some predictability and utility, but its effect is quite limited.

The final question was whether the dimensional and categorical measures of PD were contradictory. Recent research trends in the FFM of PD demonstrated a fundamental issue in the diagnosis of PD, that is, which is better for categorical or dimensional conceptualization of PDs. The results obtained in this study showed that the correlations between the two measures of PDs, the dimensional scores and their categorical criteria on the PDQ-4 scales were quite strong, meaning that a dimensional score of the PD scale had a validity for PD symptom scores for categorical diagnosis.

Although conceptual change in PDs was made in the DSM-5, it still opts for a categorical approach to PDs and maintains the same classification method as the DSM-IV-TR (APA, 2000). However, several problems remain in the categorical view of PD, such as comorbidity, limited reliability, and validity. In response to these problems with the categorical diagnostic system, the DSM-5 added a section III alternative model that includes a dimensional measurement of personality traits. It requires a diagnosis with a score on each of five dimensional personality traits based on a total of 25 facets (APA, 2013; Lanier et al., 2013; Miller et al., 2015; Morey & Skodol, 2013). These five traits are maladaptive variants of the FFM domains (but not the same of the FFM based on the NEO-PI-R).

However, there is also some criticism against the dimensional model. The dimensional model of PD assumes trait extremity as a symptom of PD, but extreme traits are not necessarily the same in PD symptoms. Additionally, as Wakefield (2013) reported, diagnostics focus on traits potentially could result in substantial false-positive diagnoses of PD, depending on the placement of the cutoff point. The cutoff point for diagnosis is not clear if dimensional conceptualization is applied, because the border between normal and abnormal personalities on the dimension is ambiguous.

In this study, since the categorical equivalent PDs were only the participants whose number of “almost/always” items exceeded the criterion in each PD scale, they could be regarded as equivalent to true PDs. The proportion of each PD group ranged from 1.2%
to 4.6% (mean = 2.8%), it could not be unreasonable to regard these participants as PDs, although the diagnostic rate of PD in university students, or even in the general population, has not been reported in Japan. The dimensional equivalent PDs were the participants whose z-score were more than +1.96 in each PD scale. The number of the participants who matched the dimensional equivalent PDs was almost 1.5 times those of categorical equivalent PDs, suggesting a possibility that PD diagnosis by dimensional criteria includes certain numbers of false-positives.

Another reason that the dimensional approach could be better than the categorical approach to PDs is that the dimensional conceptualization of PDs may reduce the probability of comorbidity (Lynam & Widiger, 2001). A study reported that most PDs also meet the diagnostic criteria for at least one other PD and/or mental disorder (Lenzenweger et al., 2007). Thus, does little comorbidity occur in the dimensional criteria? The comorbidities in this study were 58.1% in the dimensional equivalent PDs and 54.5% in the categorical equivalent PDs. These results suggest that the dimensional approach to PD would not solve the problem of comorbidity.

Background of PD Controversy

The FFM has been the most dominant model of personality in recent decades, and many studies have been reported based on FFM. Why is the FFM so dominant? In fact, convincing full explanations have not been provided as to why personality converged to the five factors around the mid-1980s, although various personality factors were proposed until that time, despite using the same method of analyzing the adjective rating/item response data via multivariate analysis. An extra-scientific reason might be related to this issue. In the 1970s, personality psychology was facing an existential crisis. The fundamental framework of “personality” had not been unified. Each personality psychologist was investigating with her/his own model, and this situation became a critical issue in “person-situation” controversy. To protect personality psychology from attacks by situationists, an agreement on the model was necessary (Wakabayashi, 2009). It suggests that FFM might not be necessarily an objectively obtained conclusion.

Since the concept of PD appeared, an implicit personality theory has been shared in psychiatry, based on the typological view of personality disorders by Schneider. To this traditional view, maybe it would be intended to spread a new theory (FFM) in the field of psychiatry by personality psychologists. Although there is no objection to the fact that the FFM is one of the most representative models of personality, but it is not necessarily the final and best answer. The possibility that there is a better personality model that can explain PDs must be examined. For example, other promising models are also proposed for representing the maladaptive personality traits of PDs (e.g., the HEXACO-model; Ashton et al., 2012).

Another possible reason for controversies on PDs may result from the difference in the basic view in psychiatry and psychology. In psychiatry, categorical diagnosis is used in general and is applied to PDs, while a dimensional multifactorial model is shared by most personality researchers in psychology. Although PD was largely investigated by researchers in psychiatry, recently many personality psychologists have become involved
in PD research. The controversies on PDs might be caused by the differences between the basic views of personality in both fields.

**Toward New Integration of Categorical and Dimensional Criteria for PDs**

Regarding PDs, many problems have been debated for years, and the trend in shifting from the categorical to the dimensional view of PD relates to these issues. However, these two criteria are not mutually exclusive. Traditional categorical criteria include the dimensional view even in the DSM diagnosis system, and the dimensional model needs a specific cutoff point along the trait dimensions for diagnosis and is inevitably categorical. The border of each PD is inherently vague and there is a lack of specific necessary and sufficient conditions for inclusion. Therefore, a sort of prototype classification is inevitable, and the prototype of each PD, which is an abstraction of the diagnostic criteria for each PD, is needed. A dimensionally flavored categorical system (Oldham, 2015) is necessary for PD diagnosis.

A common criticism of the FFM of PD has been that the existing FFM measures (the NEO-PI-R) lack fidelity for the assessment of its maladaptive variants (e.g., Krueger, 2010; Reynolds & Clark, 2001). This concern might no longer applies, as the field now has a number of alternative measures to assess maladaptive variants of the FFM (e.g., de Clercq et al., 2014). The DSM classification of PDs with the Five-Factor framework (The Personality Inventory for DSM-5 [PID-5]; Krueger et al., 2012, which consists of the items/facets different form the NEO-PI-R) was provided in the DSM-5 with the inclusion of a five-domain, 25-trait model that is aligned with the FFM (APA, 2013, p. 773). Personality trait model is moving toward a quantitative and empirically based approach to classifying psychopathology (Krueger & Markon, 2014).

There are some limitations to this study. First, the PD participants were not clinically diagnosed with PDs. In Japan, PD diagnosis is quite rare in clinical practice, and the accurate diagnostic rates of each PD are unknown. Therefore, we extracted the equivalent PDs from the large sample using two criteria, the participants who scored +1.96z on each PD scale (dimensional equivalent PDs: statistically 2.5% of the population) and those whose number of “almost/always” responses were more than half and one on each PD diagnostic criteria (categorical equivalent PDs) of the PDQ-4. Since the proportion of the two equivalent PD groups were quite small, especially in the categorical equivalent PDs, they could be almost equivalent to the patients who were diagnosed with PDs.

**Conclusion**

The Five-Factor Model of Personality Disorders might be useful for providing information regarding an individual’s personality and provides a richer and more appreciative description of each individual, but is not so helpful for diagnosing PDs if it based on existing FFM of personality (the domains and facets of the NEO-PI-R) because each PD does not necessarily exhibit a specific homogeneous trait constellation on it.
The results of the present study show that the trait dimensions of existing FFM of personality are not appropriate for use for diagnosing PD, although the dimensional model of PD is complementary to the conventional category model.

Personality trait description and diagnosis of PDs are not the same issue. It is necessary to integrate the dimensional and categorical approaches to PDs, and to find a better model of personality structure, for a more precise classification and diagnosis to provide superior treatment.

CONFLICT OF INTEREST

The author declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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