Five Factor Model of Personality, Assessment of

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Abstract

The Five Factor Model (FFM) is a hierarchical taxonomy of personality traits. At the superordinate level are five factors labeled Extraversion, Agreeableness, Conscientiousness, Emotional Stability (vs Neuroticism), and Intellect (or Openness). Below this level are several more specific personality traits that are summarized by these five higher-order dimensions. In this article, we briefly describe the lexical and questionnaire approaches that led to the development of the FFM, and review measures that derive from these two traditions, measuring both higher- and lower-order traits. In addition, we discuss abbreviated instruments, measures that assess variants of the FFM, an open source personality item pool, and a structured interview. Future research will improve upon FFM assessment by examining the five factor structure across languages and developmental periods, and detailing the structure of personality traits at lower levels of the trait hierarchy.

The Five Factor Model (FFM) is a hierarchical taxonomy of personality traits organized around five broad dimensions. While the lower levels of this taxonomy are only partially explored, the highest order level is composed of the superordinate factors labeled Extraversion, Agreeableness, Conscientiousness, Emotional Stability (vs Neuroticism), and Intellect (or Openness). Given the comprehensiveness of the FFM, one could understand any assessment of personality traits as an assessment of at least a portion of the FFM. For example, the Woodworth Personal Data Sheet, published in 1920, perhaps the first modern standardized self-report measure of personality, is an assessment of Neuroticism. However, our focus here is on more contemporary measures of personality traits that explicitly embrace or are close variants of the FFM.

Evidence supporting the FFM is necessarily linked to assessment efforts. The model arose out of the assessment tradition (see Wiggins, 1973, for a description of that tradition just as the FFM was beginning to emerge), and measures of the five factors were developed to improve, elaborate, supplant, or shorten prior trait measures. The consensus that emerged among personality trait assessors, that the FFM might indeed possess substantial generality, arose from two largely separate but converging research programs: the lexical and questionnaire approaches. The goal of the lexical approach was to identify the structure of self- and observer-rated trait descriptive adjectives, whereas the questionnaire approach sought to identify the common trait dimensions underlying extant multiscale personality inventories.

The term 'Five Factor Model' derives from the questionnaire tradition and is exemplified by the work of Paul Costa and Robert McCrae. Those working in the lexical tradition, including Warren Norman and Lewis Goldberg, have preferred the label 'Big Five.' One superficial difference between these traditions is in the naming of the fourth factor, 'Emotional Stability' (Big Five) or 'Neuroticism' (FFM). A more telling difference is in the conceptualization of the fifth factor as 'Intellect' (Big Five) or the broader 'Openness to Experience' (FFM). There is some movement toward a preference for the shorter label of 'Openness,' which suggests not only intellectual but also imaginative and affective components as well.

Below, we describe various English language measures of the five factors that evolved out of these two traditions, as well as efforts to create abbreviated Big Five/FFM measures. While there has been considerable consensus surrounding the five factors, there are close variants of six- and seven-factor measures that merit attention. Finally, we discuss an open source personality item pool, a structured interview for an FFM assessment, and studies that have examined the comparative validity of Big Five/FFM measures.

Goldberg and the Lexical Approach

The lexical hypothesis asserts that the most salient and socially relevant ways in which people differ from one another will eventually become encoded as words. Allport and Odbert's catalog of English language trait descriptive terms, published in 1936, provided a starting point for studying the structure of personality trait adjectives. In subsequent years, various investigators examined the factor structure of these terms in both self- and observer reports. As early as 1963, Warren Norman suggested that the reappearance of the same factors across different studies and samples suggested that five factors might provide an adequate taxonomy of personality traits, though this solution was not named the 'Big Five' until 1981, by Lewis Goldberg.

In the early 1980s, Goldberg initiated a series of studies designed to verify the five-factor structure. He returned to the lexicon of personality and constructed an inventory of 1710 trait descriptive adjectives. He replicated the Big Five factor structure across a variety of samples and factor analytic methods, and subsequently developed several abbreviated marker scales for the Big Five. In one of these (Goldberg, 1990; Study 2), he reduced the terms to 479, grouped into 133 clusters. Then, in study 3, he removed the least homogenous items from each cluster (i.e., those with the lowest item-total correlations), as well as single-item categories, resulting in a set of 100 clusters based on 339 trait adjectives. The 100 clusters and adjectives defining each cluster are available in Goldberg (1990; Table 3).

The 100 synonym clusters have several merits. Most notable is the balance between bandwidth and fidelity. The clusters

sample a broad range of personality characteristics, and each provides specific information that can be used for predictive purposes. However, the use of 100 synonym clusters is still time-consuming, so Goldberg (1992) developed two shorter measures: 50 bipolar rating scales (e.g., timid vs bold, rude vs polite, angry vs calm) and 100 unipolar markers (e.g., energetic, cooperative, relaxed). The rationale for using paired terms is that they can help clarify the ambiguity of some adjectives; however, Goldberg (1992) found that they are less robust across samples than factor markers presented in unipolar format. The bipolar rating scales are now less often used in research, but have been used in educational settings to demonstrate the nature of the Big Five (see Goldberg, 1992; Table 1).

Goldberg's (1992) 100 unipolar markers is an efficient and widely used measure of the Big Five. It contains 20 items per factor, with 10 items representing each pole of each factor (with the exception of Emotional Stability, which has 6 positive and 14 negative terms). From an initial pool of 566 terms, items were selected with high loadings on targeted factors and low loadings on other factors. Then, those items that maximized internal consistency and had a replicable factor structure were selected into the final list. Goldberg showed each of the five 20-item scales to be highly reliable (alpha coefficients above 0.80) and to converge with larger and more representative sets of trait adjectives, as well as with other inventories. The 100 unipolar markers are available in Goldberg (1992; Appendix A), and a 40-item, abbreviated version, the Big Five Mini-Markers, is available in Saucier (1994; Appendix). More recently, Saucier (2002) developed three sets of marker scales designed to reduce the interscale correlations often observed within Big Five measures, called the Ortho-Markers (Ortho-40), Modular Markers, and Mini-Modular Markers-40 (3M40).

Costa and McCrae and the Questionnaire Tradition

Numerous structured questionnaires to assess personality have been developed, with highly varied content and scales. Among these instruments was the NEO, developed by Paul Costa and Robert McCrae in 1980, which measured the three domains of Neuroticism, Extraversion, and Openness to Experience, and included 18 facet scales (6 per domain). Observing the findings reported by studies of the lexical structure noted above, they added (in 1985) scales to assess Agreeableness and Conscientious, and later developed (in 1992) facet scales to assess these domains. In a series of studies, Costa and McCrae found that the scales of some of the most widely known and frequently used personality measures could be placed within a five-factor framework. To be clear, their claim was not that all inventories measured all five factors (this was clearly not the case), but rather that inventory scales were largely related to the five (or a subset of the five); and scales that were outside the five-factor space were largely idiosyncratic to each inventory.

The Revised NEO Personality Inventory (NEO-PI-R; Costa and McCrae, 1992) is a 240-item questionnaire designed to measure the five major personality trait domains. Within each domain are six facet scales, with eight items per facet. The items are simple sentences that describe behaviors, preferences, and attitudes, and are responded to on a 5-point, Likert-type scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The NEO-PI-R comes in two forms: Form S, for self-reports, and Form R, for observer ratings. Form R contains the same items as Form S, but is written in the third person. A more recent version of the NEO (NEO-PI-3, McCrae and Costa, 2010) was made to be applicable to a wider range of individuals, including school-aged children and respondents with lower levels of education. The NEO-PI-3 is thus appropriate for individuals who are 12 years of age or older.

The NEO-PI-R enjoys more than 30 years of research to support its reliability and validity. The scales are internally consistent, with alpha reliabilities for the domain scales in the range of 0.86–0.92 (*Mdn.* = 0.89), and for the facet scales in the range of 0.56–0.81 (*Mdn.* = 0.76). Scores show long-term stability, with retest values for the domain scales ranging 0.63–0.83 over 3–6 years. Six-year retest coefficients in spouse ratings, using Form R, are similar to those found in self-reports. The scales have also shown evidence of convergent and discriminant validity across instruments and observers. The NEO-PI-R has a clear internal structure, though some of the facet scales have large secondary loadings (i.e., >0.40) which contribute to modest correlations among the five NEO-PI-R domain scores. To obtain truly independent domain scores, factor score weights can be applied to each of the 30 facets (provided in the NEO-PI-R professional manual).

The Revised NEO Five-Factor Inventory (NEO-FFI-R; McCrae and Costa, 2004) is an abbreviated version of the NEO-PI-R. It consists of 60 items to measure the five global dimensions of the FFM, with 12 items per scale. In the original version of the instrument, items were selected based on their correlations with factor scores from the NEO-PI. The revised version replaced 14 of the original items, thus improving its factor structure, reliability, and validity. In an even more recent version, the NEO Five-Factor Inventory-3 (NEO-FFI-3; McCrae and Costa, 2010), one additional item was replaced. All items correspond with the NEO-PI-3. McCrae and Costa (2007) reported excellent psychometric characteristics of the NEO-FFI-3 in adolescent, adult, and middle-school samples.

McCrae and Costa (2007) also developed a brief measure of all 30 facet scales, corresponding to the first 120 items of the NEO-PI-3, the NEO-PI-3 First Half (NEO-PI-3FH). For those who desire a differentiated yet brief measure of the FFM, the NEO-PI-3FH provides a flexible alternative to both global and longer multitrait inventories.

The NEO Inventories have been used extensively in research and applied contexts as diverse as counseling and clinical psychology, behavioral medicine, industrial-organizational psychology, and educational psychology (Costa and McCrae, 1992), and are commercially available through their publisher, Personality Assessment Resources.

Brief Measures of the Big Five

As personality assessors increasingly regarded the five superordinate factors as an adequate summary view of personality traits, there arose an interest to include measures of these traits in various research contexts – contexts where the inclusion of a number of other measures led to a desire for a brief measure

of the Big Five. These short measures are now widely used in a number of research settings.

Big Five Inventory – 44-Item Version

The Big Five Inventory (BFI; John et al., 1991) is a brief, 44-item self-report inventory designed to measure the Big Five personality trait dimensions. The items are in the form of short phrases, written in the third person, and based on prototypical trait markers of the Big Five with elaborative or clarifying information added (e.g., "is original, comes up with new ideas," "is relaxed, handles stress well"). Each statement uses the stem, "I see myself as someone who …" Respondents indicate the extent to which they agree or disagree with each statement on a 5-point, Likert-type scale ranging from 1 (*disagree strongly*) to 5 (*agree strongly*).

The BFI scales include 8 to 10 items, and have very good psychometric properties: The scales are highly reliable (alpha coefficients range from 0.75 to 0.90, with an average above 0.80), stable over time (3-month retest coefficients range from 0.80 to 0.90, with a mean of 0.85), and possess convergent and discriminant validity with respect to other Big Five instruments (John et al., 2008). The BFI is widely used, and is reprinted in John et al. (2008; see Appendix 4.1).

Big Five Inventory – 10-Item Version

The Big Five Inventory-10 (BFI-10; Rammstedt and John, 2007) is an abbreviated version of the BFI-44. It consists of two items per scale, representing both the high and low poles of each factor. The response format is identical to the full BFI, although the instructions have been shortened. Items were selected based on their item-total correlations with the full BFI scales, as well as their factor loadings in analyses of all 44 items. Given the brevity of this measure, it holds up remarkably well across US and German samples: The two-item scales have an average correlation of 0.83 with the full scales, are stable over 6–8 weeks (average retest stability coefficient is 0.75), and have an average self-peer convergent validity correlation of 0.44. The BFI-10 scales possess substantial convergent and discriminant validity with the domain and facet scales of the NEO-PI-R, and the items show a clear five-factor structure. The BFI-10 takes about 1 min to complete. The items and instructions are provided in Rammstedt and John (2007; see Appendix A).

Ten-Item Personality Inventory

The Ten-Item Personality Inventory (TIPI; Gosling et al., 2003) is another short measure of the Big Five. Each item consists of paired descriptors (e.g., extraverted, enthusiastic) that use the common stem, "I see myself as:" Respondents indicate the extent to which they agree or disagree with each item on a 7-point, Likert-type scale ranging from 1 (*disagree strongly*) to 7 (*agree strongly*). In a large student sample, the psychometric properties of the TIPI reached satisfactory levels across three criteria: Scores converged with widely used Big Five measures, evinced substantial 60 week test–retest correlations (mean $r = 0.72$), and exhibited patterns of correlations with a broad range of other constructs that were comparable in size to those exhibited by the BFI in the same sample. The TIPI takes about 1 min to complete, and is provided in Gosling et al. (2003; see Appendix A).

Alternative Representations of Trait Structure

The questionnaires discussed to this point are widely understood to be different measures of the same five broad traits. The measures discussed below each embrace several features of the Big Five/FFM framework, while at the same time introduce important variations.

Abridged Big Five Dimensional Circumplex

The Abridged Big Five Dimensional Circumplex (AB5C; Hofstee et al., 1992) represents an integration of Big Five and Circumplex approaches to trait structure. The model recognizes that trait descriptors rarely show simple structure, but tend to show cross-loadings on two or more factors. It 'abridges' a full five-dimensional model, where each trait would load on all five factors, to a two-dimensional model, where each trait loads on two factors. Consisting of 10 two-dimensional circumplexes, with two of the five factors serving as the axes of each circle, the AB5C model has 45 facet scales (based on 540 trait terms) representing 'blends' of the two underlying factors (e.g., *sociable* (I+II+) corresponds to high Extraversion and high Agreeableness, and *dominant* (I+II−) corresponds to high Extraversion and low Agreeableness).

Big Seven Factor Model

The Big Seven Factor Model, and its associated measure, the Inventory of Personal Characteristics (IPC-7; Tellegen et al., 1991), specify seven higher-order factors: Positive Valence, Negative Valence, Positive Emotionality, Negative Emotionality, Conscientiousness, Agreeableness, and Conventionality. This model departs from the traditional Big Five in two important ways: First, by including in its item pool evaluative and state descriptors of personality, two primary dimensions of self-evaluation, Positive Valence (e.g., excellent, special, impressive) and Negative Valence (e.g., evil, wicked, awful), emerge in factor analyses in addition to the Big Five. Second, the factors labeled Positive Emotionality (Extraversion) and Negative Emotionality (Neuroticism) emphasize the emotional aspects of their Big Five counterparts, and Openness is reinterpreted as (low) Conventionality.

Waller (1999) reviewed Big Five and Big Seven models, and described the psychometric properties of the IPC-7. Benet and Waller (1995) demonstrated the cross-cultural generalizability of the IPC-7 in a Spanish sample using an abbreviated 70-item version. American and Spanish versions of the abbreviated IPC-7 are available in Benet and Waller (1995; Appendix).

HEXACO Personality Inventory – Revised

The Revised HEXACO Personality Inventory (HEXACO-PI-R; Lee and Ashton, 2004) is a 200-item questionnaire designed to measure six factors found in lexical studies of personality trait structure: Honesty-Humility (H), Emotionality (E),

Extraversion (X), Agreeableness (A), Conscientiousness (C), and Openness to Experience (O). The HEXACO factors are alternative rotations of the Big Five, and are defined by 24 facets (four per factor) within the HEXACO-PI-R. The major difference between the models is the separate dimension of Honesty-Humility within the HEXACO model, defined by sincerity, fairness, lack of greed, and modesty. Additionally, Emotionality (i.e., Emotional Stability) and Agreeableness (as well as Extraversion to a slight degree) have been reinterpreted. The HEXACO-PI-R (100- and 60-item versions) and a list of references are available on the HEXACO web site (http://hexaco.org).

Hogan Personality Inventory

The Hogan Personality Inventory (HPI; Hogan and Hogan, 1995) was designed to assess the FFM from the perspective of socioanalytic theory. According to socioanalytic theory, the FFM represents personality from the view of the observer in terms of a person's ability to 'get along' with other group members and to 'get ahead' to earn social status. The HPI assesses individual differences in a person's ability to attain these goals. It contains seven primary scales called, along with their FFM counterpart, Adjustment (Emotional Stability), Ambition and Sociability (Extraversion), Likeability (Agreeableness), Prudence (Conscientiousness), and Intellectance and School Success (Openness).

The HPI consists of 206 true-false items, grouped into 41 'homogenous item clusters' that define the seven primary scales. Hogan and Hogan (1995) reported the scales to be internally consistent (alpha reliabilities for the primary scales range from 0.71 to 0.86), to converge with other established Big Five measures, and to predict a variety of job performance criteria. The HPI has been used primarily in occupational settings, and is commercially available through Hogan Assessment Systems.

Revised Interpersonal Adjective Scales: Big Five

The Revised Interpersonal Adjective Scales: Big Five (IASR-B5; Trapnell and Wiggins, 1990) is an extension of the Revised Interpersonal Adjective Scales, a measure of the interpersonal circumplex. In addition to the interpersonal dimensions of Dominance (or Agency) and Nurturance (or Communion), the IASR-B5 includes marker scales for Neuroticism, Conscientiousness, and Openness to Experience. Although Dominance and Nurturance generally correspond to Extraversion and Agreeableness, the latter two dimensions are broader in content to include non-interpersonal aspects of personality.

The IASR-B5 consists of 124 adjectives rated on an 8-point, Likert-type scale ranging from 1 (*extremely inaccurate*) to 8 (*extremely accurate*). The first 64 items measure the Dominance and Nurturance dimensions of the interpersonal circle, and can be used to score the eight octants of the Interpersonal Adjective Scales. The remaining 60 items measure Neuroticism, Conscientiousness, and Openness to Experience (i.e., 20 items per factor, with 10 items marking the positive and 10 items marking the negative poles). Trapnell and Wiggins (1990) reported the IASR-B5 to have a clear internal structure at the item level, and discriminant and convergent validity when compared with the NEO and Hogan personality inventories.

Measures Derived from the International Personality Item Pool

The International Personality Item Pool (IPIP; Goldberg, 1999) is a repository of over 2000 personality items that have been used to develop a number of personality inventories, including measures of the FFM. Freely available in the public domain (http://ipip.ori.org), many of these measures serve as proxies for constructs measured by commercially available inventories, such as the NEO-PI-R and HPI, as well as nonproprietary instruments, such as the HEXACO-PI, the AB5C, and 100 unipolar markers. Tables comparing the psychometric characteristics of the original scales with the IPIP proxies can be found on the IPIP web site. As Goldberg et al. (2006) noted, alpha reliabilities of these scales generally match or exceed those of the original scales, and the IPIP scales correlate highly with their parent scales.

A noteworthy measure derived from the IPIP item pool is the Big Five Aspect Scales (BFAS; DeYoung et al., 2007), a 100-item inventory designed to assess two distinct (but correlated) 'aspects' of each factor (i.e., trait variables that occupy an intermediate level of personality structure between facets and domains). Item selection was based on correlating all of the IPIP items with scores derived from factor analyses of all 75 NEO-PI-R and AB5C-IPIP (Goldberg, 1999) facet scales. Then, in an independent sample, the 20 items showing the clearest two-factor solution within each domain were selected. The ten 10-item aspect scales demonstrated good psychometric characteristics, and were associated with factors derived from studies in behavioral genetics.

Structured Interview

Self-reports are the predominant source of personality data. However, alternative modes of assessment are sometimes desired. Although several observer rating forms are available for FFM measures, the instruments are largely the same as those used in the self-report versions with minor changes in wording and instructions to reflect the stance of the observer. One novel procedure for assessing the five factors utilizes a structured interview approach using a standard set of questions and scoring procedure. Mental health practitioners often prefer interview methods because they allow for open-ended, follow-up questions and an opportunity to observe the respondent's behavior during an assessment.

The Structured Interview for the Five-Factor Model of Personality (SIFFM; Trull and Widiger, 1997) is a 120-item semistructured interview that assesses both adaptive and maladaptive aspects of the FFM. It assesses the five higher-order dimensions (with 24 items per dimension) and 30 lower-order facet traits (with 4 items per facet), corresponding to the NEO-PI-R. The SIFFM places relatively greater emphasis on potentially maladaptive aspects of personality, and was explicitly designed to be used in clinical settings. The SIFFM items (i.e., interview questions) are scored as either 0 (*absent*), 1 (*present and does not result in significant dysfunction*), or 2

(*present and may result in significant dysfunction*). Follow-up questions may or may not be asked depending on the response to the initial question. The SIFFM takes about 1 h to administer.

In samples of undergraduates and outpatients receiving treatment at a community clinic, Trull et al. (1998) showed scores on the SIFFM to be internally consistent, stable across 2 weeks, and to converge with scores on the NEO-PI-R domain and facet scales and peer-ratings on the NEO-FFI. Trull et al. also demonstrated incremental validity of the SIFFM over the NEO-PI-R in predicting 10 of 13 personality disorders. Given its relative emphasis on maladaptive aspects of traits associated with the FFM, the SIFFM is primarily used by clinical researchers and practitioners to assess personality and personality dysfunction. The SIFFM is commercially available through its publisher, Personality Assessment Resources.

Comparative Validity of FFM Personality Inventories

Relatively few studies have compared the psychometric characteristics of FFM personality inventories, but some studies are beginning to appear. John and Soto (2007) compared the reliability and validity of the NEO-FFI, the BFI, and Saucier's (1994) 40-item version of Goldberg's (1992) 100 Trait Descriptive Adjectives (TDA). All three instruments showed relatively similar internal consistency coefficients, though some differences in convergent validity were noted for the NEO Extraversion and Openness scales. Profiles of the Big Five domains showed differences in terms of how the three measures define each factor with respect to the NEO-PI-R facet scales. As a result, patterns of intercorrelations vary somewhat across instruments, although the average discriminant within-instrument correlation is quite low, with an absolute value of 0.19 overall.

Grucza and Goldberg (2007) compared the validity of 11 personality inventories in predicting three criteria: frequencies of self-reported behavioral acts, informant reports, and clinical indicators. Among the instruments they reviewed, five were designed to assess the FFM – the NEO-PI-R, HPI, HEXACO-PI, TDA, and the IPIP-AB5C. Across the three criteria, the average multiple correlation coefficient fell between a narrow range of 0.42 (for the TDA) and 0.45 (for the NEO-PI-R), suggesting little difference in overall predictability for the instruments, though there were important differences for predicting particular criteria. Similarly, Saucier (2002) reported no overall predictive differences when comparing questionnaire measures (NEO-PI-R, NEO-FFI, BFI) and a variety of adjective-based marker scales (Mini-Markers, Ortho-40, Modular Markers, 3M40). Other studies have shown that narrower trait measures, such as the facet scales included in some of these instruments, can improve the prediction of behavior above and beyond the global domains (e.g., Paunonen and Ashton, 2001).

Conclusion

As reviewed above, numerous English-language measures of the five factors are available, varying in length and specificity. In addition, Big Five/FFM adjective- and phrase-based measures have been developed within other cultures and languages, several of which are reviewed in De Raad and Perugini (2002). Furthermore, measures designed to assess the Big Five/FFM in children have been developed. The adequacy of the five-factor framework to account for personality trait differences across languages and developmental periods remains to be fully explored, as does a taxonomy of trait structure that fully describes more specific personality traits. Research that extends the limits and explores the details of this hierarchical taxonomy will inevitably lead to new and presumably improved personality measures.

See also: Agreeableness; Big Five Factor Model, Theory and Structure; Conscientiousness; Extraversion; Factor Analysis and Latent Variable Models in Personality Psychology; Five Factor Model of Personality, Facets of; Five Factor Model of Personality, Personality Disorder; Five Factor Model of Personality, Universality of; Honesty and Humility; Neuroticism; Openness to Experience; Personality Assessment: Overview; Personality Assessment; Personality, Trait Models of; Personality: Historical and Conceptual Perspectives.

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