PERSONNEL PSYCHOLOGY
1991, 44

THE BIG FIVE PERSONALITY DIMENSIONS AND JOB PERFORMANCE: A META-ANALYSIS

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This study investigated the relation of the "Big Five" personality dimensions (Extraversion, Emotional Stability, Agreeableness, Conscientiousness, and Openness to Experience) to three job performance criteria (job proficiency, training proficiency, and personnel data) for five occupational groups (professionals, police, managers, sales, and skilled/semi-skilled). Results indicated that one dimension of personality, Conscientiousness, showed consistent relations with all job performance criteria for all occupational groups. For the remaining personality dimensions, the estimated true score correlations varied by occupational group and criterion type. Extraversion was a valid predictor for two occupations involving social interaction, managers and sales (across criterion types). Also, both Openness to Experience and Extraversion were valid predictors of the training proficiency criterion (across occupations). Other personality dimensions were also found to be valid predictors for some occupations and some criterion types, but the magnitude of the estimated true score correlations was small ($\rho < .10$). Overall, the results illustrate the benefits of using the 5-factor model of personality to accumulate and communicate empirical findings. The findings have numerous implications for research and practice in personnel psychology, especially in the subfields of personnel selection, training and development, and performance appraisal.

Introduction

Over the past 25 years, a number of researchers have investigated the validity of personality measures for personnel selection purposes. The overall conclusion from these studies is that the validity of personality as a predictor of job performance is quite low (e.g., Ghiselli, 1973; Guion & Gottier, 1965; Locke & Hulin, 1962; Reilly & Chao, 1982; Schmitt,

Both authors contributed equally to this study. We would like to thank Frank Schmidt, Ralph Alexander, Paul Costa, Mike Judiesch, Wendy Dunn, and Jacob Sines for thoughtful comments about the article and some of the data analyses. We gratefully acknowledge the assistance of Mike Judiesch, Wendy Dunn, Eric Neumann, Val Arnold, and Duane Thompson in categorizing the personality scales.

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Gooding, Noe, & Kirsch, 1984). However, at the time these studies were conducted, no well-accepted taxonomy existed for classifying personality traits. Consequently, it was not possible to determine whether there were consistent, meaningful relationships between particular personality constructs and performance criteria in different occupations.

In the past 10 years, the views of many personality psychologists have converged regarding the structure and concepts of personality. Generally, researchers agree that there are five robust factors of personality (described below) which can serve as a meaningful taxonomy for classifying personality attributes (Digman, 1990). Our purpose in the present study is to examine the relationship of these five personality constructs to job performance measures for different occupations, rather than to focus on the overall validity of personality as previous researchers have done.

Emergence of the 5-Factor Model

Systematic efforts to organize the taxonomy of personality began shortly after McDougall (1932) wrote that, "Personality may to advantage be broadly analyzed into five distinguishable but separate factors, namely intellect, character, temperament, disposition, and temper..." (p. 15). About 10 years later, Cattell (1943, 1946, 1947, 1948) developed a relatively complex taxonomy of individual differences that consisted of 16 primary factors and 8 second-order factors. However, repeated attempts by researchers to replicate his work were unsuccessful (Fiske, 1949; Tupes, 1957; Tupes & Christal, 1961) and, in each case, researchers found that the 5-factor model accounted for the data quite well. For example, Tupes and Christal (1961) reanalyzed the correlations reported by Cattell and Fiske and found that there was good support for five factors: Surgency, Emotional Stability, Agreeableness, Dependability, and Culture. As it would turn out later, these factors (and those of McDougall 35 years before) were remarkably similar to those generally accepted by researchers today. However, as Digman (1990) points out, the work of Tupes and Christal had only a minor impact because their study was published in an obscure Air Force technical report. The 5-factor model obtained by Fiske (1949) and Tupes and Christal (1961) was corroborated in four subsequent studies (Borgatta, 1964; Hakel, 1974; Norman, 1963; Smith 1967). Borgatta's findings are noteworthy because he obtained five stable factors across five methods of data gathering. Norman's work is especially significant because his labels (Extraversion, Emotional Stability, Agreeableness, Conscientiousness, and Culture) are used commonly in the literature and have been referred to, subsequently, as "Norman's Big Five" or simply as the "Big Five."

During the past decade, an impressive body of literature has accumulated which provides compelling evidence for the robustness of the 5-factor model: across different theoretical frameworks (Goldberg, 1981); using different instruments (e.g., Conley, 1985; Costa & McCrae, 1988; Lorr & Youniss, 1973; McCrae, 1989; McCrae & Costa, 1985, 1987, 1989); in different cultures (e.g., Bond, Nakazato, & Shiraishi, 1975; Noller, Law, & Comrey, 1987); using ratings obtained from different sources (e.g., Digman & Inouye, 1986; Digman & Takemoto-Chock, 1981; Fiske, 1949; McCrae & Costa, 1987; Norman, 1963; Norman & Goldberg, 1966; Watson, 1989); and with a variety of samples (see Digman, 1990, for a more detailed discussion). An important consideration for the field of personnel psychology is that these dimensions are also relatively independent of measures of cognitive ability (McCrae & Costa, 1987).

It should be pointed out that some researchers have reservations about the 5-factor model, particularly the imprecise specification of these dimensions (Briggs, 1989; John, 1989; Livneh & Livneh, 1989; Waller & Ben-Porath, 1987). Some researchers suggest that more than five dimensions are needed to encompass the domain of personality. For example, Hogan (1986) advocates six dimensions (Sociability, Ambition, Adjustment, Likability, Prudence, and Intellectance). The principle difference seems to be the splitting of the Extraversion dimension into Sociability and Ambition.

Interpretations of the "Big Five"

While there is general agreement among researchers concerning the number of factors, there is some disagreement about their precise meaning, particularly Norman's Conscientiousness and Culture factors. Of course, some variation from study to study is to be expected with factors as broad and inclusive as the 5-factor model. As shown below, however, there is a great deal of commonality in the traits that define each factor, even though the name attached to the factor differs.

It is widely agreed that the first dimension is Eysenck's Extraversion/Intraversion. Most frequently this dimension has been called Extraversion or Surgency (Botwin & Buss, 1989; Digman & Takemoto-Chock, 1981; Hakel, 1974; Hogan, 1983; Howarth, 1976; John, 1989; Krug & Johns, 1986; McCrae & Costa, 1985; Noller et al., 1987; Norman, 1963; Smith, 1967). Traits frequently associated with it include being sociable, gregarious, assertive, talkative, and active. As mentioned above, Hogan (1986) interprets this dimension as consisting of two components, Ambition (initiative, surgency, ambition, and impetuous) and Sociability (sociable, exhibitionist, and expressive).

There is also general agreement about the second dimension. This factor has been most frequently called Emotional Stability, Stability, Emotionality, or Neuroticism (Borgatta, 1964; Conley, 1985; Hakel, 1974; John, 1989; Lorr & Manning, 1978; McCrae & Costa, 1985; Noller et al., 1987; Norman, 1963; Smith, 1967). Common traits associated with this factor include being anxious, depressed, angry, embarrassed, emotional, worried, and insecure. These two dimensions (Extraversion and Emotional Stability) represent the "Big Two" described by Eysenck over 40 years ago.

The third dimension has generally been interpreted as Agreeableness or Likability (Borgatta, 1964; Conley, 1985; Goldberg, 1981; Hakel, 1974; Hogan, 1983; John, 1989; McCrae & Costa, 1985; Noller et al., 1987; Norman, 1963; Smith, 1967; Tupes & Christal, 1961). Others have labeled it Friendliness (Guilford & Zimmerman, 1949), Social Conformity (Fiske, 1949), Compliance versus Hostile Non-Compliance (Digman & Takemoto-Chock, 1981), or Love (Peabody & Goldberg, 1989). Traits associated with this dimension include being courteous, flexible, trusting, good-natured, cooperative, forgiving, soft-hearted, and tolerant.

The fourth dimension has most frequently been called Conscientiousness or Conscience (Botwin & Buss, 1989; Hakel, 1974; John, 1989; McCrae & Costa, 1985; Noller et al., 1987; Norman, 1963;), although it has also been called Conformity or Dependability (Fiske, 1949; Hogan, 1983). Because of its relationship to a variety of educational achievement measures and its association with volition, it has also been called Will to Achieve or Will (Digman, 1989; Smith, 1967; Wiggins, Blackburn, & Hackman, 1969), and Work (Peabody & Goldberg, 1989). As the disparity in labels suggests, there is some disagreement regarding the essence of this dimension. Some writers (Botwin & Buss, 1989; Fiske, 1949; Hogan, 1983; John, 1989; Noller et al., 1987) have suggested that Conscientiousness reflects dependability; that is, being careful, thorough, responsible, organized, and planful. Others have suggested that in addition to these traits, it incorporates volitional variables, such as hardworking, achievement-oriented, and persevering. Based on the evidence cited by Digman (1990), the preponderance of evidence supports the definition of conscientiousness as including these volitional aspects (Bernstein, Garbin, & McClellan, 1983; Borgatta, 1964; Conley, 1985; Costa & McCrae, 1988; Digman & Inouye, 1986; Digman & Takemoto-Chock, 1981; Howarth, 1976; Krug & Johns, 1986; Lei & Skinner, 1982; Lorr & Manning, 1978; McCrae & Costa, 1985, 1987, 1989; Norman, 1963; Peabody & Goldberg, 1989; Smith, 1967).

The last dimension has been the most difficult to identify. It has been interpreted most frequently as Intellect or Intellectence (Borgatta, 1964;

Digman & Takemoto-Chock, 1981; Hogan, 1983; John, 1989; Peabody and Goldberg, 1989). It has also been called Openness to Experience (McCrae & Costa, 1985) or Culture (Hakel, 1974; Norman, 1963). Digman (1990) points out that it is most likely all of these. Traits commonly associated with this dimension include being imaginative, cultured, curious, original, broad-minded, intelligent, and artistically sensitive.

The emergence of the 5-factor model has important implications for the field of personnel psychology. It illustrates that personality consists of five relatively independent dimensions which provide a meaningful taxonomy for studying individual differences. In any field of science, the availability of such an orderly classification scheme is essential for the communication and accumulation of empirical findings. For purposes of this study, we adopted names and definitions similar to those used by Digman (1990): Extraversion, Emotional Stability, Agreeableness, Conscientiousness, and Openness to Experience.

Expected Relations Between Personality Dimensions and Job Performance

In the present study, we investigate the validity of the five dimensions of personality for five occupational groups (professionals, police, managers, sales, and skilled/semi-skilled) and for three types of job performance criteria (job proficiency, training proficiency, and personnel data) using meta-analytic methods. We also investigate the validity of the five personality dimensions for objective versus subjective criteria.

We hypothesize that two of the dimensions of personality, Conscientiousness and Emotional Stability, will be valid predictors of all job performance criteria for all jobs. Conscientiousness is expected to be related to job performance because it assesses personal characteristics such as persistent, planful, careful, responsible, and hardworking, which are important attributes for accomplishing work tasks in all jobs. There is some evidence that in educational settings there are consistent correlations between scores on this dimension and educational achievement (Digman & Takemoto-Chock, 1981; Smith, 1967). Thus, we expect that the validity of this dimension will generalize across all occupational groups and criterion categories. We also expect that the validity of Emotional Stability will generalize across occupations and criterion types. Viewing this dimension from its negative pole, we expect that employees exhibiting neurotic characteristics, such as worry, nervousness, temperamentalness, high-strungness, and self-pity, will tend to be less successful than more emotionally stable individuals in all occupations studied because these traits tend to inhibit rather than facilitate the accomplishment of work tasks.

We expect that other personality dimensions may be related to job performance, but only for some occupations or some criteria. For example, in those occupations that involve frequent interaction or cooperation with others, we expect that two personality dimensions, Extraversion and Agreeableness, will be valid predictors. These two dimensions should be predictive of performance criteria for occupations such as management and sales, but would not be expected to be valid predictors for occupations such as production worker or engineer.

In a similar vein, we expect that Openness to Experience will be a valid predictor of one of the performance criteria, training proficiency. This dimension is expected to be related to training proficiency because it assesses personal characteristics such as curious, broadminded, cultured, and intelligent, which are attributes associated with positive attitudes toward learning experiences. We believe that such individuals are more likely to be motivated to learn upon entry into the training program and, consequently, are more likely to benefit from the training.

Finally, we investigated a research question of general interest to personnel psychologists for which we are not testing a specific hypothesis. The question is whether the validity coefficients for the five personality dimensions differ for two types of criteria, objective and subjective. A recent meta-analysis by Nathan and Alexander (1988) indicates that, in general, there is no difference between the magnitude of the validities for cognitive ability tests obtained for objective and subjective criteria for clerical jobs. In another study, Schmitt et al. (1984) investigated the validity of personality measures (across dimensions and occupations) for different types of criteria, but no definitive conclusions were apparent from the data. The average validity for the subjective criterion (performance ratings) was .206. Validities for three of four objective criteria were lower (.121 for turnover, .152 for achievement/grades, and .126 for status change), whereas the validity was higher for wages (.268). Thus, conclusions regarding whether the validities for personality measures are higher for objective, compared to subjective, criteria depend to a large extent on which objective measures are used. Because our study examines personality using a 5-factor model, we are able to assess whether dimensions have differential relationships to various objective and subjective criteria.

In summary, the following hypotheses will be tested in this study. Of the five dimensions of personality, Conscientiousness and Emotional Stability are expected to be valid predictors of job performance for all jobs and all criteria because Conscientiousness measures those personal characteristics that are important for accomplishing work tasks in all jobs, while Emotional Stability (when viewed from the negative pole) measures those characteristics that may hinder successful performance.

In contrast, Extraversion and Agreeableness are expected to correlate with job performance for two occupations, sales and management, because interpersonal dispositions are likely to be important determinants of success in those occupations. Finally, Openness to Experience is expected to correlate with one of the criterion types, training proficiency, because Openness to Experience appears to assess individuals' readiness to participate in learning experiences. In addition, we investigated the validity of various objective and subjective criteria for the five personality dimensions.

Method

Literature Review

A literature search was conducted to identify published and unpublished criterion-related validity studies of personality for selection purposes between 1952 and 1988. Three strategies were used to search the relevant literature. First, a computer search was done of PsycINFO (1967–1988) and Dissertation Abstracts (1952–1988) in order to find all references to personality in occupational selection. Second, a manual search was conducted that consisted of checking the sources cited in the reference section of literature reviews, articles, and books on this topic, as well as personality inventory manuals, *Buros Tests in Print* (volumes 4–9, 1953–1985), and journals that may have included such articles (including the *Journal of Applied Psychology*, *Personnel Psychology*, *Academy of Management Journal*, *Organizational Behavior and Human Decision Processes/Organizational Behavior and Human Performance*, *Journal of Management*, *Journal of Vocational Behavior*, *Journal of Personality and Social Psychology*, *Journal of Personality*, and *Journal of Consulting and Clinical Psychology*). Finally, personality test publishers and over 60 practitioners known to utilize personality inventories in selection contexts were contacted by letter, requesting their assistance in sending or locating additional published or unpublished validation studies.

Overall, these searches yielded 231 criterion-related validity studies, 117 of which were acceptable for inclusion in this analysis. The remaining 114 studies were excluded for several reasons: 44 reported results for interest and value inventories only and were excluded because they did not focus on the validity of personality measures; 24 used composite scores or, conversely, extracted specific items from different scales and instruments; 19 reported only significant validity coefficients; 15 used military or laboratory "subjects"; and 12 either were not selection studies or provided insufficient information.

A total of 162 samples were obtained from the 117 studies. Sample sizes ranged from 13 to 1,401 (M = 148.11; SD = 185.79), yielding a total sample of 23,994. Thirty-nine samples were reported in the 1950s, 52 in the 1960s, 33 in the 1970s, and 38 in the 1980s. Fifty samples (31%) were collected from unpublished sources, most of which were unpublished dissertations.

The studies were categorized into five major occupational groupings and three criterion types. The occupational groups were *professionals* (5% of the samples), which consisted of engineers, architects, attorneys, accountants, teachers, doctors, and ministers; *police* (13% of the samples); *managers* (41% of the samples), which ranged from foremen to top executives; *sales* (17% of the samples); and *skilled/semi-skilled* (24% of the samples), which consisted of jobs such as clerical, nurses aides, farmers, flight attendants, medical assistants, orderlies, airline baggage handlers, assemblers, telephone operators, grocery clerks, truck drivers, and production workers.

The three criterion types were *job proficiency* (included in 68% of the samples), *training proficiency* (12% of the samples), and *personnel data* (33% of the samples). It should be noted that in 21 samples, data were available from two of the three criterion categories, which explains why the total percent of sample for the three criterion types exceeds 100%. Similarly, the total sample size on which these analyses are based will be larger than those for analyses by occupation. Job proficiency measures primarily included performance ratings (approximately 85% of the measures) as well as productivity data; training proficiency measures consisted mostly of training performance ratings (approximately 90% of the measures) in addition to productivity data, such as work sample data and time to complete training results; and personnel data included data from employee files, such as salary level, turnover, status change, and tenure.

Key variables of interest in this study were the validity coefficients, sample sizes, range restriction data for those samples, reliability estimates for the predictors and criteria, the personality scales (and the inventories used), and the types of occupations. A subsample of approximately 25% of the studies was selected to assess interrater agreement on the coding of the key variables of interest. Agreement was 95% for these variables and disagreement between coders was resolved by referring back to the original study.

Scales from all the inventories were classified into the five dimensions defined earlier (i.e., Extraversion, Emotional Stability, Agreeableness, Conscientiousness, and Openness to Experience) or a sixth Miscellaneous dimension. The personality scales were categorized into these dimensions by six trained raters. Five of these raters had received Ph.D.s in

psychology (three were practicing consulting psychologists with responsibilities for individual assessment; the other two were professors of psychology and human resources management, respectively, and both had taught personnel selection courses) and the other taught similar courses while completing his Ph.D. in human resources management and was very familiar with the literature on personality. A short training session was provided to the raters to familiarize them with the rating task and examples were provided. The description of the five factors provided to the raters corresponded to those presented by Digman (1990) and as described above. Raters were provided a list of the personality scales and their definitions for each inventory and were instructed to assign each to the dimension to which it best fit. A sixth category, Miscellaneous, was used in those cases where the scale could not be assigned clearly into one of the five categories. If at least five of the six raters agreed on a dimension, the scale was coded in that dimension. If four of the six raters agreed and the two authors' ratings (completed independently of the raters) agreed with the raters, the scale was coded into that dimension. If three or fewer raters agreed, the scale was coded into the Miscellaneous dimension. At least five of six raters agreed in 68% of the cases, four of six raters agreed in 23% of the cases, and three or fewer raters agreed on 9% of the cases. Of the 191 scales, 39 were categorized as representing Emotional Stability; 32 as Extraversion; 31 as Openness to Experience; 29 as Agreeableness; 32 as Conscientiousness; 28 as Miscellaneous. (A list of the inventories, their respective scales, and dimensional category assigned are available from the first author.) It should be noted that an alternative method for assigning the scales would be to use empirical data, such as factor analyses of inventories or correlations among scales from different inventories. However, we were unable to locate sufficient factor analytic studies or correlational data to allow us to use these approaches because in both cases data was available for only about half of the variables.

To arrive at an overall validity coefficient for each scale from an inventory, the following decision rules were applied in situations where more than one validity coefficient was reported from a sample: (a) If an overall criterion was provided, that coefficient was used and (b) when multiple criteria were provided, they were assigned to the appropriate criterion category (job proficiency, training proficiency, or personnel data). If there were multiple measures from a criterion category, the coefficients were averaged. However, because our analyses focused on personality *dimensions* rather than individual personality *scales* (from various inventories), the following decision rules were applied to establish the validity coefficient for each personality dimension from a sample: (a) If a personality dimension had only one scale categorized into that

dimension for that sample, the overall validity coefficient from that scale (calculated as previously explained) was used and (b) if multiple scales were available for a dimension, the coefficients from each of these scales from that sample were averaged and the resulting average validity coefficient was used in all analyses.

A number of analyses were conducted. The first was an analysis of the validities for the five personality dimensions for each occupational group (across criterion types). The second was an analysis of personality dimensions for the three criterion types (across occupations). The final analysis investigated the validity of the dimensions for objective versus subjective criteria (across occupations and criterion types).

The meta-analytic procedure adopted in this study used the formulas available in Hunter and Schmidt (1990)[1] and corrected the mean and variance of validity coefficients across studies for artifactual variance due to sampling error, range restriction, and attenuation due to measurement error. However, because the vast majority of studies did not report information on range restriction and measurement error, particularly predictor reliabilities, it was necessary to use artifact distributions to estimate artifactually induced variance on the validity coefficients (Hunter & Schmidt, 1990).

Because reliability coefficients for predictors were only rarely presented in the validity studies, the distributions were based upon information obtained from the inventories' manuals. The mean of the predictor reliability distribution was .76 (SD = .08). Similarly, because information for the criterion reliabilities was available in less than one-third of the studies, we developed an artifact distribution for criterion reliabilities based on data provided by Hunter, Schmidt, and Judiesch (1990) for productivity data (with a mean of .92, SD = .05) and Rothstein (1990) for performance ratings (with a mean of .52, SD = .05). It should be noted, however, that 30 studies included criteria which were categorized as personnel data. For these criteria (e.g., turnover, tenure, accidents, wages, etc.), reliability estimates were unknown because no estimates have been provided in the literature. Therefore, the artifact distributions for criterion reliabilities did not include reliability estimates for these criteria. Thus, for the objective versus subjective analysis, the productivity and performance rating artifact distributions were used in each analysis, respectively, for each personality dimension. For all other analyses, the two criterion distributions were combined (with a mean value of .56, SD = .10). Finally, the artifact distribution for range restriction data was based upon those studies that reported both restricted and unrestricted

[1] All analyses were conducted using a microcomputer program developed by Frank Schmidt and reported in Hunter and Schmidt, 1990.

standard deviation data (i.e., from accepted and rejected applicants). The effects on the mean validities due to range restriction were relatively small because the mean range restriction was .94 (SD = .05).

As previously stated, the Schmidt-Hunter non-interactive validity generalization procedure (Hunter & Schmidt, 1990) was applied to the data for assumed (predictors and criteria) and sample-based artifact distributions (range restriction). (These distributions are available from the first author.) However, because the purpose of our study is to enhance theoretical understanding of the five personality constructs, we present fully corrected correlations that correct for unreliability in the predictor as well as the criterion.

Finally, there has been some confusion regarding the use and interpretation of confidence and credibility values in meta-analysis (Whitener, 1990). The confidence interval is centered around the sample-size weighted mean effects sizes ($\bar{r}$, before being corrected for measurement error or range restriction) and is used to assess the influence of sampling error on the uncorrected estimate. In contrast, the credibility value is centered around the estimated true score correlations (generated from the corrected standard deviation) and is used to assess the influence of moderators. Our purpose in the present study is to understand the true score correlations between the personality dimensions and job performance criteria for different occupations and to assess the presence of moderators. Therefore, the focus in this study is on ρ and the corresponding credibility values.

Results

Analysis by Occupational Group

The number of correlations upon which the meta-analysis is based is shown in Table 1 for the five personality dimensions, five occupational types, and three criterion types. It can be seen that the frequencies differ substantially from cell to cell. For example, the number of correlations for the job proficiency criterion is generally larger for all personality dimensions and occupations than for the other criterion types. It can also be seen that the number of correlations for the management occupation is greater than for the other occupations. The table also shows that for some cells there are two or fewer correlations for professionals and sales for the training proficiency criterion, and for professionals and police for the personnel data criterion. Consequently, we were unable to

TABLE 1

Call Frequencies of Correlations for Personality Dimensions, Occupational Groups, and Criterion Types

	Personality dimensions				
Occupational group	Extraversion	Emotional stability	Agree-ableness	Conscien-tiousness	Openness to experience
Job proficiency					
Professionals	4	5	7	6	4
Police	10	12	8	12	8
Managers	29	26	25	25	19
Sales	16	14	11	17	8
Skilled/Semi-skilled	16	15	17	16	10
Training proficiency					
Professionals	0	0	0	0	0
Police	6	6	6	5	5
Managers	9	10	9	10	7
Sales	1	1	1	1	1
Skilled/Semi-skilled	3	4	4	3	1
Personnel data					
Professionals	0	0	0	0	0
Police	0	0	0	2	0
Managers	21	19	13	17	11
Sales	5	4	4	3	3
Skilled/Semi-skilled	4	7	5	6	5

analyze the data using the 3-way categorization (personality dimension by occupational type by criterion type).

Table 2 presents the results of the meta-analysis for the five personality dimensions across the occupational groups (professionals, police, managers, sales, and skilled/semi-skilled labor). The first six columns of the table contain, respectively, the total sample size, the number of correlation coefficients on which each distribution was based, the uncorrected (i.e., observed) mean validity, the estimated true correlation (ρ), the estimated true residual standard deviation (SD_ρ), and the lower bound of the 90% credibility value for each distribution, based on its true correlation and SD_ρ estimates. The true SD_ρ is the square root of the variance that was not attributed to the four artifacts (i.e., sampling error and between-study differences in test unreliability, criterion unreliability, and degree of range restriction), after correcting for those artifacts. The last column in Table 2 reports the percentage of observed variance that was accounted for by the four artifacts.

As shown in Table 2, the correlations for the occupational categories differed across the five personality dimensions. Consistent with our hypothesis, the Conscientiousness dimension was a valid predictor for all occupational groupings. It can be seen that the estimated true score correlations are noticeably larger for Conscientiousness compared to the

TABLE 2

Meta-Analysis Results for Personality Dimension-Occupation Combinations (all Criterion Types Included)

Occupational group	Total N	Number of r's	Obs $\bar{r}$	$\hat{\rho}$	SD_ρ	90% C.V.	% Variance accounted
Extraversion							
Professionals	476	4	−.05	−.09	.05	−.03	92
Police	1,496	16	.05	.09	.00	.09	127
Managers	11,335	59	.11	.18	.13	.01	48
Sales	2,316	22	.09	.15	.16	−.05	54
Skilled/Semi-Skilled	3,888	23	.01	.01	.08	−.10	72
Mean (across occupations)			.08	.13	.11	−.01	69[a]
Emotional stability							
Professionals	518	5	−.07	−.13	.04	−.07	92
Police	1,697	18	.06	.10	.00	.10	138
Managers	10,324	55	.05	.08	.09	−.04	65
Sales	2,486	19	.04	.07	.19	−.18	38
Skilled/ Semi-Skilled	3,694	26	.05	.12	.10	−.06	50
Mean (across occupations)			.05	.08	.10	−.05	63[a]
Agreeableness							
Professionals	557	7	.01	.02	0	.02	158
Police	1,437	14	.06	.10	0	.10	121
Managers	8,597	47	.05	.10	.03	.06	94
Sales	2,344	16	.00	.00	.24	−.31	25
Skilled/Semi-Skilled	4,585	28	.04	.06	.17	−.16	37
Mean (across occupations)			.04	.07	.09	−.05	54[a]
Conscientiousness							
Professionals	767	6	.11	.20	.00	.20	106
Police	2,045	19	.13	.22	.20	−.03	40
Managers	10,058	52	.13	.22	.10	.09	64
Sales	2,263	21	.09	.23	.00	.23	150
Skilled/Semi-Skilled	4,588	25	.12	.21	.09	.09	67
Mean (across occupations)			.13	.22	.09	.10	70[a]
Openness to experience							
Professionals	476	4	−.05	−.08	.04	−.03	94
Police	1,364	13	.00	.00	.00	.00	181
Managers	7,611	37	.05	.08	.16	−.12	37
Sales	1,566	12	−.01	−.02	.16	.18	46
Skilled/Semi-Skilled	3,219	16	.01	.01	.12	−.15	49
Mean (across occupations)			.03	.04	.13	.13	59[a]

[a] An unbiased estimate of mean percentage of variance accounted for across meta-analyses, calculated by taking the reciprocal of the average of reciprocals of individual predicted to observed variance ratios (Hunter & Schmidt, 1990).

other personality dimensions and are remarkably consistent across the five occupational groups (ρ ranges from .20 to .23).

Very little support was found for the hypothesis regarding Emotional Stability. Compared to the Conscientiousness dimension, the correlations for Emotional Stability are lower (ρ ranges from $-.13$ to .12). In fact, for professionals the relationship was in the opposite direction predicted ($\rho = -.13$).

It was also hypothesized that Extraversion and Agreeableness would be valid predictors for the two occupations involving interpersonal skills, managers and sales representatives. This hypothesis was supported for Extraversion for both occupations ($\rho = .18$ and .15, respectively). However, very little support was obtained for Agreeableness, as $\rho = .10$ for managers and .00 for sales. With respect to the other dimensions, the remaining true score correlations reported in the table were quite low (i.e., $\rho = .10$ or less).

Analysis by Criteria Type

Table 3 shows the correlation coefficients for the five personality dimensions for the three criterion types. Consistent with our hypothesis, Conscientiousness is a valid predictor for each of the three criterion types. As was the case with the occupational analysis in Table 2, the results for Conscientiousness are quite consistent across the criterion types (ρ ranges from .20 to .23). As reported, the correlations are generally higher than for the other personality dimensions. Also consistent with our hypothesis, Openness to Experience predicted the training proficiency criterion relatively well ($\rho = .25$). Interestingly, Extraversion was also a significant predictor of training proficiency ($\rho = .26$). Most of the remaining correlations for the three criterion types are relatively small (i.e., $\rho = .10$ or less).

Analysis by Objective and Subjective Criteria

Table 4 shows the validity of the five personality dimensions for criteria categorized as objective and subjective. It should be noted that this analysis is different from that reported in Table 3 because two of the three criterion types contain some objective and subjective measures. First, it can be seen that the subjective criteria are used about twice as frequently as objective criteria. Second, the estimated true score correlations are generally higher for subjective, compared to objective, criteria. In fact, only one objective criterion, status change, has true score correlations equal to or larger than the subjective ratings for four of the personality dimensions. For the fifth personality dimension, Conscientiousness, the estimated true correlations for the subjective criteria are higher ($\rho = .23$) than for all objective criteria (ρ ranges from .12 to .17).

TABLE 3

Meta-Analysis Results for Personality Dimension and Criteria (Pooled Across Occupational Groups)

Criterion type	Total N	Number of r's	Obs $\bar{r}$	$\hat{\rho}$	SD_ρ	90% C.V.	% Variance accounted
Extraversion							
Job proficiency	12,396	89	.06	.10	.10	−.03	69
Training proficiency	3,101	17	.15	.26	.14	.08	49
Personnel data	6,477	33	.06	.11	.18	−.12	33
Mean (across criteria)			08	.13	.13	−.01	47[a]
Emotional stability							
Job proficiency	11,635	87	.04	.07	.11	−.07	64
Training proficiency	3,283	19	.04	.07	0	.07	120
Personnel data	5,644	29	.05	.09	.16	−.11	38
Mean (across criteria)			.05	.08	.10	−.05	60[a]
Agreeableness							
Job proficiency	11,526	80	.04	.06	.14	−.12	49
Training proficiency	3,685	19	.06	.10	0	.10	134
Personnel data	4,474	26	.08	.14	.11	.00	59
Mean (across criteria)			.04	.07	.10	−.05	68[a]
Conscientiousness							
Job proficiency	12,893	92	.13	.23	.10	.10	70
Training proficiency	3,585	17	.13	.23	.15	.04	41
Personnel data	6,175	32	.11	.20	.10	.07	71
Mean (across criteria)			.13	.22	.10	.08	57[a]
Openness to experience							
Job proficiency	9,454	55	−.02	−.03	.04	.00	93
Training proficiency	2,700	14	.14	.25	.16	.05	40
Personnel data	3,785	22	.01	.01	.15	−.18	44
Mean (across criteria)			.03	.04	.09	−.02	51[a]

[a] An unbiased estimate of mean percentage of variance accounted for across meta-analyses, calculated by taking the reciprocal of the average of reciprocals of individual predicted to observed variance ratios (Hunter & Schmidt, 1990).

We conducted additional analyses of the correlation coefficients by personality dimensions, criterion types, and occupational subgroups. Data from these analyses are not reported here (though available upon request) because for many of the subgroup categories there were too few validity studies. Overall, however, the results for those subcategories where data were available do not alter the conclusions reported above.

A key outcome in any meta-analysis of selection studies is the amount of variation in the validities that is attributed to different situations. For a majority of the analyses reported in Tables 2, 3, and 4, the percentage of variance accounted for by the four statistical artifacts (i.e., sampling

TABLE 4

Meta-Analysis Results for Personality Dimensions and Objective and Subjective Criteria (Pooled Across Occupational Groups)

Criterion type	Total N	Number Obs of r's	$\bar{r}$	$\hat{\rho}$	SD_ρ	90% C.V.	% Variance accounted
Extraversion							
Productivity data	1,774	12	.07	.10	.03	.06	95
Turnover/Tenure	1,437	13	−.03	−.03	.12	.12	52
Status change	4,374	15	.10	.14	.16	−.06	31
Salary	666	4	.04	.06	.08	−.04	68
Objective mean (across criteria)			.07	.10	.11	−.04	52[a]
Subjective ratings	12,943	93	.08	.14	.14	−.05	52
Emotional stability							
Productivity data	1,436	11	−.03	−.04	.14	−.14	45
Turnover/Tenure	1,495	13	.01	.02	.17	−.20	37
Status change	3,483	12	.08	.11	.11	−.03	38
Salary	666	4	−.01	−.01	0	−.01	181
Objective mean (across criteria)			.04	.05	.12	−.10	49[a]
Subjective ratings	12,739	95	.05	.09	.07	.00	83
Agreeableness							
Productivity data	2,082	15	−.03	−.05	.23	.24	28
Turnover/Tenure	1,838	15	.06	.09	0	.09	129
Status change	2,515	9	.09	.13	.13	−.04	30
Salary	121	2	−.01	−.02	0	−.02	143
Objective mean (across criteria)			.04	.05	.14	−.13	48[a]
Subjective ratings	12,467	83	.05	.09	.08	−.01	76
Conscientiousness							
Productivity data	1,639	14	.10	.17	0	.17	176
Turnover/Tenure	2,759	19	.09	.12	.08	.02	47
Status change	2,698	8	.11	.15	.04	.10	88
Salary	718	5	.13	.17	.02	.14	97
Objective mean (across criteria)			.10	.14	.03	.10	82[a]
Subjective ratings	14,059	94	.15	.26	.12	.11	60
Openness to experience							
Productivity data	1,060	9	.00	.01	0	.01	161
Turnover/Tenure	1,628	12	−.08	−.11	.06	−.03	80
Status change	1,766	5	.09	.12	0	.12	119
Salary	121	2	.04	.05	0	.05	120
Objective mean (across criteria)			.01	.02	.09	−.10	113[a]
Subjective ratings	10,639	62	.02	.04	.16	−.16	42

[a] An unbiased estimate of mean percentage of variance accounted for across meta-analyses, calculated by taking the reciprocal of the average of reciprocals of individual predicted to observed variance ratios (Hunter & Schmidt, 1990).

error and between-study differences in test unreliability, criterion unreliability, and degree of range restriction) failed to exceed the 75% rule (Hunter & Schmidt, 1990). This suggests that differences in correlations may exist across subpopulations.

Discussion

This study differs from previous studies by using an accepted taxonomy to study the relation of personality to job performance criteria. The results illustrate the benefits of using this classification scheme to communicate and accumulate empirical findings. Using this taxonomy, we were able to show that there are differential relations between the personality dimensions and occupations and performance criteria.

Before discussing the substantive findings, a comment is in order regarding the relatively small observed and true score correlations obtained in this study. We would like to re-emphasize that our purpose was not to determine the overall validity of personality; in fact, we question whether such an analysis is meaningful. Rather, the purpose was to increase our understanding of the way the Big Five personality dimensions relate to selected occupational groups and criterion types.

It is likely that the purpose and methodology used in the present study, both of which differ from other reviews, may have contributed to the lower correlations. For example, in the present study, only those samples that reported zero-order correlations for all scales from an inventory were included in the analysis. Studies were excluded if they reported composite validities or reported only those scales with significant correlations. Thus, the results for each of the five dimensions are based on the average of the correlations between personality scales and job performance criteria. Further, for those studies reporting multiple measures for each dimension, an average correlation was used in the meta-analysis, rather than a composite score correlation (which adjusts the average correlation by the sum of the covariances among the measures incorporated in the average estimate). Use of the composite score correlation *always* results in a mean validity estimate larger in size than that resulting from the average correlation (Hunter & Schmidt, 1990). However, because intercorrelations among personality scales or dimensions were generally not reported (even inventory manuals report only a few intercorrelations), it was not possible to use the composite score correlation in this analysis. A better estimate of the validity of a personality dimension would be provided by combining all scales measuring a single dimension into a predictor composite. Doing this would provide a better measure of the predictive validity of the construct in question. Therefore, in interpreting the results of this study, the reader should focus on understanding which dimensions are the best predictors for specific occupations and criterion types rather than on the magnitude of the validities because they are underestimates.

The most significant finding in the study relates to the Conscientiousness dimension. It was found to be a consistently valid predictor for all

occupational groups studied and for all criterion types. Thus, this aspect of personality appears to tap traits which are important to the accomplishment of work tasks in all jobs. That is, those individuals who exhibit traits associated with a strong sense of purpose, obligation, and persistence generally perform better than those who do not. Similar findings have been reported in educational settings where correlations between scores on this dimension and educational achievement (Digman & Takemoto-Chock, 1981; Smith, 1967) and vocational achievement (Takemoto, 1979) have consistently been reported in the range of .50 to .60.

Further evidence that this dimension is a valid predictor of job performance is found in two studies conducted as part of the U.S. Army Selection and Classification Study (Project A) (Hough, Hanser, & Eaton 1988; McHenry, Hough, Toquam, Hanson, & Ashworth, 1990). Two of the personality constructs, Achievement Orientation and Dependability, were found to be valid predictors of job performance measures in both studies. Although the relationship of the personality constructs investigated by the researchers to the 5-factor taxonomy was not specified, it appears that these two constructs (Achievement/Achievement Orientation and Dependability) are aspects of the Conscientiousness dimension as defined earlier. Achievement taps traits such as planful, organized, persistent, and hardworking, whereas Dependability assesses traits such as careful, thorough, and responsible.

An important area of future research suggested by these results is to further delineate the boundaries of the Conscientiousness dimension. There is some disagreement among researchers about the precise meaning of this construct. Some define it in terms of responsibility or dependability (e.g., Hogan, 1986), whereas others view it as also including volitional aspects, such as hardworking, persistent, and achievement-oriented (e.g., Conley, 1985; Costa & McCrae, 1988; Digman & Inouye, 1986; Digman & Takemoto-Chock, 1981; Krug & Johns, 1986; McCrae & Costa, 1985, 1987, 1989). It is not likely that there will ever be complete agreement among researchers regarding the content of this or any of the other dimensions. However, results of recent studies by researchers in the field of personality psychology, in which scales from personality inventories are factor analyzed and assessed via the 5-factor model, may yield valuable insight into the content of the Conscientiousness dimension (and the four others as well) (McCrae, 1989).

Another area of research suggested by these results is to investigate whether measures of Conscientiousness should be incorporated into theories which attempt to account for work performance. For example, Hunter (1983) has shown that cognitive ability has an indirect effect on supervisory ratings of performance through its effects on the acquisition of job knowledge, which in turn impacts work sample performance. In

view of the relatively low correlation between Conscientiousness and cognitive ability (McCrae, 1989), it seems plausible that this aspect of personality may account for unique variance in the acquisition of job knowledge and (therefore) in job performance. Of course, an important issue is whether the effects of Conscientiousness on job performance are direct or indirect, or both, and whether the resulting model would generalize to different occupations. We believe that this is a fertile area for future research.

Consistent with our hypotheses, Extraversion was a valid predictor (across the criterion types) for two occupations, managers and sales. For both types of jobs, interaction with others is a significant portion of the job. Thus traits such as sociable, gregarious, talkative, assertive, and active would lead to effective performance in these jobs, whereas these traits would be less important in jobs such as skilled/semi-skilled (e.g., secretaries, orderlies, assemblers, accountants, production workers) and professionals (e.g., engineers, architects). In both of these cases, however, the estimated true score correlations are less than .20.

The results with respect to Openness to Experience suggest some fruitful areas for future research. This personality construct was found to be a valid predictor of one of the criterion categories, training proficiency, but not for the other two, job proficiency or personnel data. One possible explanation of these findings is that individuals who score high on this dimension (e.g., intelligent, curious, broad-minded, and cultured) are more likely to have positive attitudes toward learning experiences in general. Several researchers have shown that a key component in the success of training programs is the attitude of the individual when s/he enters the training program. As Goldstein (1986) states, "...it is also clear that individuals who are motivated upon entry into the training program have an advantage from the very beginning" (p. 70). Research by Ryman and Biersner (1975) supports this, as they found that scores on a scale designed to measure attitudes of trainees prior to the training (e.g., "If I have trouble during training I will try harder"; "I will get more from this training than most people") predicted eventual graduation from a Navy School for Divers. Similarly, Sanders and Vanouzas (1983) have shown that the attitudes and expectations of the trainees influence whether or not learning is likely to occur. That is, trainees who accepted personal responsibility for the learning process and were willing to participate in discussions, engage in self assessment, and so forth, were more likely to benefit from the training. Thus, measures of Openness to Experience may identify which individuals are "training ready"—those who are most willing to engage in learning experiences—and, consequently, may be useful in identifying those who are most likely to benefit from training programs. As a final comment, it should also be

recognized that this dimension has the highest correlation (uncorrected, r = .20 to .30) of any of the personality dimensions with measures of cognitive ability (McCrae & Costa, 1987). Therefore, it is possible that Openness to Experience is actually measuring ability to learn as well as motivation to learn.

Similarly, Extraversion was found to predict the training proficiency criterion relatively well. Although the relationship with Extraversion was not hypothesized, in retrospect the findings are not surprising, especially in light of the types of training programs that were used in these studies. Most required a high energy level among participants and were highly interactive, such as assessment centers, police academy training, on-the-job training for sales and flight attendants, and so forth. Because Extraversion assesses traits associated with general activity level (talkative, active, assertive) and sociability, these relationships would be expected. As Burris (1976) indicates, based on his review of the literature, research and experience suggest overwhelmingly that learning is more effective when the learner is active rather than passive. However, it seems logical that these relations would not exist in training programs that do not involve social interaction (e.g., lectures, computer assisted instruction, videotapes). The results for Openness to Experience and Extraversion suggest that the relation of personality measures to training proficiency is an important area for future research.

Most of the correlations for Emotional Stability were relatively low. These findings may be due to a type of range restriction, based on a "selecting-out" process, which was not accounted for in the present study. At the extreme, those individuals who are highly neurotic are unable to function effectively on their own and, as a result, are not likely to be in the labor force. More generally, individuals may have "self-selected out" based on their own interests or perceptions of their emotional stability. Another explanation is that there may not be a linear relation between Emotional Stability and job performance beyond the "critically unstable" range. That is, as long as an individual possesses "enough" Emotional Stability, the predictive value of any differences are minimized.

Finally, it was interesting to observe that the coefficient for professionals for this dimension was in a negative direction, suggesting that individuals who are worrying, nervous, emotional, and high-strung are better performers in these jobs. It is difficult to explain these results, although it is possible that the causal direction may be such that in some professional jobs pressures related to high performance cause the individuals to display neurotic traits. Given that these results are based on only five samples, however, they should be interpreted cautiously.

The results for Agreeableness suggest that it is not an important predictor of job performance, even in those jobs containing a large social component (e.g., sales or management). Such results are in contrast with the other socially based personality dimension, Extraversion. Thus, it appears that being courteous, trusting, straight forward, and soft-hearted has a smaller impact on job performance than being talkative, active, and assertive.

An issue of general interest to many personnel psychologists is whether objective measures of job performance result in different validity results than subjective criteria, particularly because objective and subjective measures often cannot be treated as substitutes for one another (Heneman, 1986). In general, for the five personality dimensions, the true score correlations for subjective criteria were larger than for objective criteria. However, for one objective measure, status change, the correlations were equal to or larger than subjective measures for four of the five personality dimensions.

However, for one dimension, Conscientiousness, the correlations for all objective criteria were smaller than for the subjective ratings. This result is particularly intriguing because this dimension was found to be the most predictive personality dimension in this study. A possible explanation for the lower correlations is that the objective criteria are contaminated or deficient, or both. An alternative explanation is that the subjective measures may be susceptible to bias resulting from the individual's personality. For example, Hogan (in press) suggests that one meaning of personality refers to a person's social reputation; that is to the manner in which he or she is perceived by friends, co-workers, and supervisors. Viewed in this way, personality concerns the amount of esteem, regard, and status accorded by his or her social groups. Thus, according to Hogan, reputations summarize what individuals say about a person's past behaviors and may be used to forecast future performance or, at least, what others are likely to say about a person's future behavior. The higher correlations for the subjective criteria in the present study suggest that one's reputation may influence judgments of performance.

The results of the present study have implications for both research and practice in personnel selection. From a practitioner's standpoint, the results suggest that if the purpose is to predict job performance based on an individual's personality, then those measures associated with Conscientiousness are most likely to be valid predictors for all jobs. In fact, it is difficult to conceive of a job in which the traits associated with the

Conscientiousness dimension would not contribute to job success. Interestingly, this dimension, which measures traits such as planful, organized, hardworking, persistent, and achievement oriented, has been labeled Work by Peabody and Goldberg (1989) in recognition that these personality traits are closely related to the performance of work tasks.

Of course this does not preclude the possibility that some measures from other personality dimensions may predict job performance. For example, Hogan and Hogan (1989) developed and validated a personality instrument called Employee Reliability, which was composed of relevant measures from the five personality dimensions studied in this analysis. A large component of this instrument was associated with dependability and carefulness, traits which are representative of the Conscientiousness dimension in the present study. Thus, their finding that the Employee Reliability instrument was a valid predictor of job performance criteria (in addition to counterproductive work behaviors) is consistent with the results of the present study. Taken together, these results further strengthen the conclusion that the most predictive measures of personality are those that emphasize traits associated with the Conscientiousness dimension. (For another example, the reader is directed to the Work Orientation Scale developed by Gough (1985), based on items from multiple scales of the CPI).

In retrospect, it is not surprising that the overall validity of personality measures has been found to be relatively low. As one example, the MMPI is often seen as the prototypical personality inventory. However, a fact that cannot be overlooked is that the MMPI was not designed to predict job performance in normal populations. Thus, findings that the MMPI is a relatively poor predictor of job performance would be expected, based on the results of this study, because most scales on the MMPI measure Emotional Stability and none measure Conscientiousness directly (based on the classifications made by the raters in this study and based on factor analyses of the MMPI by Johnson, Null, Butcher, & Johnson, 1984). Thus, the results of the present study are also useful in explaining why some personality inventories are likely to be better predictors of job performance than others.

Of interest to those in the training and development field are the findings that two of the personality dimensions, Openness to Experience and Extraversion, are related to performance in training programs. Very little research has investigated the relation of individual measures of personality to measures of training readiness and training success. Perhaps future research and practice in the training and development field will be stimulated by the availability of a classification scheme for organizing individual differences in personality.

In summary, in order for any field of science to advance, it is necessary to have an accepted classification scheme for accumulating and categorizing empirical findings. We believe that the robustness of the 5-factor model provides a meaningful framework for formulating and testing hypotheses relating individual differences in personality to a wide range of criteria in personnel psychology, especially in the subfields of personnel selection, performance appraisal, and training and development.

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