THE STRUCTURE OF CONSCIENTIOUSNESS: AN EMPIRICAL INVESTIGATION BASED ON SEVEN MAJOR PERSONALITY QUESTIONNAIRES

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The purpose of this study was to identify the underlying structure of the trait domain of Conscientiousness using scales drawn from 7 major personality inventories. Thirty-six scales conceptually related to Conscientiousness were administered to a large community sample ($N = 737$); analyses of those scales revealed a hierarchical structure with 6 factors: industriousness, order, self-control, responsibility, traditionalism, and virtue. All 6 factors demonstrated excellent convergent validity. Three of the 6 factors, industriousness, order, and self-control, showed good discriminant validity. The remaining 3 factors—responsibility, traditionalism and virtue—appear to be interstitial constructs located equally between Conscientiousness and the remaining Big Five dimensions. In addition, the 6 underlying factors had both differential predictive validity and provided incremental validity beyond the general factor of Conscientiousness when used to predict a variety of criterion variables, including work dedication, drug use, and health behaviors.

In recent years, interest in personality measurement has increased among applied psychologists because of studies demonstrating that personality variables predict performance across a diverse array of occupational groups (Barrick & Mount, 1991; Hough, Eaton, Dunnette, Kamp, & McCloy, 1990; Tett, Jackson, & Rothstein, 1991). Among the traits assessed by personality measures, Conscientiousness is arguably the most important. Measures of Conscientiousness have been shown to predict task performance (Ones, Viswesvaran, & Schmidt, 1993), contextual

performance (Hogan, Rybicki, Motowidlo, & Borman, 1998; Ladd & Henry, 2000; McNeely & Meglino, 1994; Organ, 1994; Organ & Ryan, 1995), and a variety of outcomes related to adaptive social functioning. For example, Conscientiousness scores correlate positively with long-term career success (Judge, Higgins, Thoresen, & Barrick, 1999), college retention (Tross, Harper, Osher, & Kneidinger, 2000), marital stability (Kelly & Conley, 1987; Tucker, Kressin, Spiro, & Ruscio, 1998), healthy lifestyle behaviors (Booth-Kewley & Vickers, 1994; Roberts & Bogg, 2004), and longevity (Friedman, Tucker, Tomlinson-Keasey, Schwartz, Wingard, & Criqui, 1993).

Although these studies suggest that *Conscientiousness* has both predictive and descriptive value, this generalization is somewhat inappropriate. Many studies of Conscientiousness involved different definitions of the construct. Some researchers measured Conscientiousness in terms of achievement, whereas others focused on order, impulse control, or responsibility. Moreover, recent research suggests that the lower-order facets of Conscientiousness provide as good or better prediction of behavioral outcomes than composite measures (Ashton, 1998; Mershon & Gorsuch, 1988; Paunonen, 1998; Paunonen & Ashton, 2001). For example, Stewart (1999) found that the order facet of Conscientiousness strongly correlated with the performance of newly hired employees, but the achievement facet strongly correlated with the performance of veteran employees; both facets had substantially higher correlations with performance when examined individually than when combined. Even more importantly, lower-order facets sometimes show *differential* relationships with performance criteria. For example, Moon (2001) found that a composite measure of Conscientiousness had zero relationship with performance, defined as the escalation of commitment tasks; yet, two lower-order facets, achievement and duty, showed substantial, but opposite, relationships with the performance criterion. In addition, LePine, Colquitt, and Erez (2000) found that an order-dependability composite exhibited a negative correlation with adaptation to changing task contexts, but achievement showed no relationship.

In sum, these results suggest that more attention should be devoted to studying the lower-order facets of Conscientiousness. In fact, a growing number of studies focusing on narrow Conscientiousness traits are beginning to appear in the applied psychology literature. For example, Dudley, Orvis, and Lebiecki (2003) recently conducted a meta-analysis of relationships between four lower-order Conscientiousness traits and a number of criteria, including job and task performance, job dedication, and counterproductive behaviors. One problem confronting the organization of studies in this way is the complete lack of an acceptable lower-order taxonomy of Conscientiousness facets. Hough and colleagues have long argued that an adequate personality taxonomy at the facet level is critical

to the understanding of the relationships between personality variables and criteria of interest to industrial/organizational psychologists and that research at the Big Five level may obscure important differences in the way personality facets may relate differentially to criteria (Hough, 1992; Hough & Furnham, 2003; Hough & Ones, 2001; Hough & Oswald, 2000; Hough & Schneider, 1996). Clearly, taxonometric work in the area of Conscientiousness (and other Big Five factors) is critical for the future synthesis of work-related research.

In this paper, we empirically derived an initial taxonomy for the lower-order facets of Conscientiousness by analyzing scale scores from seven widely used inventories. Exploratory factor analysis was used to identify facets of Conscientiousness that were clearly interpretable. Then, confirmatory factor analysis and correlations with the remaining Big Five, demographic variables, and a set of criterion variables were used to examine convergent, discriminant, and incremental validities of the lower-order Conscientiousness facets.

Current Views on the Structure of Conscientiousness

At present, there is little conceptual or empirical agreement concerning the underlying structure of Conscientiousness. One reason for this lack of consensus lies in the relative newness of the Big Five taxonomy. Much of the recent research has appropriately focused on whether the Big Five are sufficient and to what extent they capture the variance in most, if not all, trait terms (e.g., Paunonen & Ashton, 2001; Paunonen & Jackson, 2000; Saucier & Goldberg, 1998). Although there is agreement that there are at least five broad categories, and a willingness to settle on the gross features of those five domains, there is little agreement about the specific facets that make up each of the Big Five (Costa & McCrae, 1998; Saucier & Ostendorf, 1999).

Several attempts to conceptually organize the domain of Conscientiousness have been proposed. Hough (1992) and Mount and Barrick (1995) argued that Conscientiousness could be further divided into two domains, achievement and dependability. Achievement represents the capacity to work hard and meet challenges, whereas dependability reflects a more interpersonal component of Conscientiousness manifest in traits of responsibility and dutifulness. Alternatively, Costa and McCrae (1998) claimed that the facets of Conscientiousness could be categorized into proactive and inhibitive groupings. In this taxonomy, achievement and dutifulness would be considered proactive, and other facets, such as orderliness and self-control, would be inhibitive. Recently, Hough and Ones (2001) proposed a taxonomy of Conscientiousness-related traits that considered both the factor structure and patterns of validity across personality scales. This model identified one global Conscientiousness domain and six

facets of Conscientiousness: achievement, dependability, impulse control, order, moralistic, and persistence. This new model adds the impulse control, and moralistic facets to the four facets already identified. Presumably, global measures of Conscientiousness subsume some or all of the remaining facets of Conscientiousness. Unfortunately, none of these taxonomies is represented in an existing personality inventory, nor have they been tested empirically.

One route to identifying the structure of Conscientiousness is to examine lexically derived trait adjectives, as was done to develop the Big Five (e.g., Goldberg, 1993). There have been four studies to date using lexical systems to identify the lower-order structure of the Big Five. Saucier and Ostendorf (1999) used the abridged Big Five dimensional circumplex (AB5C) model (Hofstee, De Raad, & Goldberg, 1992) to select adjectives and then used hierarchical factor analysis to identify lower-order factors that would replicate across English and German languages. They found four facets of Conscientiousness: orderliness, industriousness, responsibility, and decisiveness. In a similar study based on an Italian lexicon, Perugini and Gallucci (1997) found four distinct factors: meticulousness (akin to orderliness), superficiality (similar to industriousness), reliability, and recklessness. Moreover, Peabody and De Raad (2002) found independent evidence for facets that correspond to the orderliness, responsibility, industriousness, and impulse control. They also identified a persistence factor that is a "transitional" domain between Conscientiousness and Extraversion. This persistence factor also loaded on the Emotional Stability factor in several samples and may therefore be similar to the decisiveness factor described above.

The fourth study delved deeper into the lexicon of trait adjectives that mark the Conscientiousness domain (Roberts, Bogg, Walton, Chernyshenko, & Stark, 2004). Most of the previous psycholexical research focused on creating marker sets for the Big Five (see Saucier, 2002 for a discussion) or on creating or maintaining a list of adjectives that was cross-culturally valid (e.g., Saucier & Ostendorf, 1999). Both of these strategies result in an abbreviated set of trait adjectives because their goal is to develop relatively orthogonal measures of the Big Five or find adjectives that perform equivalently across languages. Alternatively, one can sample broadly from the domain of Conscientiousness and not be as concerned with the potential overlap with other trait domains. Roberts et al. (2004) adopted this broader search strategy in order to be more inclusive and thus to identify a maximum number of potential facets of Conscientiousness.

The results replicated and extended previous research on the lexical structure of Conscientiousness. Five components found in previous lexical research on the lower-order structure of Conscientiousness were identified: orderliness, industriousness, reliability, decisiveness, and impulse control.

Close examination of the content of the factors indicated that the orderliness, decisiveness, reliability, and industriousness components were clear replications of factors of the same names found by Saucier and Ostendorf (1999). The orderliness, reliability, and industriousness components also were close approximates of Peabody and De Raad's (2002) orderliness, responsibleness, and work factors. In addition, the impulse control factor was similar to the impulse control factor found by Peabody and De Raad (2002), although their factor was broader and more heterogeneous in content.

Unlike previous research, two additional, interpretable facets were found: formalness and conventionality. Both of these dimensions appeared to represent blends of Conscientiousness with high and low Openness to Experience, respectively. The formalness dimension appeared close to what might be termed culture and contained the items formal, sophisticated, and refined. Conventionality was related to supporting social norms and conventions and was marked by the items traditional, conventional, and nonconforming (reversed). Despite the conceptual overlap with Openness to Experience, the empirical correlation was in the correct direction for both dimensions, but rather small in magnitude. In fact, the dimension with the most problematic discriminant validity was responsibility, which showed a strong relationship to Agreeableness in addition to Conscientiousness.

In summary, across the conceptual and lexical taxonometric efforts to date, nine unique facets of Conscientiousness have been identified (order, achievement, responsibility, impulse control, moralistic, persistence, traditionalism, formalness, and decisiveness) with no conceptual or empirical solution providing comprehensive coverage of all nine facets and no two systems in complete agreement. One piece of the puzzle missing from the taxonometric research so far is an examination of the factor structure of personality inventories that measure Conscientiousness-related traits. In the search for the Big Five, a systematic analysis of previously developed personality inventories provided much needed confirmation that the Big Five was an appropriate higher-order taxonomy for the domain of personality traits (McCrae & John, 1992). To date, there has been no effort to identify the lower-order structure of Conscientiousness, or any other domain of personality traits, through a comprehensive assessment of personality inventory scales. This study constitutes the first effort to our knowledge to explore the lower-order structure of Conscientiousness using scales drawn from the most thoroughly validated personality inventories created to date.

In this study, our goal was to investigate the lower-order structure of Conscientiousness by examining a diverse array of personality inventories related to the domain of Conscientiousness. We examined several personality measures developed under different theoretical considerations and

factor analyzed Conscientiousness-related scales to establish a shared overall structure. The main assumption of this approach is that most, if not all, important lower-order Conscientiousness factors have been identified in one form or another by the different theoretical perspectives and, thus, are embedded in the corresponding personality inventories. If a comprehensive set of measured variables for lower-order Conscientiousness domains is identified and the matrix of correlations between measured variables is available, then factor-analytic techniques can help to determine the number and nature of lower-order factors (Fabrigar, Wegener, MacCallum, & Strahan, 1999).

In this study, seven personality inventories with various perspectives on Conscientiousness and its subcomponents were used. The seven inventories were the NEO-PI-R, 16 Personality Factor Questionnaire 16PF, California Psychological Inventory (CPI), Multidimensional Personality Questionnaire (MPQ), the Jackson Personality Inventory—Revised (JPI-R; Jackson, 1994), the Hogan Personality Inventory (HPI; Hogan & Hogan, 1992), and the AB5C scales from the International Personality Item Pool (AB5C-IPIP; Goldberg, 1999a, 1999c). These seven inventories constitute one of the most comprehensive assessments of personality inventories in general and the domain of Conscientiousness in particular. Each of these inventories contains two or more subscales tapping into the domain of Conscientiousness and several are used widely in industry for selection purposes (e.g., HPI, CPI, 16PF). Moreover, the few personality inventories not administered to the Eugene community sample are either no longer being published or used in research, such as the Edwards Personality Preferences Schedule (EPPS), or are tests not typically used in industry, such as the MMPI. Moreover, these inventories provide an excellent example of the variety of techniques used to create personality tests and represent the types of personality questionnaires most often used in research and in establishing the relationship of traits, like Conscientiousness, to specific criteria.

This study was conducted in three phases. In Phase 1, we identified scales in each of the seven personality inventories that were conceptually related to the Conscientiousness domain. This was accomplished by searching the technical manuals of inventories and identifying scales that were described either as being part of Conscientiousness or as being part of a closely related concept. In Phase 2, we derived a lower-order structure of Conscientiousness by factor analyzing scale scores for individuals who completed all seven inventories. In Phase 3, a confirmatory factor analysis was used to examine the convergent and discriminant validity of the resulting lower-order Conscientiousness facets with global measures of the Big Five. In addition, correlations between Conscientiousness facets and a variety of outcome measures were computed. Of particular interest

was evidence of the incremental validity of the facets beyond the general factor of Conscientiousness.

Participants

A sample of 737 individuals was used in this study. All participants were members of the Eugene-Springfield Community Sample, which was recruited by a mail solicitation in 1993 from lists of local homeowners; the participants had initially agreed to complete various mailed questionnaires for pay for at least 5 to 10 years. Participants' ages ranged from 22 to 90 years. All levels of educational attainment were represented in the sample, with the average level being 2 years of post-secondary schooling.

Over a period of 5 years, participants completed seven personality measures, the inventory of 400 behavioral acts (e.g., drug use), and measures of health practices. Each questionnaire was sent separately by mail to the research participants, who returned them in preaddressed postage-paid envelopes. Thus, the potential for fatigue or random responding was minimal. In addition, because study participation was voluntary and scores were not used to make personnel selection or other important decisions, it is unlikely that participants were motivated to present themselves in a socially desirable manner.

All participants completed at least four of the seven personality inventories used in this study, with more than half ($N = 401$) completing all seven. We limited the analyses of criterion-related validity to the 197 individuals who were currently working when they completed the surveys.

Phase 1: Selecting Scales Related to Conscientiousness from Seven Personality Inventories

Method

Initially, two methods were used to make scale selection decisions. First, we searched for scales that were *conceptually* identified as being related to Conscientiousness by the *authors* of the personality instruments. Specifically, we examined the technical manuals for the seven inventories and selected scales that were described as being part of Conscientiousness or a closely related concept. Second, we used an *empirical* approach for scale selection, based on the correlations of scale scores with widely agreed on markers of Conscientiousness (e.g., facet scales for the Conscientiousness factor in NEO-FFI or NEO-PI). However, this method was abandoned because we could not establish a clear empirical standard for scale inclusion. For example, how large a correlation is needed to conclude that two scales measure the same construct? Hough, et al. (1990) have

reported correlations between Conscientiousness-(dependability-) related scales from 12 inventories having a mean of .34 and standard deviation of .18. This variability made it difficult to justify a threshold value for scale inclusion.

Scale Selection

Table 1 presents 36 scales that were identified as conceptually related to Conscientiousness. In addition, for each scale we report its mean, standard deviation, internal consistency reliability (alpha), skew, and kurtosis. These statistics were important for subsequent factor analyses. We will now briefly introduce each of the seven instruments used in our study and describe the scales included in Table 1.

The revised NEO Personality Inventory (NEO-PI-R). The NEO-PI-R, administered in the summer of 1994, is a 240-item questionnaire designed to assess the Big Five (Costa, McCrae, & Dye, 1991). The NEO contains five domain scales: Neuroticism, Emotional Stability, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Each domain includes six subscales or "facets." Typically when the 30 facets are factor analyzed, five factors clearly emerge (Costa & McCrae, 1992, 1994). A 5-point Likert format ranging from "strongly disagree" to "strongly agree" is used throughout the inventory. Internal consistency (reliability) coefficients are reported to range from .86 to .95 for domain scales and from .62 to .82 for facet scales (Costa & McCrae, 1994). Similar reliabilities were obtained in our study.

Costa et al. (1991, p. 887) conceptualized Conscientiousness "as having both proactive and inhibitive aspects." Proactive aspects deal with behaviors related to success at work (e.g., the need for achievement and commitment to work), whereas inhibitive aspects relate to self-control and cautiousness. These aspects are encompassed by six facets, labeled dutifulness, achievement striving, competence, order, self-discipline, and deliberation. Dutifulness reflects the propensity to honor and uphold commitments to social justice and social obligations, often found in work contexts. Achievement striving reflects the propensity to be hard working and driven. Competence refers to one's sense of being capable, effective, and sensible. Order refers to one's propensity to be well organized, neat, and clean. Self-discipline is the ability to "begin tasks and carry them through to completion despite boredom and other distractions" (Costa & McCrae, 1994). Finally, deliberation reflects impulse control, patience, and maturity. These six facets are clearly related to Conscientiousness and were included in our analyses.

The Sixteen Personality Factor Questionnaire (16PF). The 16PF, administered in the fall of 1996, was originally developed from the factor-analytic research of Raymond Cattell (1945). The fifth edition of the 16PF

TABLE 1
Descriptive Statistics for Scales Conceptually Related To Conscientiousness

Inventory name	Scale name	N	Number of items	Scale reliability	Mean	SD	Skewness	Kurtosis
Revised NEO Personality Inventory	Competence	692	8	.70	23.12	3.58	−.38	.61
	Order	692	8	.74	18.65	4.84	−.37	.09
	Dutifulness	692	8	.67	24.08	3.81	−.44	.72
	Achievement striving	692	8	.67	18.62	4.49	−.21	−.13
	Self-discipline	692	8	.80	21.28	4.53	−.55	.54
	Deliberation	692	8	.70	18.12	4.12	−.06	−.10
Sixteen Personality Factor Questionnaire	Rule-consciousness	639	11	.75	15.11	4.95	−.54	−.55
	Perfectionism	639	10	.74	11.54	5.05	−.17	−.76
California Personality Inventory	Responsibility	668	36	.72	27.10	4.32	−.74	.72
	Socialization	668	46	.72	32.29	5.19	−.50	−.13
	Self-control	668	38	.79	24.68	5.52	−.51	.04
	Good impression	668	40	.78	20.45	5.57	−.12	−.37
	Well-being	668	38	.80	31.49	4.53	−1.33	2.28
	Achievement via conformance	668	38	.69	29.10	4.27	−.65	.26

TABLE 1 (continued)

Inventory name	Scale name	N	Number of items	Scale reliability	Mean	SD	Skewness	Kurtosis
Hogan Personality Inventory	Moralistic	717	5	.46	1.70	1.27	.53	-.33
	Mastery	717	4	.34	2.82	.98	-.47	-.44
	Virtuous	717	5	.34	3.26	1.05	-.48	-.09
	Not autonomous	717	3	.70	2.11	1.06	-.89	-.53
	Not spontaneous	717	4	.36	2.89	.95	-.66	.08
	Impulse control	717	5	.60	2.89	1.42	-.24	-.80
	Avoids trouble	717	5	.53	3.76	1.24	-.96	.41
Jackson Personality Inventory—Revised	Organization	650	20	.73	12.56	3.65	-.35	-.27
	Traditional values	649	20	.79	11.52	4.08	-.31	-.53
	Responsibility	650	20	.66	15.80	2.85	-.96	.94
Multidimensional Personality Questionnaire	Control	665	24	.83	41.27	4.71	-.84	.31
	Harm-avoidance	665	26	.82	45.70	4.83	-.90	.25
	Traditionalism	665	27	.87	44.62	5.78	-.54	-.46
AB5C scales from the International Personality Item Pool	Conscientiousness	496	13	.75	52.29	6.33	-.83	.98
	Efficiency	496	11	.83	41.37	6.82	-.63	.83
	Dutifulness	496	13	.78	54.56	5.92	-.51	-.21
	Purposefulness	496	12	.81	46.22	6.49	-.96	1.90
	Organization	496	12	.78	49.28	5.39	-.37	.00
	Cautiousness	496	12	.77	38.63	6.92	-.17	-.22
	Rationality	496	14	.67	47.54	6.42	.13	.06
	Perfectionism	496	9	.76	30.65	5.63	-.07	-.35
	Orderliness	496	10	.78	37.64	5.99	-.45	-.11

(Conn & Rieke, 1994) consists of 185 items measuring 16 personality traits (known as "primary" scales) and one intellectual reasoning trait. A three-response category format is used throughout the inventory. Coefficient alpha values for the primary scales are reported to range from .68 to .87 (Chernyshenko, Stark, & Chan, 2001; Conn & Rieke, 1994).

The second-order factor analysis of the 16 personality scales consistently reveals a clear five-factor structure (Chernyshenko et al., 2001; Conn & Rieke, 1994). These factors are termed "global" and closely resemble the Big Five. One of the global factors, labeled self-control, can be viewed as conceptually related to Conscientiousness. In Cattell's original writings, he discussed this domain as partially reflecting the "ideal self"—the self that an individual wishes to be that encompasses moral behavior (Cattell, 1965). Cattell described a person with high desire to achieve that ideal as persevering, responsible, ordered, and attentive or, in other words, someone who exercises a high degree of *control* over his/her thoughts, feelings, and behavior. Two scales from the 16PF are most closely associated with the global factor of self-control: rule-consciousness (formerly called superego strength) and perfectionism. Based on these findings, we included these two scales in our analyses.

California Psychological Inventory (CPI). The original CPI was published in 1956, followed by the manual in 1957 (Gough, 1957). The purpose of the inventory was to assess everyday interpersonal themes in behavior called "folk concepts." The 1987 revision, Form 462, (Gough, 1987) includes 462 true–false items that form 20 folk scales, three structural, and a number of special purpose scales and indices. As reported by Gough and Bradley (1996), alpha coefficients for the folk scales ($N = 6,000$) ranged from .62 to .84 with a median of .77. Reliability coefficients for the structural scales were generally higher. The CPI, Form 462, was administered in the fall of 1994.

In the CPI technical manual, both the conceptual framework and factor structure point to six scales potentially belonging to the domain of Conscientiousness: responsibility, socialization, self-control, good impression, well-being,[1] and achievement via conformance. These scales are concerned with following rules, being socially appropriate, and working hard

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[1] Although the labels of the CPI good impression and well-being scales would seemingly indicate that they do not belong in the domain of Conscientiousness, the factor structure of the CPI shown in the CPI manual does (Gough & Bradley, 1996). The factor structure of the CPI shows that the top loading scale in the second factor, which we interpret as norm adherence or broadly speaking one aspect of Conscientiousness, is the self-control scale (.93) followed by the good impression (.83) and well-being scales (.68), and then the socialization (.53), achievement via conformance (.52), and responsibility scales (.51). Based on this factor structure we conclude that the names of the good impression and well-being scales overemphasize aspects of the scales unrelated to Conscientiousness whereas their empirical relations to the remaining CPI scales clearly indicate that they belong to the domain.

in well-structured environments. Because these behaviors are congruent with traditional notions of Conscientiousness, we included these six scales in our analyses.

The Hogan Personality Inventory (HPI).   The HPI was developed in the context of socioanalytic theory (Hogan & Roberts, 2000). The revised 1992 edition consists of seven higher-order primary scales and a validity scale (Hogan & Hogan, 1992). The primary scales are adjustment, ambition, sociability, likeability, prudence, intellectance, and school success. Each primary scale can be further divided into subscales known as Homogeneous Item Composites (HICs). The 1992 edition of the HPI contains a total of 206 items in 41 HICs; this edition was administered in our study. A "yes"/"no" item response format is used throughout the inventory. Internal consistency reliabilities for the primary scales range from .71 to .89 (Hogan & Hogan, 1992). Reliabilities of the HICs are lower, because they consist of only 3–5 items (see Table 1). The HPI was administered in the winter of 1997.

From its conception, the HPI was constructed to reflect the Big Five dimensions of personality (Hogan & Hogan, 1992). Items for the likeability scale assess the Big Five factor of Agreeableness; adjustment items measure Big Five Neuroticism; prudence items assess Big Five Conscientiousness; the remaining four HPI scales assess Big Five Extraversion and intellect.

According to Hogan and Hogan (1992), the prudence dimension is designed to measure the degree to which a person is conscientious, conforming, and dependable. It currently contains seven HICs: moralistic (adheres to conventional values), mastery (hard working), virtuous (perfectionistic), not autonomous (concerned about others opinions), not spontaneous (predictable), impulse control (lack of impulsivity), and avoids trouble (probity). These seven HICs were included in our analyses.

The Jackson Personality Inventory—Revised (JPI-R).   The JPI, originally developed in 1976, was designed to provide measures of personality traits that were found to be relevant to the prediction of behavior in a range of contexts, especially in industrial settings. In 1994, the inventory was revised to address more recent research in personality measurement (Jackson, 1994). The new JPI-R, administered in the fall of 1999, is a 300-item questionnaire composed of 15 scales (Jackson, 1994), which can be grouped into five "higher-order" clusters that closely resemble the Big Five. Scale reliabilities range from .66 to .87 with a median of .79 (similar reliabilities were obtained in our study).

The JPI-R item cluster, labeled dependable, closely resembles the dimension of Conscientiousness. This cluster includes three scales: organization, traditional values, and responsibility. The organization scale is concerned with planning and completing projects on schedule. The traditional

values scale assesses the degree to which an individual adheres to conservative, "old fashioned" customs and beliefs, resisting more liberal or radical values. The responsibility scale denotes feelings of moral obligation to be honest and upright with others and society at large. These three scales were included in our analyses.

The Multidimensional Personality Questionnaire (MPQ). The MPQ included 300 true/false items and was administered in the summer of 1999. The 11 primary scales (originally derived from a series of exploratory factor analyses) are composed of 272 items. The length of each scale was determined by how many items were needed to ensure adequate reliability (Tellegen & Waller, in press). Consequently, scale reliabilities of the MPQ scales are somewhat higher than those of other personality inventories and generally exceeded .80.

According to Tellegen (1982), the 11 primary scales can be collapsed into three or four higher-order dimensions. One of these, the constraint factor, is viewed as related to Conscientiousness. It includes such primary scales as control, harm avoidance, and traditionalism. People with high scores on the constraint factor are described as cautious, planful, and conventional; they also have a tendency to avoid danger. The control scale reflects the tendency to be careful, rational, and not impulsive. The harm avoidance scale reflects the tendency to avoid excitement, adventure, and danger. The traditionalism scale taps moral standards, religious values, and strict social norms. All these scales were included in our analyses.

AB5C scales from the International Personality Item Pool (AB5C-IPIP). The scales on the AB5C-IPIP were derived from the fact that most trait adjectives are multidimensional and can be represented as a blend of two higher-order Big Five dimensions (Hofstee et al., 1992). Each of the 10 unique Big Five pairings defines a circumplex plane, upon which the trait adjectives can be located. For example, the dimensions of Extraversion and Agreeableness form the basis of a circumplex of interpersonal traits. Traits that are pure Extraversion lie on the Extraversion dimension, whereas traits that reflect blends of Extraversion and Agreeableness lie between the poles of the two dimensions. Friendliness, for example, is a combination of high Extraversion and high Agreeableness. Each circumplex can be divided into 12 slices of 30 degrees each; the six lines demarcating the boundaries between the slices represent bipolar subcomponent factors. Thus, each circumplex has two "pure" subcomponent factors, which represent the Big Five dimensions; the axes defining these subcomponent factors are located at 0–180 and 90–270 degrees, respectively. In addition, there are two "high loadings" subcomponent factors for each Big Five dimension, located at ±30 degrees from the "pure" axes. Based on this representation, nine narrow traits can be derived rationally for each Big Five dimension (see Hofstee et al., 1992; Johnson & Ostendorf, 1993).

There are a total of 45 bipolar dimensions in the AB5C model of the Big Five proposed by Hofstee, et al. (1992). To measure each of these dimensions, Goldberg (1999a) developed a 45-scale AB5C-IPIP measure, which is available for public use on the Web at http://ipip.ori.org/. The scales comprise 9 to 13 items and have internal consistency-reliabilities ranging from .67 to .90, with an average of .80 (Goldberg, 1999c). The Big Five factor of Conscientiousness in the AB5C-IPIP includes the following nine facets: Conscientiousness (pure Conscientiousness), efficiency (high Conscientiousness, high Extraversion), cautiousness (high Conscientiousness, low Extraversion), dutifulness (high Conscientiousness, high Agreeableness), rationality (high Conscientiousness, low Agreeableness), purposefulness (high Conscientiousness, high Emotional Stability), perfectionism (high Conscientiousness, low Emotional Stability), organization (high Conscientiousness, high intellect), and orderliness (high Conscientiousness, low intellect). All nine of these scales were included in our analyses. Different items from the AB5C were administered in the spring of 1994, fall of 1995, and fall of 1996.

Phase 2: Deriving the Lower-Order Structure of Conscientiousness

Method

Many have argued that factor analysis should be guided by theory and that confirmatory factor analysis (CFA) should be preferred over a data-driven, exploratory factor analysis (EFA). However, there is no unifying theory of the lower-order structure of Conscientiousness. Thus, we have no basis to make strong assumptions about how many lower-order Conscientiousness factors exist or what specific personality scales they influence. In this situation, EFA is likely to be more appropriate than the CFA, because the number of plausible alternative models is so high that it makes confirmatory analyses infeasible (Fabrigar et al., 1999). As Finch and West (1997) noted, EFA is useful for probing the underlying structure of data and generating hypotheses that can be subjected to more rigorous subsequent testing.

In this investigation, responses to 36 scales identified as related to Conscientiousness were subjected to exploratory factor analysis with oblique (promax) rotation. Examination of skewness and kurtosis values for individual scales, as well as randomly selected bivariate scatterplots, suggested that multivariate normality could be assumed. Thus maximum likelihood estimation (MLE), which provides model-data fit statistics, was used to compare different factor solutions.

One of the crucial issues for our analyses was to decide on how many lower-order Conscientiousness factors to retain. We used several methods

TABLE 2

*Comparison of Eigenvalues for the Sample and Random Data and the Root
Mean Square Error of Approximation Statistics for the Sample Data*

Factor number	Eigenvalues for sample data	Average eigenvalues for 100 sets of random data	RMSEA
1	11.39	1.44	.11
2	3.96	1.39	.10
3	2.89	1.35	.08
4	1.83	1.31	.07
5	1.58	1.28	.06
6	1.07	1.26	.05
7	1.02	1.23	.05
8	0.92	1.21	.05
9	0.85	1.18	.04
10	0.79	1.16	.03

to determine the optimal number of factors. First we used two tech-
niques, parallel analysis (Horn, 1965; Humphreys & Montanelli, 1975)
and the root mean square error of approximation goodness-of-fit (RMSEA;
Browne & Cudeck, 1993; Steiger & Lind, 1980) to identify a number of
factors to examine further. We did not use the familiar Kaiser-Guttman
criterion, which suggests retaining factors with eigenvalues greater than 1
(Guttman, 1954; Kaiser, 1960) because application of this rule to eigenval-
ues of a reduced correlation matrix is inappropriate (Fabrigar et al., 1999;
Gorsuch, 1980; Horn, 1969). For parallel analysis, eigenvalues obtained
from real data were compared to those obtained from simulated random
data based on the same number of respondents and variables. The number
of factors to be retained was determined by counting the number of eigen-
values in the real data that were larger than those from the random data. To
use RMSEA statistics to determine the number of factors, we computed
goodness-of-fit values for models of increasing complexity (one factor at
a time was added) until an RMSEA value of .05 or less was obtained, as
.05 is usually considered the threshold for good fit (Browne & Cudeck,
1993). Finally, we examined the hierarchical structure of various rotated
solutions in order to evaluate the conceptual clarity of different solutions
(e.g., Goldberg & Strycker, 2002).

Results

   Table 2 presents parallel analysis and RMSEA results that were used
to determine the range of the number of lower-order Conscientiousness
factors to retain. Column 2 shows the first 10 eigenvalues obtained by factor

analyzing real data; Column 3 contains the mean eigenvalues obtained by factoring 100 random data sets and averaging them; Column 4 presents the RMSEA goodness-of-fit statistics obtained by fitting models having 1, 2, . . . , 10 factors to the sample data.

As can be seen by comparing Columns 2 and 3, parallel analysis suggested a five-factor solution; that is, only the first five eigenvalues from the real data (11.39, 3.96, 2.89, 1.83, 1.58) were larger than those from the random data (1.44, 1.39, 1.35, 1.31, 1.28). On the other hand, the RMSEA = .05 criterion suggested a six-factor solution.

In order to aid in deciding between the five- and six-factor solutions, we analyzed both orthogonal (varimax) and oblique (promax) rotations in the ML extraction. The two types of analyses produced virtually identical findings. For example, for the five-factor solution, the corresponding factors scores derived from the varimax and promax rotations correlated .90 or higher. Because the two rotations produced similar results and, theoretically, Conscientiousness-related facets were expected to correlate with each other, we focused on the results from the promax rotation.

Next, using the ML estimation with a promax rotation we overextracted seven factors to see if the six-factor solution was stable (e.g., Wood, Tataryn, & Gorsuch, 1996). The first six factors from the seven-factor solution were identical to the six-factor solution with the seventh factor having no high-loading items and was therefore uninterpretable. Finally, we performed a hierarchical analysis by computing factor scores for the extractions with one through six factors and related these factor scores across solutions (see Figure 1). The path coefficients in Figure 1 are the correlations between the factor scores from the factors at each level with those at levels above and below it. This simple "top-down" procedure for clarifying the hierarchical structure of a set of variables was developed by Ostendorf (1990) and Saucier (1997) and used more recently by Goldberg (1999b), Goldberg and Somer (2000), and Goldberg and Strycker (2002).

As can be seen in Figure 1, the 36 scales first broke into proactive and inhibitive aspects of Conscientiousness in the two-factor solution. In the three-factor solution, a subcomponent of proactive aspects became an achievement factor, and the remaining proactive aspects of Conscientiousness combined with the inhibitive aspects to create an integrity factor, which consisted of scales measuring social responsibility and honesty and a rule-orientation factor containing scales measuring traditionality and impulse control. In the four-factor solution, the rule-orientation factor was further divided into self-control and traditionalism factors. Moving to the fifth level, the integrity factor was split into responsibility and virtue factors. And finally, moving to the six-factor solution resulted in the achievement factor splitting into industriousness and order factors.
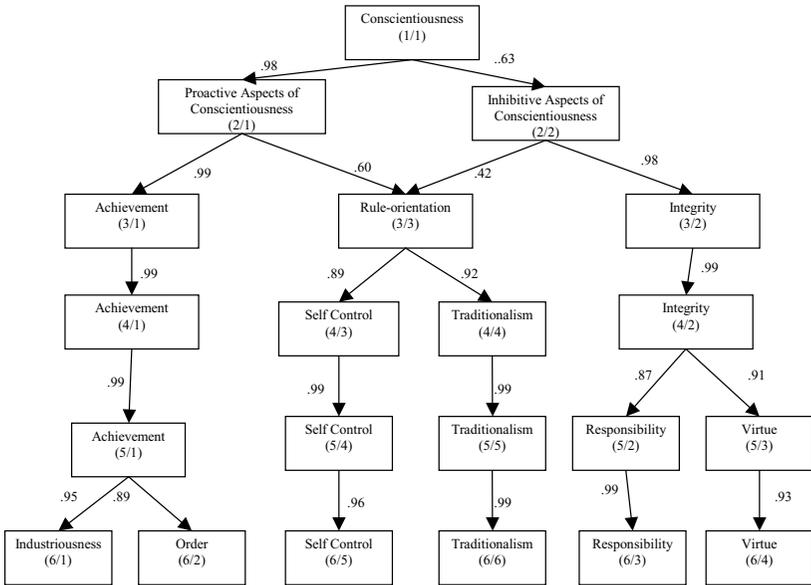
Figure 1: **The Hierarchical Structure of the 36 Consciousness-Related Scales.**

From these analyses we concluded that the six-factor solution provided the most empirically and conceptually satisfactory structure for the lower-order domain of Conscientiousness. This structure held up across rotation techniques and when we overextracted factors. Conceptually, according to the hierarchical analysis, moving from the five-factor solution to the six-factor solution means splitting the achievement factor into industriousness and order factors. The division of achievement into industriousness and order factors is further supported by studies that have shown that measures of order and achievement differentially predict important organizational outcomes (e.g., Moon, 2001).

The rotated pattern matrix for the six-factor model is presented in Table 3. The first factor, named *industriousness*, was defined by four scales from the NEO-PI (competence, achievement-striving, self discipline, and dutifulness) and by four scales from the AB5C (organization, purposefulness, efficiency, and rationality). Individuals with high scores on this factor would be described as hard working, ambitious, confident, and resourceful.

The second factor, named *order*, was defined by high loadings on three AB5C scales (orderliness, Conscientiousness, and perfectionism), the order scale from the NEO-PI, the organization scale from the JPI, and

TABLE 3
The Six-Factor EFA Solution for 36 Conscientiousness-Related Scales

Scale name	Factor					
	Industriousness	Order	Self-control	Responsibility	Traditionalism	Virtue
NEO competence	**.88**	−.28	.14	.10	−.01	−.09
NEO achievement striving	**.76**	.02	−.12	.10	.09	−.18
AB5C organization	**.75**	.11	.05	.11	−.10	−.17
AB5C purposefulness	**.67**	.18	−.04	−.02	−.11	.24
NEO self-discipline	**.65**	.22	−.11	−.03	−.02	.16
AB5C efficiency	**.63**	.36	−.19	−.03	−.07	.21
AB5C rationality	**.50**	.16	.12	−.28	.16	−.01
NEO dutifulness	**.49**	−.05	.14	−.02	.26	.09
AB5C dutifulness	.22	.12	.17	.17	.14	.11
AB5C orderliness	−.08	**.86**	.01	.03	.03	.03
NEO order	.12	**.78**	.02	−.01	−.05	−.09
16pf perfectionism	.02	**.72**	.08	−.03	.07	−.03
JPI organization	.16	**.62**	.09	.05	−.02	−.05
AB5C Conscientiousness	.35	**.61**	.01	.00	−.10	.08
AB5C perfectionism	.17	**.60**	.06	−.02	.09	−.37
HPI mastery	.16	.29	.02	−.01	.22	−.01

AB5C cautiousness	.09	.02	.75	–.07	–.04	.02
NEO deliberation	.37	–.23	.72	–.11	–.01	.06
MPQ self-control	.10	.16	.69	.01	–.05	–.03
HPI impulse control	–.25	.14	.63	.04	.01	.19
HPI not spontaneous	–.05	.05	.45	.10	–.06	–.08
MPQ harm avoidance	–.24	.18	.33	.15	.06	–.01
CPI responsibility	.09	–.02	–.05	.90	–.06	–.02
CPI achievement via conformance	.35	–.03	.04	.71	–.03	–.07
CPI socialization	.03	–.01	.10	.52	.11	.17
JPI respon	.00	–.04	–.09	.51	.38	.06
HPI avoids trouble	–.20	.11	.13	.40	–.04	.19
HPI not autonomous	–.18	.11	.09	.34	.05	–.27
MPQ traditionalism	.01	.01	–.04	–.08	.91	.04
JPI tradit	–.04	.00	–.04	.06	.85	.10
16PF rule consciousness	–.02	.12	.04	.22	.63	.03
CPI good impression	.03	–.06	–.01	.14	.04	.80
CPI self-control	–.21	–.01	.25	.12	–.03	.78
CPI well-being	.21	–.13	–.12	.33	–.17	.48
HPI moralistic	.09	.01	–.12	–.20	.33	.47
HPI virtuous	–.02	–.13	.03	–.03	.13	.44

Note. N = 734.

the perfectionism scale from the 16PF. All these scales emphasize the ability to plan and organize tasks and activities.

The third factor, *self-control*, was defined by the self-control scale of the MPQ, the cautiousness scale of the AB5C, the deliberation scale of the NEO-PI, and the impulse control scale of the HPI. Individuals with high scores on self-control tend to be cautious, levelheaded, able to delay gratification, and be patient. In contrast, individuals with low self-control scores tend to be impulsive, spontaneous, easily distracted, and careless.

The fourth factor, named *responsibility*, was defined primarily by the responsibility, achievement via conformance, and socialization scales from the CPI; the responsibility scale from the JPI; and the avoids trouble scale of the HPI. Individuals with high responsibility scores like to be of service to others, frequently contribute their time and money to community projects, and tend to be cooperative and dependable.

The fifth factor was named *traditionalism* because it was defined by the traditionalism scales of the MPQ and JPI, as well as by the rule-consciousness scale of the 16PF. People with high scores on traditionalism tend to comply with current rules, customs, norms, and expectations; they dislike changes and do not challenge authority.

The sixth lower-order Conscientiousness factor, *virtue*, represents a constellation of beliefs and behaviors associated with adherence to standards of honesty, morality, and "good Samaritan" behavior. The scales that defined this factor were the good impression, self-control and well-being scales from the CPI, and the virtuous and moralistic scales from the HPI. Ostensibly, individuals who score high on this dimension would have a tendency to act in accordance with accepted rules of good or moral behavior, and strive to be a moral exemplar.

A closer examination of Table 3 revealed that none of the inventories measured all six lower-order factors. For example, five of six NEO-PI scales and eight of nine AB5C scales loaded primarily on the industriousness and order facets. No scales from those two inventories loaded highly on the responsibility and virtue facets.

Phase 3: Convergent, Discriminant, and Criterion Related Validity of Conscientiousness Facets

Method

Procedure.   In the third phase of our study, we examined the convergent, discriminant, and criterion-related validities of the six facets. To examine convergent validity, the following approach was used. First, based on the results in Table 3, three scales that showed the highest loading on each facet were identified, and standardized scores for those scales were

summed to obtain a single score for that facet (standardized scores were used so that scales from different inventories were on the same metric).[2] For example, standardized scores for the AB5C orderliness scale, the NEO-PI order scale, and the 16PF perfectionism scale were added to obtain a single indicator score for each respondent on the order facet. Next, the facet correlation matrix was computed and subjected to the confirmatory factor analysis (CFA) using LISREL 8.53 (Jöreskog & Sörbom, 1993). For the CFA model, the six Conscientiousness indicators were constrained to load on a single higher-order factor (unweighted least squares estimation was implemented). Model data fit indices as well as the magnitudes of indicator loadings were then examined to determine if a single, higher-order factor can adequately describe the relationships between facets.

To examine discriminant validity, we computed product-moment correlations between the six Conscientiousness facet indicators and indicators for the other Big Five. Indicators for each of the remaining Big Five global factors were based on six scales each from the NEO-PI and AB5C (three scales per inventory). For example, standardized scores of the gregariousness, assertiveness, and activity scales from the NEO-PI and the standardized scores of the gregariousness, talkativeness, and assertiveness scales from AB5C were summed to form an Extraversion global factor indicator.

The magnitude of correlations between each Conscientiousness indicator and the four Big Five indicators was then compared to the correlation of that facet with the overall Conscientiousness composite (the composite was computed by summing standardized scores for all facets except the studied facet and is similar in spirit to "corrected item-total" correlation used in item analysis).

For the criterion validity evidence, the six Conscientiousness facet scores and the overall Conscientiousness composite score were correlated with various behavioral and health-related outcomes (described below). In addition, regression analyses were conducted against each criterion using the six facet scores as predictor variables to determine those facets that were the most important in predicting specific outcomes. In each analysis, the resulting coefficient of multiple correlation (R) was also compared to the one obtained when only the overall Conscientiousness composite score was used as the predictor.

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[2]Note that there are a number of alternatives to forming facet scores. For example, one can add standardized scores for all scales that load on the facet. Another way is to weight each scale by its loading before adding it to a composite facet score. Although all these methods are credible and may appear more sophisticated than a simple unit weighted composite of the three highest loading scales, they would only negligibly affect the convergent/discriminant validity results. This situation is similar to multiple regression selection situations where unit weighting of predictors works nearly as well as "optimal" weighting of predictors by their regression weights.

Criterion measures.   Four measures were used to evaluate the criterion-related validity of the Conscientiousness facets. Two of these measures were constructed from a list of responses to 400 behavioral acts assessed in the fall of 1997 (e.g., did not return a phone call, signed a petition, smoked marijuana), to each of which participants reported the frequency of that activity, using the following response options: 1 = never in my life; 2 = not in the past year; 3 = once or twice in the past year; 4 = three or more times in the past year, but not more than 15 times (such as once or twice a month); 5 = more than 15 times in the past year. Both criterion measures were constructed using classical test theory approaches to scale development (i.e., a sample of items belonging to a homogeneous domain was identified, item responses were analyzed with item and factor analyses, and the best items were retained to form each scale). The other two criterion measures were subscales from the Health Behavior Checklist (HBCL; Vickers, Conway, & Hervig, 1990; administered in the spring of 1995). Unlike the behavioral act list where respondents rated the frequency of each activity, the HBCL was an attitudinal measure where respondents rated each item on a 5-point scale from 1 = *very uncharacteristic of me* to 5 = *very characteristic of me*. Note that although all aforementioned criterion measures were self-reports, which inevitably raises concerns about social desirability, there was little reason to believe that participants deliberately distorted their responses in any way. Participation in the study was voluntary, for research purposes only, and carried no negative consequences. In addition, because participants were paid, random responding and other response distortions associated with a lack of motivation were likely to be minimized.

The first criterion, labeled "Drug Use," included 13 behaviors involving drinking alcohol, using drugs, or becoming intoxicated (e.g., Drunk alcohol during working hours). The internal consistency reliability for this behavioral cluster was .88. Drug use is an important criterion for many organizations because it not only negatively affects overall safety in the workplace but also results in loss of productivity and increased personnel costs (i.e., replacement cost, health bills, etc.). It was expected that scores on the virtue, traditionalism, and self-control facets would be most negatively associated with "Drug Use" scores, because individuals who adhere to moral and societal rules and/or can delay gratification are less likely to engage in an extensive drug use than those who are less concerned with rules of proper conduct and/or tend to act on the spur of the moment. On the other hand, scores on the industriousness and order facets were not expected to have a particularly high negative association with drug use; it is unlikely that more orderly or achievement-oriented individuals have considerably lower substance use levels than those who are less organized or driven to achieve their goals.

The second criterion, labeled work dedication, comprised four behaviors (e.g., thought about work in my free time, stayed away from a social event in order to finish some work). People scoring high on this cluster reported a high degree of involvement in work-related activities, often at the expense of nonwork engagements (i.e., leisure or family). From the perspective of job performance theories, work dedication can be considered as part of the conscientious–initiative dimension of contextual performance (Walter Borman, personal communication, May 15, 2004). Although some employers might not like to be seen as putting work before everything else, most organizations are probably quite interested in recruiting at least some proportion of employees for whom work is their primary concern. Thus, showing which personality variables can predict work dedication can have an important value for selection. We expected that industriousness facet would have positive correlation with "work dedication" because achievement-oriented people tend to be more focused and are willing to pull all stops to accomplish their goals as compared to less industrious individuals. On the other hand, other Conscientiousness facets were expected to have zero or even negative relationships with the "work dedication" criterion. For example, we hypothesized that individuals who are high on virtue or traditionalism would find the emphasis on work at the expense of other activities not very desirable because such individuals are likely to value one's contributions to family life or community.

The remaining two criterion measures were the preventative health and traffic risk subscales of the HBCL. The 16-item preventative health subscale included behavioral items, such as, "I exercise to stay healthy" and "I see a doctor for regular checkups"; the internal consistency reliability was .75. The traffic risk subscale consisted of 9 items (e.g., I speed while driving, I cross busy streets in the middle of the block), and had an internal consistency reliability of .80. These two criteria were selected because the occupational health and safety area is becoming increasingly important in I-O research and practice (Quick & Tetrick, 2003). Studies by Burke, Sarpy, Tesluk, and Smith-Crowe (2002) on safety performance modeling or by de Jonge, Reuvers, Houtman, Bongers, and Kompier (2000) on linking health behaviors to employee absenteeism are a few examples of burgeoning interest in this area. In addition, the "traffic risk" criterion may be relevant to personnel decisions on a number of jobs (truck driving, delivery, etc.). Therefore, this study could contribute to this growing literature by learning those Conscientiousness facets that have the strongest associations with preventative health and traffic risk behaviors. It was expected that respondents with high scores on the responsibility and order facets would exhibit more preventative behaviors than those with low scores on those facets. On the other hand, the self-control and traditionalism facet scores were expected to be most predictive of traffic risk scores because

exhibiting traffic risk behaviors is likely to be associated with impulsivity and disregard for societal rules.

Results

Table 4 presents the correlation matrix for six Conscientiousness facet indicators. It can be seen that all correlations are positive and ranged between .18 (order and virtue) and .61 (responsibility and virtue). The mean correlation between facets was .38, which suggested the presence of a relatively strong, higher-order factor. The fact that no correlation exceeded .61 was encouraging, because highly correlated facets would likely to be redundant. Instead, the six facets appeared to be occupying a relatively unique space in the overall Conscientiousness domain.

The results of the CFA analyses indicated that the single-factor model provided a reasonably good fit. Although the chi-square statistic was significant ($\chi^2 = 163.53$, $df = 9$), it is widely accepted that theoretically sensible models are often rejected by the chi-square test and other fit indices should be considered. For the single factor model, these indices showed adequate fit: the Goodness-of-Fit Index (GFI) was .97, Normed Fit Index (NFI) was .93, Comparative-Fit Index (CFI) was .94, and the Root Mean Square Residual (RMR) was .09. Note that fitting a two-factor CFA model with industriousness, order, self control, and traditionalism loading on the first factor, and responsibility and virtue loading on the second factor, had significantly improved fit ($\Delta\chi^2 = 110.25$, $\Delta df = 1$). This was consistent with the hierarchical structure found in Part 2 of this study (see Figure 1), in which we found proactive and inhibitive factors at the second level of analysis. However, the correlation between the proactive and inhibitive factors of Conscientiousness in the CFA was .62, which suggested the presence of a common underlying factor. Overall, we believe, that these results supported the convergent validity of the six empirically derived facets.

Discriminant validity results are presented in Table 5. The first four rows contain correlations between a particular Big Five factor indicator (sum of six standardized scores from NEO-PI and AB5C) and the respective Conscientiousness facet; these are essentially discriminant validities. To verify that the six facets were not actually facets of other traits, the first row of Table 5 also contained correlations between each facet and the overall composite computed as the sum of standardized facet scores except the studied facet.

It can be seen that the order, industriousness, and self-control facets demonstrated a relatively strong pattern of convergent and discriminant validity, being correlated most highly with the Conscientiousness composite and moderately with the remaining Big Five. In contrast, the virtue,

TABLE 4

Correlation Matrix for Six Facet Indicators of Conscientiousness

	Industriousness	Order	Self-control	Responsibility	Traditionalism	Virtue	Loadings on higher order factor
Industriousness	1.00						.66
Order	.51	1.00					.61
Self-control	.50	.52	1.00				.74
Responsibility	.40	.23	.41	1.00			.62
Traditionalism	.23	.44	.36	.28	1.00		.49
Virtue	.35	.18	.41	.61	.28	1.00	.59

Note. N = 401.

TABLE 5

Correlations of Conscientiousness Facet Composites with Big Five Factors

| | Conscientiousness facets | | | | | |
Big Five Composite	Industriousness	Order	Self-control	Responsibility	Traditionalism	Virtue
Conscientiousness	.57	.53	.64	.54	.44	.51
Agreeableness	.10	.14	.20	.37	.28	.54
Extraversion	.43	.10	−.13	.17	−.11	−.08
Emotional Stability	.44	.02	.20	.49	.05	.59
Openness	.18	−.18	−.18	.09	−.42	−.07

Note. N = 398. Conscientiousness Composite was computed by summing all Conscientiousness facet scores except the studied facet. Big Five Composites were unit weight composites of scales from the NEO-PI and AB5C.

responsibility, and traditionalism facets demonstrated less clear patterns of discriminant validity. All adequately correlated with the Conscientiousness, but in some instances, they also correlated strongly with one or more other Big Five factors. Traditionalism correlated highly with Openness to Experience ($-.42$). Responsibility correlated highly with Emotional Stability ($.49$). The high correlation is most likely due to the fact that responsibility was primarily defined by CPI scales, which tend to be more factorially complex, because they were derived by empirical techniques (see Gough & Bradley, 1996). Finally, virtue was correlated with Agreeableness and Emotional Stability in addition to Conscientiousness. This finding is consistent with the argument that virtue, which is often interpreted as integrity, is a complex construct related to all three of these domains (Ones & Viswesvaran, 2001).

Table 6 shows the relations of the six Conscientiousness facets and an overall Conscientiousness composite with the four criterion measures based on both the results of the raw correlations and the multiple regression results. The first thing to note is the range of correlations both across different facets and within facets across criteria. It is clear that the facets are themselves not interchangeable when predicting a wide variety of criteria theoretically related to the domain of Conscientiousness. Consistent with our expectations, we found the industriousness facet had a positive correlation with work dedication ($r = .10$), and the traditionalism had negative correlation and virtue had near-zero correlation. Importantly, the combination of positive and negative predictive correlates resulted in the overall Conscientiousness composite performing considerably worse in predicting work dedication than the six facet measures ($R_0 = .00$ as compared to $R_1 = .23$). These results clearly show that the lower-order facets had *differential* relationships with criteria, and thus improved criterion-related validity over the use of a broad measure of Conscientiousness.

For the remaining three criteria, the six Conscientiousness facets showed less differential prediction from the overall Conscientiousness composite. Nonetheless, in each case, the use of the six separate facets improved validity over the composite measure of Conscientiousness. In addition, there were large differences in the magnitudes of correlations across various facets and criteria, indicating that using measures of Conscientiousness that emphasize specific aspects of the construct may hinder or enhance efforts to demonstrate the criterion-related validity of Conscientiousness. For example, the traditionalism facet had a $-.44$ correlation with drug use, and the industriousness facet correlated $-.10$ with the same criterion. Similarly, the responsibility facet predicted preventative health behaviors at a much higher level ($.22$) than the traditionalism facet

TABLE 6

Criterion Correlations and Coefficients of Multiple Correlation for Six Conscientiousness Facets and an Overall Conscientiousness Composite

Criterion measures	Conscientiousness measures							R_1	R_0
	Industriousness	Order	Self-control	Responsibility	Traditionalism	Virtue	Overall		
Drug Use	−.10	−.18*	−.29*	−.24*	**−.44***	−.23*	−.37*	.46	.37
Work Dedication	**.10**	**−.12**	**.10**	.01	−.12	.02	.00	.23	.00
Preventative Health Behaviors	.13	**.17***	.04	**.22***	−.02	.12	.16*	.26	.15
Traffic Risk	−.24	−.30*	**−.46***	**−.33***	**−.36***	−.29*	−.50*	.51	.49

Note. $N = 197$. R_1 = adjusted multiple correlation of six Conscientiousness facets with criterion; R_0 = adjusted multiple correlation of overall Conscientiousness composite with criterion. Bold correlations signify relationships that were statistically significant ($p < .05$) when all facets were entered simultaneously as predictors in a multiple regression.
*Correlation is significant at the 0.05 level (2-tailed).

(−.02). Finally, traditionalism (−.36) and self-control (−.46) were the best predictors of traffic risk, whereas industriousness was related at a much lower level (−.24).

Discussion

In this study, we examined the factor structure of scales that measure the Big Five trait of Conscientiousness. Factor analysis of scales drawn from seven different personality inventories, all developed using different theoretical and empirical approaches to scale construction, resulted in a six-factor solution: order, virtue, traditionalism, self-control, responsibility, and industriousness. These six lower-order factors (i.e., facets) formed a single higher-order latent factor of Conscientiousness, showed good convergent validity (high correlations with the global Conscientiousness factor), and, in most cases, demonstrated adequate discriminant validity (low correlations with the other Big Five). In addition, the lower-order facets were differentially related to criteria and in several cases accounted for a larger portion of criterion variance than a broad Conscientiousness measure.

When compared to previous conceptualizations of Conscientiousness found in personality inventories, the factor structure discovered here is more comprehensive. None of the personality inventories used here had scales that loaded on more than three Conscientiousness facets.[3] This indicates that no existing personality test provides systematic coverage of the total domain of Conscientiousness. Even if we limit the analysis to the dimensions of order, traditionalism, and self-control, which make up the core dimensions according to our test of convergent and discriminant validity, no single inventory provides markers of these three dimensions. Actually, each inventory emphasizes certain aspects of Conscientiousness. The AB5C and NEO appear to be most similar and to both emphasize the assessment of order and industriousness. The CPI and HPI emphasize virtue and responsibility. The MPQ and the JPI focus more on the dimensions of traditionalism and self-control.

The lower-order factor structure of Conscientiousness we derived, using data from seven personality inventories, has common elements with structures derived by conceptual and lexical research. For example, Hough

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[3]A reviewer of this paper noted that MPQ Achievement scale needed to be included in our analyses (it was not part of Tellegen's view of the constraint factor and, thus, was originally omitted). We have conducted an EFA analysis, which included the MPQ achievement, and found that the inclusion did not affect our results. As expected, the scale had a high loading on the industriousness facet (.63) and near-zero loadings on other facets. Note, however, that the inclusion of achievement would make MPQ to load on three Conscientiousness facets: self-control, traditionalism, and industriousness.

and Ones's (2001) conceptual review identified five narrow factors that corresponded to our order, virtue, self-control, responsibility, and industriousness facets. Also consistent with Hough and One's conceptual model, we discovered a dimension of traditionality that was, as predicted, strongly related to both Conscientiousness and Openness to Experience. In addition, our structure also was quite similar to previous lexical research (e.g., Roberts et al., 2004; Saucier & Ostendorf, 1999) in that we identified facets associated with orderliness (our order), reliability (responsibility), industriousness (industriousness), recklessness (self-control), and traditionality (traditionality).

Our structure departs, however, from previous research in two ways. First, lexical research identified a decisiveness factor and Hough and Ones (2001) identified a persistence factor, neither of which emerged in our analysis. There are two possible explanations for this discrepancy. Either our inventories represented a biased sample of Conscientiousness-related scales, in that they did not measure these two dimensions, or decisiveness and persistence were subsumed by facets, such as industriousness or order. The discrepancies between these taxonomies suggest that more research is needed to reconcile these differences before arriving at a final model.

The evidence for convergent and discriminant validity of the six facets both replicated and extended previous research on the lower-order domain of Conscientiousness. For the most part, the facets of Conscientiousness demonstrated excellent convergent validity. Moreover, the evidence for discriminant validity, where problematic, actually replicated previous research. For example, in existing measurement models of Conscientiousness, such as the NEO, Conscientiousness is often positively related to Agreeableness and Emotional Stability (see Digman, 1997). In the present study, facets such as responsibility and virtue were strongly correlated with Emotional Stability in addition to Agreeableness. It may be that the inclusion of these facets in global measures of Conscientiousness leads to the higher correlations with Agreeableness and Emotional Stability. The correlation between traditionalism and Openness to Experience is also similar to recent lexical research on Conscientiousness (Roberts et al., 2004), although in that study the correlation was not as high. Until further research is carried out or measures of these lower-order facets are developed, these dimensions may be best considered "transition" dimensions, or more appropriately, "interstitial" dimensions that lie directly between Conscientiousness and one or more of the remaining Big Five (see Hofstee et al., 1992). In addition, within a program dedicated to developing new measures of each of these Conscientiousness facets, researchers may be able to diminish the amount of overlap of these facets with the remaining Big Five domains.

Unlike previous taxonometric research, this is the first study to include tests of criterion-related validity on the lower-order domain of Conscientiousness. Although not all of the outcomes were related to job performance (with the exception of work dedication), they were still of interest to organizations, as substance abuse, and health practices affect job-related outcomes such as contextual performance, job satisfaction, workplace safety, and health care costs (Adams, King, & King, 1996; Galaif, Newcomb, & Carmona, 2001; Motowidlo, Borman, & Schmit, 1997; Stein, Karel, & Zuidema, 1999). Interestingly, the six facet dimensions demonstrated quite varied patterns of predictive validity across the four criteria. First, for each outcome it was clear that there were one or two facets of Conscientiousness that constituted the best predictors. For example, traditionalism and self-control were the strongest, negative predictors of drug consumption and traffic risk. In one case, we even discovered reversals, in which one aspect of Conscientiousness was positively related to the outcome and another negatively. For example, industriousness was positively related whereas traditionalism was negatively related to work dedication. This result was important because it supported previous studies reporting differential validity of Conscientiousness facets, such as Moon (2001) and Stewart (1999). As a result, in nearly all cases, individual facets were better predictors of the criteria than the overall Conscientiousness composite.

Limitations, Implications, and Conclusions

Despite the fact that this is one of the most thorough studies of the domain of Conscientiousness to date, the study has several clear limitations that should be considered when generalizing from our findings. First, despite including more personality inventories than ever examined before in one study, not all inventories in existence were assessed. Including more clinically oriented scales or scales just now being developed may provide a more refined understanding of the lower-order structure of Conscientiousness. Second, the factor structure and criterion-related validity results were based entirely on self-reports, and thus in some cases, socially desirable responding may have influenced the factor structure and patterns of correlations with external criteria. In the case of the factor structure, we believe that social desirability is not an issue, as similar factor structures have been found using self-report and observer ratings of trait adjectives (e.g., Roberts et al., 2004). As for the external correlates, given the volunteer nature of the sample and the fact that many outcomes, such as drug consumption, are more accurately assessed via self-report (Krueger et al., 1994), we believe the results are most likely robust. Nonetheless, future research should attempt to identify similar facets and correlates in alternative methods, such as observer ratings or test data, and in different samples,

such as job applicants. In this study, predictor and criterion data came from the same source (self), which could potentially lead to common method variance and, thus, somewhat inflated criterion validities. Third, it would have been preferable to have included multidimensional job performance criteria in the study to evaluate the differential validity of the six Conscientiousness facets. Fortunately, a growing number of studies investigating relationships between Conscientiousness facets and various organizational outcomes can overcome this limitation and address more systematically criterion validity questions.

Our results, though unique to our set of measures, do point to several implications and future directions. The developing structure of the domain of Conscientiousness is highly relevant to applied settings and issues. A more differentiated model of Conscientiousness can help to inform research, such as Moon's (2001) showing that the achievement facet, or what we would describe as industriousness, is more important for performance outcomes than dutifulness, or what we would describe as responsibility. Thus, with a sufficient working taxonomy, we may develop more precise knowledge about how each facet of Conscientiousness affects important work outcomes and how these results might even change across different occupations. So, for example, industriousness may be much more important in managerial or research-and-development occupations, whereas responsibility may be more important for customer service jobs. With accumulating knowledge about the lower-order structure and its correlates, practitioners may begin to base judgments, such as selection decisions, on specific facets depending on the type of job for which they are selecting. Although measures of global factors are shorter and more convenient than measures of specific facets, results of our study (and a number of others) clearly indicate that employers who desire better predictive validity should focus on facets. Moreover, due to moderate sizes of intercorrelations between facets, practitioners should be cautious in interpreting what the average global conscientious scores really mean. A number of widely different personality profiles can be observed for the same average global factor score.

In conclusion, this study moves us closer to a lower-order taxonomy of Conscientiousness that we believe is critical for understanding predictor-criterion links in I-O psychology, as advocated by Hough and Oswald (2000) and others. For example, our results can be used to refine meta-analytic categorizations of personality measures in an effort to determine those aspects of Conscientiousness that are most related to outcomes such as task and contextual performance. Because the six facets of Conscientiousness were found to be sufficiently heterogeneous, their relationships with I-O related criterion variables may be quite different, and, in turn, provide incremental validity beyond the general factor of Conscientiousness.

REFERENCES

Adams GA, King LA, King DW. (1996). Relationships of job and family involvement, family social support, and work-family conflict with job and life satisfaction. *Journal of Applied Psychology, 81*, 411–420.

Ashton MC. (1998). Personality and job performance: The importance of narrow traits. *Journal of Organizational Behavior, 19*, 289–303.

Barrick MR, Mount MK. (1991). The Big Five personality dimensions and job performance: A meta-analysis. Personnel Psychology, *44*, 1–26.

Booth-Kewley S, Vickers RR, Jr. (1994). Associations between major domains of personality and health behavior. *Journal of Personality, 62*, 281–298.

Browne MW, Cudeck R. (1993). Alternative ways of assessing model fit. In Bollen KA, Long JS (Eds.), *Testing structural equation models* (pp. 136–162). Newbury Park, CA: Sage.

Burke MJ, Sarpy SA, Tesluk PE, Smith-Crowe K. (2002). General safety performance: A test of a grounded theoretical model. Personnel Psychology, *55*, 429–457.

Cattell RB. (1945). The description of personality: Principles and findings in a factor analysis. *American Journal of Psychology, 58*, 69–90.

Cattell RB. (1965). *The scientific analysis of personality*. Baltimore, MD: Penguin.

Chernyshenko OS, Stark S, Chan K. (2001). Investigating the hierarchical factor structure of the fifth edition of the 16PF: An application of the Schmid-Leiman orthogonalization procedure. *Educational and Psychological Measurement, 61*, 290–302.

Conn S, Reike ML. (Eds.). (1994). *The 16PF fifth edition technical manual*. Champaign, IL: Institute for Personality and Ability Testing.

Costa PT, Jr, McCrae RR. (1992). Four ways five factors are basic. *Personality and Individual Differences, 13*, 861–865.

Costa PT, Jr, McCrae RR. (1994). *Revised NEO Personality Inventory (NEO-PI-R) and NEO-Five-Factor Inventory (NEO-FFI) Professional Manual*. Odessa, FL: Psychological Assessment Resources.

Costa PT, McCrae RR. (1998). Six approaches to the explication of facet-level traits: Examples from Conscientiousness. *European Journal of Personality, 12*, 117–134.

Costa PT, Jr, McCrae RR, Dye DA. (1991). Facet scales for Agreeableness and Conscientiousness: A revision of the NEO Personality Inventory. *Personality and Individual Differences, 12*, 887–898.

de Jonge J, Reuvers MEN, Houtman ID, Bongers PM, Kompier MAJ. (2000). Linear and nonlinear relations between psychosocial job characteristics, subjective outcomes, and sickness absence: Baseline results from SMASH. *Journal of Occupational Health Psychology, 5*, 256–268.

Digman JM. (1997). Higher-order factors of the Big Five. *Journal of Personality & Social Psychology, 73*, 1246–1256.

Dudley NM, Orvis KA, Lebiecki JE. (2003, April). *A meta-analytic investigation of Conscientiousness in the prediction of job performance: Examining the intercorrelations and the incremental validity of narrow traits*. Paper presented at the 18th Annual Conference of the Society for Industrial-Organizational Psychology, Orlando, FL.

Fabrigar LR, Wegener DT, MacCallum RC, Strahan EJ. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods, 4*, 272–299.

Finch JF, West SG. (1997). The investigation of personality structure: Statistical models. *Journal of Research in Personality, 31*, 439–485.

Friedman HS, Tucker JS, Tomlinson-Keasey C, Schwartz JE, Wingard DL, Criqui MH. (1993). Does childhood personality predict longevity. *Journal of Personality and Social Psychology, 65*, 176–185.

Galaif ER, Newcomb MD, Carmona JV. (2001). Prospective relationships between drug problems and work adjustment in a community sample of adults. *Journal of Applied Psychology, 86*, 337–350.

Goldberg LR. (1993). The structure of phenotypic personality traits. *American Psychologist, 48*, 26–34.

Goldberg LR. (1999a). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In Mervielde I, Deary I, De Fruyt F, Ostendorf F (Eds.), *Personality psychology in Europe,* Vol. 7 (pp. 7–28). The Netherlands: Tilburg Free Press.

Goldberg LR. (1999b). *International Personality Item Pool: A scientific collaboratory for the development of advanced measures of personality and other individual differences*. [On-line]. Available HTTP: http//ipip.ori.org/html.

Goldberg LR. (1999c). The Curious Experiences Survey, a revised version of the Dissociative Experiences Scale: Factor structure, reliability, and relations to demographic and personality variables. *Psychological Assessment, 11*, 134–145.

Goldberg LR, Somer O. (2000). The hierarchical structure of common Turkish person-descriptive adjectives. *European Journal of Personality, 14*, 497–531.

Goldberg LR, Strycker LA. (2002). Personality traits and eating habits: The assessment of food preferences in a large community sample. *Personality & Individual Differences, 32*, 49–65.

Gorsuch RL. (1980). Factor score reliabilities and domain variables. *Educational and Psychological Measurement, 40*, 895–897.

Gough HG. (1957). *Manual for the California Psychological Inventory*. Palo Alto, CA: Consulting Psychologists Press.

Gough HG. (1987). *The California Psychological Inventory administrators guide*. Palo Alto, CA: Consulting Psychologists Press.

Gough HG, Bradley P. (1996). *CPI Manual* (3rd Edition). Palo Alto, CA: Consulting Psychologists Press.

Guttman L. (1954). Some necessary conditions for common-factor analysis. *Psychometrika, 19*, 149–161.

Hofstee WK, De Raad B, Goldberg LR. (1992). Integration of the Big Five and circumplex approaches to trait structure. *Journal of Personality and Social Psychology, 63*, 146–163.

Hogan R, Hogan J. (1992). *Hogan Personality Inventory manual*. Tulsa, OK: Hogan Assessment Systems.

Hogan RT, Roberts BW. (2000). A socioanalytic perspective on person/environment interaction. In Walsh WB, Craik KH, Price RH (Eds.), *New directions in person-environment psychology* (pp. 1–24). Mahwah, NJ: Earlbaum.

Hogan J, Rybicki SL, Motowidlo SJ, Borman WC. (1998). Relations between contextual performance, personality, and occupational advancement. *Human Performance, 11*, 189–207.

Horn JL. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika, 30*, 179–185.

Horn JL. (1969). On the internal consistency reliability of factors. *Multivariate Behavioral Research, 4*, 115–125.

Hough LM. (1992). The "Big Five" personality variables–construct confusion: Description versus prediction. *Human Performance, 5*, 139–155.

Hough LM, Eaton NK, Dunnette MD, Kamp JD, McCloy RA. (1990). Criterion related validities of personality constructs and the effect of response distortion on those validities. *Journal of Applied Psychology, 75*, 581–595.

Hough LM, Furnham A. (2003). Importance and use of personality variables in work settings. In Weiner IB (Ed.-in-Chief), Borman W, Ilgen D, Klimoski R (Eds.), *Handbook of Psychology: Vol. 12. Industrial and Organizational Psychology* (pp. 131–169). New York: Wiley.

Hough LM, Ones DS. (2001). The structure, measurement, validity, and use of personality variables in industrial work, and organizational psychology. In Anderson N, Ones DS, Sinangil HK, Viswesvaran C (Eds.), *Handbook of industrial, work and organizational psychology* (Vol. 1, pp. 233–277). Sage.

Hough LM, Oswald FL. (2000). Personnel selection: Looking toward the future—remembering the past. *Annual Review of Psychology, 51*, 631–664.

Hough LM, Schneider RJ. (1996). Personality traits, taxonomies, and applications in organizations. In Murphy K (Ed.), *Individual differences and behavior in organizations* (pp. 31–88). San Francisco: Jossey-Bass.

Humphreys LG, Montanelli RG. (1975). An investigation of the parallel analysis criterion for determining the number of common factors. *Multivariate Behavioral Research, 10*, 193–205.

Jackson DN. (1994). *Jackson personality inventory—Revised manual*. Port Huron, MI: Sigma Assessment Systems, Inc.

Johnson JA, Ostendorf F. (1993). Clarification of the five-factor model with the abridged Big Five dimensional circumplex. *Journal of Personality and Social Psychology, 65*, 563–576.

Jöreskog KG, Sörbom D. (1993). *New features in LISREL 8*. Chicago: Scientific Software.

Judge TA, Higgins CA, Thoresen CJ, Barrick MR. (1999). The Big Five personaltiy traits, general mental ability, and career success across the life span. PERSONNEL PSYCHOLOGY, *52*, 621–652.

Kaiser HF. (1960). The application of electronic computers to factor analysis. *Educational and Psychological Measurement, 20*, 141–151.

Kelly E, Conley J. (1987). Personality and compatibility: A prospective analysis of marital stability and marital satisfaction. *Journal of Personality and Social Psychology, 52*, 27–40.

Krueger RF, Schmutte PS, Caspi A, Moffitt TE, Campbell K, Silva PA. (1994). Personality traits are linked to crime among men and women: Evidence from a birth cohort. *Journal of Abnormal Psychology, 103*, 328–338.

Ladd D, Henry RA. (2000). Helping coworkers and helping the organization: The role of support perceptions, exchange ideology, and Conscientiousness. *Journal of Applied Social Psychology, 30*, 2028–2049.

LePine JA, Colquitt JA, Erez A. (2000). Adaptability to changing task contexts: Effects of general cognitive ability, Conscientiousness, and Openness to Experience. PERSONNEL PSYCHOLOGY, *53*, 563–593.

McCrae RR, John OP. (1992). An introduction to the five-factor model and its applications. *Journal of Personality, 60*, 175–215.

McNeely BL, Meglino BM. (1994). The role of dispositional and situational antecedents in prosocial organizational behavior: An examination of the intended beneficiaries of prosocial behavior. *Journal of Applied Psychology, 79*, 836–844.

Mershon B, Gorsuch RL. (1988). Number of factors in personality sphere: Does increase in factors increase predictability of real life criteria? *Journal of Personality and Social Psychology, 55*, 675–680.

Moon H. (2001). The two faces of Conscientiousness: Duty and achievement striving in escalation of commitment dilemmas. *Journal of Applied Psychology, 86*, 535–540.

Motowidlo SJ, Borman WC, Schmit MJ. (1997). A theory of individual differences in task and contextual performance. *Human Performance, 10*, 71–83.

Mount MK, Barrick MR. (1995). The Big Five personality dimensions: Implications for research and practice in human resources management. *Research in Personnel and Human Resources Management, 13*, 153–200.

Ones DS, Viswesvaran C. (2001). Personality at work: Criterion-focused occupational personality scales used in personnel selection. In Roberts BW, Hogan RT (Eds.), *Personality psychology in the workplace* (pp. 63–92). Washington, DC: APA.

Ones DS, Viswesvaran C, Schmidt FL. (1993). Comprehensive meta-analysis of integrity test validities: Findings and implications for personnel selection and theories of job performance. *Journal of Applied Psychology, 78*, 679–703.

Organ DW. (1994). Personality and organizational citizenship behavior. *Journal of Management, 20*, 465–478.

Organ DW, Ryan K. (1995). A meta-analytic review of attitudinal and dispositional predictors of organizational citizenship behavior. PERSONNEL PSYCHOLOGY, *48*, 775–802.

Ostendorf F. (1990). *Sprache und persönlichkeitsstruktur: Zur validität des fünf-faktoren-modells der persönlichkeit* [Language and personality structure: Toward the validation of the five-factor model of personality]. Regensberg, Germany: S. Roderer Verlag.

Paunonen SV. (1998). Hierarchical organization of personality and prediction of behavior. *Journal of Personality and Social Psychology, 74*, 538–556.

Paunonen SV, Ashton MC. (2001). Big Five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology, 81*, 524–539.

Paunonen SV, Jackson DN. (2000). What is beyond the Big Five? Plenty! *Journal of Personality, 68*, 821–835.

Peabody D, De Raad B. (2002). The substantive nature of psycholexical personality factors: A comparison across languages. *Journal of Personality and Social Psychology, 83*, 983–997.

Perugini M, Gallucci M. (1997). A hierarchical faceted model of the Big Five. *European Journal of Personality, 11*, 279–301.

Quick J, Tetrick LE. (2003). *Handbook of occupational and health psychology*. Washington, DC: American Psychological Association.

Roberts BW, Bogg T. (2004). A 30-year longitudinal study of the relationships between Conscientiousness-related traits, and the family structure and health-behavior factors that affect health. *Journal of Personality, 72*, 324–354.

Roberts BW, Bogg T, Walton K, Chernyshenko OS, Stark S. (2004). A lexical investigation of the lower-order structure of Conscientiousness. *Journal of Research in Personality, 38*, 164–178.

Saucier G. (1997). Effect of variable selection on the factor structure of person descriptors. *Journal of Personality and Social Psychology, 73*, 1296–1312.

Saucier G. (2002). Orthogonal markers for orthogonal factors: The case of the Big Five. *Journal of Research in Personality, 36*, 1–31.

Saucier G, Goldberg LR. (1998). What is beyond the Big Five? *Journal of Personality, 66*, 495–524.

Saucier G, Ostendorf F. (1999). Hierarchical subcomponents of the Big Five personality factors: A cross-language replication. *Journal of Personality and Social Psychology, 76*, 613–627.

Steiger JH, Lind JM. (1980, June). *Statistically based tests for the number of common factors*. Paper presented at the annual meeting of the Psychometric Society, Iowa City, IA.

Stein AD, Karel T, Zuidema R. (1999). Carrots and sticks: Impact of an incentive/disincentive employee flexible credit benefit plan on health status and medical costs. *American Journal of Health Promotion, 13*, 260–267.

Stewart GL. (1999). Trait bandwidth and stages of job performance: Assessing differential effects for Conscientiousness and its subtraits. *Journal of Applied Psychology, 84*, 959–968.

Tellegen A. (1982). *A brief manual for the multidimensional personality questionnaire*. Unpublished manuscript, University of Minnesota.

Tellegen A, Waller NG. (in press). Exploring personality through test construction: Development of the Multidimensional Personality Questionnaire. In Briggs SR, Cheek JM (Eds.), *Personality measures: Development and evaluation* (*Vol. 1*). Greenwich, CT: JAI Press.

Tett RP, Jackson DN, Rothstein M. (1991). Personality measures as predictors of job performance: A meta-analytic review. PERSONNEL PSYCHOLOGY, *44*, 703–742.

Tross SA, Harper JP, Osher LW, Kneidinger LM. (2000). Not just the usual cast of characteristics: Using personality to predict college performance and retention. *Journal of College Student Development, 41*, 323–334.

Tucker JS, Kressin NR, Spiro A, Ruscio J. (1998). Intrapersonal characteristics and the timing of divorce: A prospective investigation. *Journal of Social and Personal Relationships, 15*, 211–225.

Vickers RR, Jr, Conway TL, Hervig LK. (1990). Demonstration of replicable dimensions of health behaviors. *Preventive Medicine, 19*, 377–401.

Wood JM, Tataryn DJ, Gorsuch RL. (1996). Effects of under- and overextraction on principal axis factor analysis with varimax rotation. *Psychological Methods, 4*, 354–365.