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I am submitting herewith a dissertation written by Susan D. Ridgell entitled "Predicting Academic Success: A Re-Examination of Broad Versus Narrow Personality Traits." I have examined the final electronic copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Psychology.

John W. Lounsbury
Major Professor

We have read this dissertation
and recommend its acceptance:

Eric Sundstrom

Richard Saudargas

Steve McCallum

Accepted for the Council:

Anne Mayhew
Vice Provost and
Dean of Graduate Studies

(Original signatures are on file with official student records.)

PREDICTING ACADEMIC SUCCESS: A RE-EXAMINATION OF BROAD VERSUS NARROW PERSONALITY TRAITS

A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville

Susan D. Ridgell
December 2003

ABSTRACT

Personality and cognitive variables were examined to determine relative validity in predicting academic performance. This study investigated whether broad personality variables (in this case, the Big Five: Extraversion, Agreeableness, Conscientiousness, Emotional Stability, and Openness to Experience) predicted academic success better than narrow personality variables (the construct Work Drive); it also explored the utility of operationalizing academic performance via cumulative grade point average (GPA) versus a single course grade. The highest significant correlates of GPA and course grade were Work Drive (r=.42, p<.01; r=.29, p<.01) and general intelligence, the cognitive variable (r=.40, p<.01; r=.35, p<.01). Regression analysis revealed that Work Drive was the stronger predictor of GPA (17.9% unique variance as step 1, compared to general intelligence's 15.7% unique variance as step 1); while general intelligence was found to be the stronger predictor of course grade (11.8% unique variance as step 1, compared to Work Drive's 8.6% unique variance as step 1). Two Big Five variables, Conscientiousness and Emotional Stability, correlated significantly with GPA (r=.15, p<.05; and r=.14, p<.05; respectively). Therefore, this study found that the narrow personality trait predicted better than the broader traits. Conflicting evidence was provided concerning whether GPA and course grade might be used interchangeably as valid criteria.

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CHAPTER I

INTRODUCTION AND REVIEW OF THE LITERATURE

Background

Although the study of personality, within several sub-fields of psychology, has waxed and waned throughout the twentieth century, current interest has never been keener. Developed from psychopathological origins, personality as an area of research first gained prominence in the early 1900's within models proposed by Freud, Jung, Adler, and Horney. Thus, personality's theoretical underpinnings include an approach that is almost entirely based on identifying each individual's neuroses and his or her struggle to overcome these neuroses (Hogan & Roberts, 2001). Allport's and Stagner's textbooks (1937), although a minority voice, presented a different approach: personality could be considered a part of everyday life, de-coupled from analysis of the abnormal. While psychopathology's influence on personality remained strong, Allport's and Stagner's empirical and pragmatic view was very influential in establishing personality psychology as a discipline.

During the mid-twentieth century years, the focus on personality was primarily one of identification and measurement. What are the personality features of interest, those stable and enduring aspects within an individual across time and situations; and how are they best measured? This era, roughly from the late 1930's through early 1960's, produced a large number of approaches toward personality assessment. Researchers developed varying models, each containing varying numbers of personality

dimensions and features to be measured. A common theme, however, was the use of factor analysis as a statistical method to identify personality dimensions. A pioneer in personality research, Cattell had, as early as 1943, developed what some have termed a "complex system" with a minimum of 16 primary factors and 8 sub-factors (Cattell, 1943; Cattell et al., 1970). Eysenck (1947) developed a two-factor model (Extraversion and Neuroticism), setting the stage with "The Big Two" (later followed by "The Big Five") and introducing the use of initials to denote each factor: E for Extraversion and N for Neuroticism. Eysenck later added a third factor, Psychoticism, or P (Eysenck, 1970), reflecting personality's continuing tie, in part, to psychopathology. Leary (1957) also proposed a two-factor personality model (based in part on the work of Horney and consequently including echoes of psychopathology), organized in a circular pattern around two main axes, Love-Hate and Power.

By the 1960's, many researchers had studied and proposed a wide variety of approaches to the understanding of personality; the models cited in the preceding discussion represent only a small sampling of the more prominent theories. The study of personality was on the rise, but several forces converged to stem the tide. Hogan and Roberts (2001) concluded that there were three major reasons why the study of personality psychology experienced a decline during the 1960's and 1970's: lack of consensus regarding (1) conceptual underpinnings; (2) the purpose for personality assessment; and (3) the content of assessment (i.e., *what* to measure). These are concerns of a fundamental nature. Also, an important debate in other sub-fields of psychology was gathering momentum at this time, and it contributed greatly to the reduced emphasis on personality research: the persuasiveness of *situation* within the person-situation debate.

Sparked by Hartshorne and May's (1928) study, this debate reached its zenith within the social reforms of the 1960's and 1970's. The debate centers on the age-old nature-nurture controversy: which factor more significantly impacts one's behavior – innate traits or the situation within which one finds oneself? Social psychologists and behaviorists such as Mischel (1968) and Peterson (1965) argued that environmental elements are far more influential, to the point that personality is essentially irrelevant. Furthermore, Mischel (1968) concluded that validity coefficients for personality measures were not significant. Personality research stalled during this period.

Why is the study of personality receiving increased emphasis? Hogan and Roberts (2001) contend that around 1990, the field of industrial and organizational (I/O) psychology rediscovered personality. Importantly, I/O psychologists began to understand and demonstrate the usefulness of personality measures for selection (initial employment hiring decisions and promotions). I/O psychologists found personality assessments to be essentially discrimination-free, resulting in far less adverse impact than traditional cognitive tests on protected classes of job seekers. In addition, the Five-Factor Model ("The Big Five") finally emerged as a unifying personality theory around which many noted personality and I/O researchers rallied. Although The Big Five had appeared several decades earlier (Tupes & Christal, 1961), the late 1980's saw a resurgence of interest and acceptance (McCrae & Costa, 1987; Borkenau & Ostendorf, 1990; Brand & Egan, 1989; Costa & McCrae, 1988; Digman, 1985; McCrae, 1989; John, 1989). Three major works, however, broadened support for personality (and The Big Five): Digman (1990), whose review of the Big Five literature concluded that it is, indeed, a unifying theory for personality; and Barrick and Mount's (1991) and Tett, Jackson, and

Rothstein's (1991) meta-analyses, both of which showed validity in Big Five personality factors in applied I/O settings.

In addition, perhaps personality's rise has been supported by the tentative resolution of the person-situation debate. Carson (1989) concluded that the debate may be over, and the situationists have not prevailed after all. Kendrick and Funder (1988) examined hypotheses advanced by situationists (to account for any consistency that had been reported) and found that none of them (e.g., attribution, semantic illusions, stereotypes) held up under rigorous scrutiny. A related contributing factor is the large amount of technological advancement experienced in the physiological sciences, especially during the past 15 years, lending more weight toward biological bases for behavior (Weiten, 1995). This supports the nature position within the nature versus nurture debate (reinforcement of nature generally supports personality, or the person, when considering the person-situation question).

Further evidence of the revival of the role of personality in psychology is the recent American Psychological Association's (APA) information exchange between personality psychologists and I/O psychologists. The 1999 conference Applied Personality Psychology: The Intersection of Personality and I/O Psychology at the University of Tulsa was held to bring these two formerly separate sub-fields together that both might profit from advances made in their respective fields. Subsequently, within the APA's Science Directorate program, the book Personality Psychology in the Workplace (2001) was published, and it contains a number of scientific articles authored by researchers in both personality and I/O sub-fields. The book's preface (page xiv) suggests that the potential for continued and ongoing dialogue between the two fields is

excellent. With the current high level of interest and collaboration among those involved in these areas, it is likely that significant advances will continue in personality research.

We turn next to investigation of the Big Five personality model, as introduced in the preceding discussion. To explore personality's current status and future directions, no study would be complete without an understanding of the Big Five.

The Big Five Personality Model

This section begins with a description of the traits that comprise the Big Five personality model, followed by a discussion of whether the Big Five might be considered a unifying, overarching and comprehensive theory of personality. The concluding section will deal with the Big Five's predictive value in I/O and educational psychology.

Known both as the "Five-Factor Model" (FFM) and the "Big Five," personality traits within this standard are generally identified as Extraversion (E) or Surgency, Agreeableness (A), Conscientiousness (C), Emotional Stability, or ES (formerly referred to as Neuroticism), and Openness to Experience (O) or Intellect (Digman, 1997). Two studies published during the early 1960's are usually credited with developing the beginnings of the Big Five: (1) Tupes and Christal's (1961) American Air Force applied research, and (2) Norman's (1963) derivation of Cattell's natural language trait term reductions. (Incidentally, Goldberg [1981] may have been the first to use the expression "Big Five" to describe the five-factor model.) However, to continue tracing the Big Five's historical roots, Barrick and Mount (1991) report that systematic efforts to develop and organize the taxonomy of personality actually 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 …" That a gap of several decades exists between Tupes and Christal's (1961) work and the commonly-held emergence and acceptance time-frame of the early 1990's is due in large part to the dynamics discussed in the Background portion of this paper.

Today's Big Five descriptive trait names have evolved; while they were not always known by these exact terms, the meanings attached within each of the five dimensions have been compatible and very largely overlapping. McCrae and John (1992) noted that Norman's (1963) assignment of factor numbers (I through V) is logical and nonrandom, and the same arrangement remains today: I for Extraversion or Surgency; II for Agreeableness; III for Conscientiousness; IV for Emotional Stability; and V for Culture (Norman's [1963] Culture relates to Openness to Experience or Intellect). The numerical order roughly parallels the quantitative rank within which the factors are represented among English trait terms in the dictionary. That is, there are more words descriptive of Factors I, II, and III than of IV and V (Peabody & Goldberg, 1989).

Digman (1990) compiled a similar listing of Big Five adjectives that includes reference to specific research supporting each term. For example, Eysenck's (1970) Extraversion was Guilford's (1975) Social Activity; Peabody and Goldberg's (1989) Power; Tellegen's (1985) Positive Emotionality; and Norman's (1963) Surgency. Likewise, Tupes and Christal's (1961) Agreeableness was Fiske's (1949) Conformity; Hogan's (1986) Likeability; Peabody and Goldberg's (1989) Love; and Digman's (1988) Friendly Compliance. A full description of the definition of each of the five factors may be found in Barrick and Mount's (1991) meta-analytic work; for example, Extraversion is

associated with being sociable, gregarious, assertive, talkative, and active. Barrick and Mount (1991) also provide compelling evidence for the robustness of the Big Five; its validity has been established in different cultures, with a variety of samples, across different theoretical frameworks, using different instruments, and using ratings obtained from different sources.

As noted earlier, one sign of the revival of personality research is the emergence of the Big Five as a unifying personality theory. Certainly the sheer volume of published works generated since the late 1980's is one indicator. In addition, it is significant that the Big Five has been embraced not only by the personality psychologists, but also by researchers in I/O, clinical, and developmental psychology as well (Paunonen & Jackson, 2000).

Turning to the question of the Big Five's comprehensiveness, many researchers hold that the primary usefulness of the Big Five model lies in its very structure: the Big Five is a hierarchical representation of personality attributes (Digman, 1990). Extending the previous work of Norman, Digman (1990) described the hierarchy as follows: The top level, E, A, C, ES, and O are labeled "Level 4 traits" and subsume all underlying levels; "Level 3" includes characteristics, scales, and facets; "Level 2" includes habits, act frequencies, dispositions, and items; and "Level 1" includes responses. This approach clearly touts the model's summarizing power of five broad orthogonal traits. Corroboration for this aspect of the model, that all or most significant aspects of personality can be subsumed within the Big Five, was offered by Goldberg (1993), John (1990), and Wiggins and Trapnell (1997). Saucier and Goldberg (1998) added further support with their study of dimensions which had been previously posited as "beyond the

Big Five." Their results showed that the Big Five would best be supplemented by a few cluster traits (for example, Religiousness or Attractiveness) *only* if one wanted to extend variable selection outside the conventionally defined domain of personality. Therefore, these researchers concluded that their study provided strong indirect evidence of the comprehensiveness of the Big Five within the realm of traditionally understood personality variables.

However, others have disagreed with the conclusion that the Big Five is a comprehensive theory. Paunonen and Jackson (2000) answered Saucier and Goldberg (1998) by re-analyzing the same data, using a different ("more realistic") criterion to decide whether a variable falls in a particular factor space. Paunonen and Jackson claimed that the use of extension analysis in the previous study distorted purported relationships among variables and the Big Five traits. In addition, Paunonen and Jackson used a more conservative communality (.20 compared to Saucier and Goldberg's "more liberal".09), and they eliminated variables "having to do with physical characteristics (e.g., short-tall), demographics (e.g., employed-unemployed), low base rate undesirable behaviors (e.g., evil, cruel), and variables otherwise not clearly related to traditional personality traits (e.g., lucky-unlucky)." Paunonen and Jackson concluded that there is much important variance in human behavior that is not accounted for within the Big Five. They argued, similarly to Saucier and Goldberg (1998) that various factors are "not well represented in the language of personality"; however, they also contend that such lack of inclusion should be disregarded, and that incremental utility should be the true test of whether a variable should be considered as important to the understanding of human behavior: "If one can identify theoretically meaningful, internally consistent classes of

behavior that are able to predict socially and personally significant life criteria, then such personality dimensions are important."

In another critique of the Big Five, McAdams (1992) grants that the model might represent an effective scheme for organizing trait descriptions, but concluded with two basic Big Five weaknesses: it does not address the causes of personality, as it is merely descriptive in nature; and because it is based on typical behavior, it does not account for exceptions to these traits (exceptions that are the effects of situations that depart from the usual). Block (1995) and Loevinger (1994) expressed doubts that a model based on five basically independent dimensions of traits will adequately address personality development.

While the Big Five's usefulness vis-à-vis its comprehensiveness continues to be debated, a more pragmatic argument for its utility is the empirical evidence that answers a critical research question: What important outcomes do the Big Five traits predict? Because of their prominence in the literature as first reporting significant correlational relationships between Big Five traits and key dependent variables, the two meta-analyses conducted by Barrick and Mount (1991) and Tett, Jackson, and Rothstein (1991) are discussed first. These are followed by more recent findings in I/O psychology. This section concludes with discussion of the Big Five's predictive value within other sub-fields of psychology.

Prior to the meta-analytic studies conducted by Barrick and Mount (1991) and Tett et al. (1991), a great deal of research had concluded that personality measures do not reliably predict job performance or personnel selection (Guion & Gottier, 1965). However, both 1991 studies pointed out significant weaknesses in the methodology of

previous research. Barrick and Mount noted that no well-accepted taxonomy of personality existed to classify personality traits, and they proposed that recent convergence of opinion concerning the Big Five constituted a valid basis to review the validity of Big Five traits. Tett et al. (1991) identified several corrections that were required for more accurate assessment of personality's predictive value. First, while cognitive ability predicts well regardless of type of job or situational factors, personality is more diverse and less frequently related to job performance than cognitive abilities; therefore the use of job analysis would necessarily facilitate personality trait selection for measurement. This argument, according to Tett et al. (1991), was also supported by the SIOP (1987) standards of psychological scale use, which emphasized the value of conceptual links between predictor and criterion. This is related to Tett et al.'s (1991) choice of differentiating confirmatory from exploratory studies, as confirmatory would likely yield stronger relationships. (A theoretical approach would generally be superior to a purely empirical approach.) Secondly, Tett et al. (1991) identified several statistical methodologies previously used that should be corrected: errors of bias in the sampling of correlations, inflation of the mean validity (by including only the reported significant relationships), and within-study averaging of absolute value correlations. Regarding the final method, Tett et al. (1991) noted that observed values had been used rather than absolute values, and positive and negative values, either of which can support a scale's validity, can cancel one another out; the result is that the overall average is lowered. This impact is especially true with exploratory studies because lower and/or negative validities are more likely to be obtained. Corrections of other methods would arguably alter meta-analytic results in varying directions.

Both Barrick and Mount (1991) and Tett et al. (1991) focused on Big Five personality traits. (Barrick & Mount [1991] included only the Big Five; Tett et al. [1991] meta-analyzed eight traits, and the Big Five were five of those eight.) Both studies isolated Big Five traits from a number of well-validated personality scales. While Tett et al. (1991) summarized from an overall perspective, Barrick and Mount (1991) focused on the Big Five's relationship to three I/O outcomes (job proficiency, training proficiency, and personnel data) within five occupational groupings (professionals, police, managers, sales, and skilled/semi-skilled).

Tett et al.'s (1991) corrected estimate for the overall relation between personality and job performance is .24, a significant relationship; however, the researchers opined that while this relationship is strong, it is probably understated, as confirmatory studies are higher than exploratory (r=.29 versus r=.12, respectively); within confirmatory studies, the relationship is stronger when job analysis was used to select trait scales than when it was not used (r=.38 versus r=.29, respectively); and when articles versus dissertations are summarized (r=.27 versus r=.13, respectively). Tett et al.'s (1991) primary findings regarding specific Big Five traits were that the mean validities for three of the five traits were significantly related to job performance: Neuroticism (r=-.22), Openness (r=.27), and Agreeableness (r=.33).

Barrick and Mount's (1991) overall corrected sample-weighted mean correlation was .11 (compared to Tett et al's [1991] .24; Tett et al. [1991] explained this difference as Barrick and Mount's [1991] use of observed values rather than absolute values, as discussed previously). Specifically, Barrick and Mount (1991) found that Conscientiousness predicted across occupations (ranged from r=.20 to r=.23); after that,

predictors varied by outcome and occupational type. Openness and Extraversion related to training proficiency criterion (r=.25 and r=.26, respectively); and Extraversion related to two occupations involving social interactions (r=.18 for managers and r=.15 for sales). Barrick and Mount's (1991) and Tett et al.'s (1991) work was clearly groundbreaking in its conclusion that personality traits, and in particular, the Big Five, predict important I/O outcomes.

While a great deal of attention has been focused on the Big Five's relationship with I/O criteria, it is important to note that the Big Five has also been embraced by educational psychology researchers; personality is one class of individual differences that is currently being studied seriously with respect to academic performance (Paunonen & Ashton, 2001). One critical outcome in education, academic success as measured by specific grades or cumulative grade point averages, has been consistently linked to Big Five traits: Agreeableness and Conscientiousness (Fritzche, McIntire, & Yost, 2002); Conscientiousness (Busato, Prins, Elshout, & Hamaker, 2000; Goff & Ackerman (1992); Musgrave-Marquart, Bromley, & Dalley, 1997; Paunonen & Ashton, 2001, and Wolfe & Johnson, 1995); Openness (Paunonen & Ashton, 2001) and Agreeableness (Rothstein, Paunonen, Rush, & King, 1994). This topic will be explored further in this paper within the discussion of the construct Work Drive and academic success.

In summary, convergence on the Big Five personality model among personality researchers within several sub-fields of psychology has been significant and has occurred relatively recently (early 1990's and forward). Agreement on taxonomy of personality to classify traits has provided a common language for consistency in approach and communication, and it has also facilitated more focus within personality studies.

However, not all researchers agree that the Big Five is comprehensive, and a current personality discussion (illustrated recently at the Society for Industrial and Organizational Psychology, 18th Annual Conference, 2003, Symposium 141) involves a related question: Should we measure personality more narrowly or more broadly than presently conceptualized? The following section examines this debate and comments on its significance within the milieu of the Big Five.

Lumpers and Splitters: The Broad-Narrow Trait Controversy Continues

This section begins with background information regarding the bandwidth-fidelity controversy and broad versus narrow personality traits: distinctions between the two, and attempts to define them. Next, several issues which are being debated about broad versus narrow traits are presented, generally nested within the perspective of relative predictive capability.

Although issues surrounding the bandwidth-fidelity dilemma have generated a great deal of current discussion and controversy (Society for Industrial and Organizational Psychology 18th Annual Conference, Symposium 141, 2003), the dilemma itself is not new. Recent research and comment seems to have been energized by general acceptance, and dissent, as well (Block, 1995) of the Big Five; that is, debate about narrow versus broad personality traits appears to be one next logical step in the evolution of personality research following convergence on a taxonomy of personality (Stewart, 1999). Ones and Viswesvaran (1996) claim that renewed interested in this "old debate" of bandwidth-fidelity is the result of increased usage of personality inventories in

personnel selection. What is the dilemma? What are researchers concluding about the dilemma, and what remains to be resolved?

Many researchers agree that we generally consider personality traits to be "broad" or "narrow" in their ability to describe individual behavior (Spector, 1996). Numerous terms are used to connote *broad*; while "broad" is perhaps the most widely used, researchers have also chosen to use the descriptors "global", "superordinate", "meta-traits", "factors", "higher-order factors", "higher-level factors", "common core construct", "general", "abstract", and "lumpers" (Judge et al., 2002; Judge et al., 1997; Digman, 1997; Moon et al., 2003; Paunonen, 1998; Ones & Viswesvaran, 1996; Schneider, Hourh, & Dunnette, 1996). "Narrow," while generally referring to "traits" rather than "factors" as a result of Eysenck's (1947) foundational work, is also referred to as "fine-grained", "specific", "specifically defined", "lower-level traits", "concrete", and "splitters" (Judge et al., 2002; Judge et al., 1997; Ones & Viswesvaran, 1996; Judge et al., 1997; Paunonen, 1998; Ashton, 1998; Schneider et al., 1996). While each of these terms is descriptive, this paper will use "broad" and "narrow", the most commonly used terms, for consistency. In addition, while the term "trait" is sometimes used to describe narrow dimensions, as "factor" is sometimes used to describe broad dimensions, both of these terms are often used generically to refer to any personality dimension. Within this paper, "trait" and "factor" will be used in a generic fashion, applicable to either broad or narrow dimensions, unless otherwise noted.

Why utilize hierarchies in personality research? An important function of the concept of traits in general is to classify, describe, and summarize a person's observable behaviors and internal experiences (John, Hampson, & Goldberg, 1991). It follows that

when trait concepts are viewed as categories, an organization or taxonomy may unfold and is instructive via its breadth of individual categories. Trait hierarchies have a long history in personality research; Cattell's influential model includes 16 "primary factors" and 8 sub-factors necessary to describe personality (Cattell, 1943; Cattell et al., 1970). Eysenck's (1947) foundational work suggested four levels within a personality hierarchy, listed here in descending order: factor, trait, habitual response, and specific response. Eysenck's specific figure illustrating this hierarchy uses Conscientiousness as one factor level, with five traits contained within the factor: Responsibility, Orderliness, Ambition, Endurance, and Methodicalness. The habitual response and specific response levels were not labeled; they were depicted as boxes stemming from the level immediately above.

The Big Five presents yet another model of hierarchy, with numerous traits included in each of the five larger factors. Digman (1997), reviewing Eysenck's 1992 work and comparing it to the Big Five model, noted Eysenck's (1992) suggestion that two factors (Agreeableness and Conscientiousness) contained in his model are at a "lower level of abstraction" than his more basic Psychoticism, Extraversion, and Neuroticism factors. This is contrasted with the Big Five's inclusion of Agreeableness and Conscientiousness at levels equal to Extraversion and Neuroticism (generally understood as Emotional Stability). Digman (1997) developed an alternative hierarchy, based on his factor analysis of correlations reported in 14 separate studies: two higher-order factors α (Agreeableness, Conscientiousness, and Emotional Stability) and β (Extraversion and Intellect).

Therefore, it is clear that universal agreement on one single hierarchical representational model of personality does not, as yet, exist. Unfortunately, this is also

the case when a clear definition of "broad" and "narrow" traits is sought: such precision is simply not to be found (Schneider et al., 1996). However, there is general guidance from John et al. (1991), in that relatively broad traits include a large number of distinct behaviors, whereas relatively narrow traits refer to a more limited range of behaviors. The simplicity, the *ceteris paribus*, of this distinction between broad and narrow seems to serve our purposes best at this time. In addition, Judge, Erez, Bono, and Thoresen (2002) offer an instructive pair of definitions: splitters are those who seek to make fine distinctions among psychological concepts by splitting them into constituent elements, while lumpers are those who seek to aggregate concepts by combining narrow concepts into broader ones.

The bandwidth-fidelity tradeoff issue appears entwined with issues of defining "broad" and "narrow" traits. While exact definitions have not gained wide consensus, Hogan and Roberts' (1996) analogy provides interesting insight and contributes to our understanding of this topic: the choice between binoculars and a microscope is similar to the choice between fidelity and bandwidth – one provides a wide field of vision and little detail, while the other offers a narrow field of vision with great detail. Ones and Viswesvaran (1996) describe the bandwidth-fidelity dilemma as the choice of careful measurement of a single narrowly defined variable and more cursory exploration of many separate variables. Murphy (1993) describes it as follows: "In psychological testing, there is an inevitable trade-off between attaining a high degree of precision in measurement of any one attribute or characteristic, and obtaining information about a large number of characteristics."

Within social science, Shannon and Weaver (1949) introduced these concepts as a tradeoff. Fidelity was viewed as quality of information, while bandwidth was viewed as complexity of information obtained. Greater fidelity may be achieved, but at the loss of bandwidth; with increased bandwidth, fidelity is lowered. Cronbach (1960) continued the discussion, interpreting Shannon and Weaver's (1949) theory into four proposals: (1) a shift toward greater fidelity reduces bandwidth and conversely, an increase in bandwidth comes at the price of fidelity; (2) information from extremely large bandwidth assessments is unreliable and conversely, small bandwidth assessment is appropriate only when there is one question to be answered; (3) when many outcomes are important, assessment bandwidth must increase; and (4) low fidelity assessments are a problem only when they lead to costly errors or are used to make irreversible decisions.

One of Cronbach's (1960) generalizations has echoed to current discussions and has evolved to a related sweeping contention: matching predictors with criteria always enhances validity (Hogan and Roberts, 1996). This flow of thought leads directly to the next topic within this section, do narrow or broad traits predict more accurately?

A number of researchers agree with Hogan and Roberts' (1996) assertion that predictors and criteria must match, to the fullest extent possible, to maximize predictive value (Stewart, 1999). The work of Ones and Viswesvaran (1996), while ostensibly advocating the use of only broad traits, actually recommends that broad traits be used in personnel selection research and applied purposes, while suggesting that narrow and more specific personality dimensions may be more appropriate for training and development interventions. While Schneider et al. (1996) agree in principle that predictors should match criteria in terms of specificity, they disagree with Ones and

Viswesvaran (1996) in their view of how traits should be chosen to obtain the best possible prediction and explanation of a complex overall job performance criterion. Schneider et al. (1996) advocates the use of multidimensional measurement of job performance; therefore, they also recommend the use of narrow personality traits as predictors of these outcomes.

Departing from this view is the work spawned by Judge, Locke and Durham's (1997) dispositional theory, which combines four traits previously viewed as separate (neuroticism, locus of control, self-esteem, and generalized self-efficacy) into one broad "lumper" trait, core self-evaluation (CSE). Judge et al. (1997) hold that these specific traits indicate a single, higher order factor (CSE). Using three independent samples, Judge, Locke, Durham, and Kluger (1998) demonstrated that CSE has direct and indirect relationships with job satisfaction and life satisfaction. CSE's predictive power was further studied by Judge, Bono, and Locke (2000), who found that subjective job characteristics and job complexity mediate the relationship between CSEs and job satisfaction. Erez and Judge (2001) validated that CSE is a higher order factor derived from neuroticism, locus of control, self-esteem, and generalized self-efficacy. In addition, the 2001 study showed both lab and field study results indicating that CSE is related to task motivation, productivity, and job performance. The meta-analysis provided by Judge, Erez, Bono, and Thoresen (2002) provided new strength to establishing CSE as a valid trait; the authors conclude that each of the four individual traits are strongly related, that they display relatively poor discriminant validity, that each accounts for little incremental variance in predicting external criteria relative to the higher order construct, and that CSE explained the relationships among the four traits.

Finally, Bono and Judge (2003) found that CSE is related to both job satisfaction and job performance. Various issues of CSE's potential relationships to the Big Five were explored, including the contention that CSE is probably a broader measure than Emotional Stability, and the offering of suggestions about changes in hierarchical arrangements involving the Big Five and CSE.

Indeed, support for broad factors as better predictors than narrow ones is often found within exploration of the Big Five model. As noted by Schneider et al. (1996), many researchers view traits greater than or equal to the Big Five in breadth as "broad," while those considered less broad than the Big Five are "narrow." (It is an indication of the Big Five's acceptance that it is used as criteria.) However, this raises at least two concerns. First, "narrow" may still be defined too broadly. Secondly, the Big Five are probably not equally broad. Saucier and Goldberg (1996) point out that Extraversion, Agreeableness, and Conscientiousness have many more English adjectives associated with them than do Emotional Stability and Openness to Experience. Digman's (1997) review of factor correlations from 14 studies supporting the Big Five model concluded that two higher-order factors (metatraits) emerge: one includes Agreeableness, Conscientiousness, and Emotional Stability; the other, Extraversion and Openness to Experience. Eysenck (1992) had previously taken a similar view, proposing that the Big Five are not really "basic," and that a level above the Big Five factors would include Eysenck's own Psychoticism, Extraversion, and Neuroticism factors.

Several studies, however, have focused on the sole use of narrow traits. Using Ones and Viswesvaran's (1996) data, Paunonen, et al (1999) claim that use of broad traits will produce two undesirable results: (1) prediction inaccuracy, and (2) compromising of

psychological meaningfulness and interpretability of personality-job performance findings. Paunonen et al. (1999) essentially contends that much important information is lost when performance is aggregated into a single, broad, multidimensional composite criterion (such as Ones and Viswesvaran's 1996 global index of job performance). Ashton (1998), while admitting that performance might be optimally predicted by broad measures for some jobs, concluded that narrow traits predict better for most jobs and most job performance criteria. Further evidence that narrow traits have higher predictive value has been provided by Paunonen and Ashton (2001); Paunonen (1998); Jang et al. (1998), Mershon and Gorsuch (1988); Borman and Penner (2001); and Paunonen and Nicol (2001).

Additional argument for narrow traits' predictive value is afforded by Moon, Hollenbeck, Humphrey, and Maue (2003). Considering the work of clinical psychologists, who view Emotional Stability (Neuroticism) as two separate components (anxiety and depression), Moon et al. (2003) compared the predictive value of the broader factor to that of each narrow trait. The dependent variable was escalation of commitment, or the tendency to escalate one's behavior to losing courses of action (an undesirable tendency and viewed as a decision error). This study found a curious suppression effect. The broad factor of Emotional Stability (ES) showed no relationship with escalation of commitment; however, this probably resulted from suppression created by the opposite significant relationships identified for each of the narrower traits with the outcome measure. That is, anxiety was significantly positively related to escalation of commitment, while depression was significantly negatively related to escalation of commitment. Moon et al.'s (2003) work calls for more research on ES, particularly as it

has previously been viewed as having low predictive ability of organizational criteria (Hurtz & Donovan, 2000). The low predictive results for ES could simply be the result of viewing the construct too broadly, as narrower traits included in ES might have suppressing effects that would only be apparent with a more narrow analysis.

One narrow trait in particular has begun to garner attention, primarily due to its predictive ability regarding job and academic performance: the construct *work drive* (Lounsbury & Gibson, 2002). Within the context of narrow versus broad personality traits, and a view toward predictive capability, we will now turn to an examination of the narrow construct of work drive.

Work Drive as a Splitter (Narrow) Construct to Predict Academic Performance

As defined by Lounsbury, Loveland, Sundstrom, Gibson, Drost, and Hamrick (in press), *work drive* represents an enduring motivation to expend time and effort to finish projects, meet deadlines, be productive, and achieve success. This construct is similar to some aspects of the broader *work ethic*, a multidimensional trait defined in summary as a commitment to the value and importance of hard work (Miller, Woehr, & Hudspeth, 2002). Lounsbury, Gibson, and Hamrick (in press) found that work drive and work ethic were positively related (r=.48, p<.01). In recognition of the link between work drive and work ethic, this section will first discuss the development of work ethic and its predictive capability; next, work drive will be introduced, along with its application in an academic setting. Within the discussion of work drive, predicting academic performance will be presented, including identification of personality trait predictors and a link to the narrow trait of work drive.

While its primary forerunner was known as Protestant work ethic, religious connections have now evolved unequivocally to the secular domain; Miller et al. (2002) stated in their comprehensive monograph on work ethic that the construct is best viewed as a general, not Protestant, work ethic. Indeed, Niles (1999) provided evidence of the cross-cultural nature of work ethic. An important definitional nuance of work ethic was noted by Jazarek (1978), who observed that many see the work ethic as manifest because people have a desire, stronger than in previous times, for meaningful work: this is, perhaps, missing the point. The thrust of work ethic is not a focus on achieving intrinsic value but a recognition that "the non creative, menial, unpleasant, untimely work had to be done." Jazarek (1978) was disappointed that this dimension seems missing from many work ethic definitions.

Because of its evident link to commitment, work ethic has been studied as a predictor of organizational commitment (Piankoff, 1999); work centrality (Hirschfeld & Field, 2000); career commitment (Goulet & Singh, 2002); and organizational citizenship behavior (Ryan, 2002). In addition, with regard to organizational change, work ethic has been studied as a moderator (Yousef, 2001a), and as a predictor in conjunction with various moderators (Yousef, 2001b). Cohen (1999) explored several interrelationships among work ethic and career commitment, job involvement, continuance organizational commitment, and affective organizational commitment. Significantly, work ethic was identified as an antecedent variable within the two theoretical models tested by Cohen (1999).

Research conducted by Pogson, Cober, Doverspike and Rogers (2003) concluded that studying work ethic across career stages is revealing (higher levels were observed in

trial stages of careers, compared to stabilization and maintenance stages), and that it is important to consider the multidimensional nature of the construct. Christopher and Jones (2002) also commented on the "multifaceted nature of work ethic," as they studied two separate components of work ethic: hard work as a means to success, and antileisure. With results similar to Moon et al.'s (2003) study of emotional stability and its suppression effects, Christopher and Jones (2002) found that each sub-factor had a significant relationship with the dependent measure (need for cognition), but in opposing directions. Hard work as a means to success was negatively related to need for cognition, while antileisure was positively related. Miller et al. (2002) also categorized work ethic as multidimensional and commented on various subscales.

Moving next to another important dependent variable, academic performance, linkage among predictors will be developed. What predicts academic success? Cognitive ability has long been shown to consistently predict academic performance (House, Johnson, & Tolone, 1987; Thornell & McCoy, 1985); however, validity controversy remains at a fevered pitch when cultural differences are considered within the context of cognitive testing. Psychologists and those who work in educational research have turned with renewed interest to personality testing. Following its general acceptance as a taxonomy of personality in the 1990's, the Big Five has been and continues to be studied extensively with regard to its academic performance predictive capability.

Which Big Five factors are related to academic success? Conscientiousness has positive relationships (Busato, Prins, Elshout & Hamaker, 2000; Fritzche, McIntire, & Yost, 2002; Goff & Ackerman, 1992; Musgrave-Marquart, Bromley & Dalley, 1997;

Paunonen & Ashton, 2001). Agreeableness has also been found to be positively related to academic performance (Fritzche, McIntire, & Yost, 2002); and Openness (Paunonen & Ashton, 2001) positively relates to this outcome. Lounsbury et al. (in press), in a study that included sixth and seventh grade students, as well as high school students, found that all of the Big Five traits were positively related to academic performance (except for Emotional Stability and Extraversion in 11th and 12th graders). However, few have studied more narrow traits, and fewer still have studied both broad and narrow traits to obtain comparisons for predictive value. Paunonen and Ashton's (2001) and Lounsbury et al. (2003) provide two exceptions.

Paunonen and Ashton's (2001) study concludes that two narrow traits, sub-factors of Big five traits, predict academic success (in one course) better than two broad Big Five traits. The two Big Five factors selected for study were Conscientiousness and Openness. One narrow trait, nested within each of these two broad factors, was selected: need for achievement (nested within Conscientiousness), and need for understanding (nested within Openness). Paunonen and Ashton (2001) described need for achievement as a motivation to achieve high levels of performance in many domains, including academics; this overlaps with commonly held definitions of work ethic. (Need for understanding relates to intellectual curiosity about many areas of knowledge and probably is not as related to work drive as need for achievement.)

Turning to a narrower dimension of work ethic, Rau and Durand (2000) studied a related construct, academic ethic, defined as follows: "Students with a well-developed academic ethic place their studies above leisure activities; study on a daily or near-daily basis; and study in a disciplined, intense, and sober fashion." Rau and Durand's (2000)

work found that academic ethic predicts college grades. Similar findings are contained in studies by Lounsbury, Sundstrom, Loveland and Gibson (2003), Prenuss (2000), Jessup (2001), and Paunonen and Ashton (2001).

Rau and Durand's (2000) study found "solid evidence for the existence of the academic ethic" by identifying a coherent set of behaviors and attitudes that clearly differentiate college students who see academic work as a calling from those who do not. Lounsbury, et al's (2003) work found that after controlling for general intelligence and Big Five personality traits, work drive still accounted for a significant unique portion (7%) of variance in relation to college students' academic success. In addition, Lounsbury et al. (2003) found that when work drive was entered before the Big Five variables, the Big Five variables did not add significantly, either as a set or individually, to academic success. One conclusion from this finding is that work drive, a narrow construct, in some cases predicts better than the broader Big Five factors. Both Prenuss (2000) and Jessup (2001) studied work ethic in academic settings (college and middle school, respectively), and both found it to be positively correlated with academic performance.

Lounsbury, Gibson and Hamrick's (in press) study and its findings are particularly of interest. Work drive is defined with a definition common across diverse settings (organizational and academic are two examples): "an individual's disposition to work long hours and extend oneself, when needed, to meet job demands and achieve job success." Lounsbury et al. (in press) contend, as do Munson and Rubenstein (1992), that "schoolwork is the student's job", linking the outcomes of job performance and students' performance in academic settings. Adapting their work drive scale to relate to the school

setting, these researchers found, for middle- and high-schoolers, that work drive added significantly to academic success beyond the Big Five measures. That is, the narrow trait, work drive, added incremental significant variance after considering the broader factor, each of the Big Five variables.

Interestingly, the work drive measure utilized by Lounsbury et al. (in press) includes distinctions indicated as fundamentally necessary, by Jazarek (1978), for a complete, more theoretically accurate definition of the construct. Jazarek (1978) called for such measures to include fine distinctions recognizing that "menial, unpleasant, untimely work had to be done." For example, Lounsbury et al.'s (in press) items include "I would keep going to school even if I didn't have to", "I always try to do more than I have to in my classes", and "I study more than most students I know". Such items build support for the case that work drive is a narrow construct, as gradations of meaning are more finely tuned, more specific in the item wording for scales of narrow traits.

In conclusion, a review of current research in academic performance and the narrow construct of work drive reveals that much remains to be studied. First, as the construct is still fairly new and continuing to gain validity, can these findings be replicated in other settings? While Rau and Durand (2000) used college undergraduate student samples, Lounsbury et al.'s (in press) study included middle- and high-school students. Is it likely that work drive will continue to add unique variance following consideration of Big Five personality factors? In addition, "academic success" for college undergraduate students may be operationalized as collegiate cumulative grade-point-average (GPA), averaged across courses; high school grades; ACT scores; SAT scores; or single college course grades. As noted by Lounsbury et al. (in press),

cumulative GPA incorporates variability among instructors and courses as uncontrolled sources of variance; using a single course grade could avoid such variability and could potentially serve as a better validity criterion for research on both cognitive and personality predictors. Continued research to examine these factors will add to the ongoing discussion concerning broad versus narrow traits, and it will provide further support for identifying valid predictors of academic success.

CHAPTER II

EXAMINATION OF BIG FIVE AND WORK DRIVE VARIABLES

Objectives

This study recognized several key issues in recent research, including the ongoing debate over the use and predictive value of broad versus narrow predictor variables; the need for further research involving a relatively new personality variable (Work Drive) that is gaining validity; and continuing questions concerning the operationalizing of academic success via measurement of collegiate cumulative grade-point-average (GPA), averaged across courses, or by the use of other measures such as single college course grades. In addition, this study adds to the growing body of knowledge relating to Big Five personality variables and their predictive value.

The purpose of this study is to examine relationships among six personality traits (Big Five personality factors and work drive), general intelligence, and two academic outcomes: college undergraduate cumulative GPA and a single course grade. In particular, significant correlational relationships are identified among all variables; and the ability of predictor variables (Big Five personality factors and work drive) to add incremental variance is explored using hierarchical regression analysis.

This study includes three specific objectives:

(1) To evaluate the validity of Work Drive, a personality construct generally held to be more narrow in scope than Big Five personality traits, for predicting two academic success variables, cumulative GPA and a single course grade; Work

Drive validities with regard to academic success will be examined (a) individually (correlationally), and (b) uniquely (utilizing hierarchical regression analysis) in relation to general intelligence and the Big Five personality traits (Big Five traits will be considered separately and as a group);

(2) To evaluate the validity of the Big Five personality factors for predicting two academic success variables, cumulative GPA and a single course grade; Big Five validities with regard to academic success will be examined (a) individually (correlationally), and (b) uniquely (utilizing hierarchical regression analysis) in relation to general intelligence and Work Drive; and

(3) To compare the validities obtained above for each of the two measures of academic success (cumulative GPA and a single course grade) to determine if there were similar or different patterns of results for these two criteria of academic performance.

Method

Research Design

This research was a field study of college undergraduate students at a large southeastern state university, and it measured the course grade received by each participant, self-reported GPA, general intelligence, the Big Five personality traits, and the more narrow personality trait Work Drive.

Participants

Participants were 286 college undergraduate students enrolled in two sections of an introductory psychology course. One course section (hereafter referred to as "section one") included 140 students, and the other course section ("section two") included 146 students. The students received extra course credit in return for their voluntary completion of the measures included in this study. The extra course credit received was nominal in relation to their academic performance measure for this study's purposes. Within the combined group of two class sections (n = 286), 52% of the sample was women, and 48% was men; the average age was 19.24 years. The participants' year in school was predominantly freshman (70%); sophomores comprised 21% of the sample; and juniors and seniors totaled 5% and 4%, respectively.

Examination of the demographic information on a section-by-section basis revealed that the composition of the two sections was similar: sections one and two included 46% and 58% females, respectively; and 54% and 42% males, respectively. The average age for sections one and two was 19.18 years and 19.31 years, respectively. Freshman representation was 74% and 66% in sections one and two, respectively; followed by 19% and 22% for sophomores, respectively; and 7% and 12% for combined junior / senior representation, respectively. When data was gathered, this demographic data was requested of participants in the opening section of the Personal Style Inventory (PSI), described below.

Participants provided documentation of their voluntary consent in this study, at the time data were collected, by reading and signing a form attached to the PSI; this document, Information/Consent Form, is shown at Appendix 1.

Measures

General Intelligence. A general intelligence scale was used, as developed by Resource Associates (Lounsbury & Gibson, 2002), measuring verbal reasoning (15 items) and numerical reasoning (15 items). This is an untimed test, and each item has 4 to 5 answer choices (a through d; or a through e) with scoring as 1=correct, 0=incorrect. The total score represents an unweighted linear composite of all items. Coefficient alpha for this scale is .90. Scores on this test correlate .70 with overall intelligence scores on the Otis-Lennon Test of Mental Maturity, a group-administered test of general intelligence that has been extensively normed and researched (Anastasi & Urbina, 1997; Otis & Lennon, 1969).

Big Five Personality Measures. The Personal Style Inventory (PSI), a 136-item general personality inventory, was used, as developed by Lounsbury and Gibson (2002) and validated in a study of predictors of career decidedness of college students (Lounsbury, Tatum, Chambers, Owens, & Gibson, 1999) and a study of predictors of career satisfaction for a sample of 5,932 individuals in a variety of occupations going through career transition (Lounsbury et al., in press). Each item in the PSI, with wording tailored for student populations, is presented with responses placed on a five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). The following Cronbach coefficient alphas were observed: Extroversion -- .87; Agreeableness -- .75; Conscientiousness -- .82; Emotional Stability -- .79; and Openness to Experience -- .75.

Work Drive. The Lounsbury and Gibson's Work Drive measure was used, a scale that has been extensively validated in various settings (Lounsbury & Gibson, 2002;

Lounsbury et al., in press). The scale's items included wording tailored for student populations, and the items were presented with responses placed on a five-point Likert scale ranging from "Strongly Disagree" (1) to "Strongly Agree" (5). The following are three sample Work Drive items: "I always try to do more than I have to in my classes" (item 30); "Being a good student means a lot to me" (item 98); and "Even if I won a million dollars, I would study hard to make good grades in college" (item 73). Cronbach's coefficient alpha for the Work Drive scale was .81. Within the PSI, the Work Drive scale is represented by seven items.

Grade Point Average (GPA). Concurrent with administering the PSI, Work Drive, and general intelligence scales, various demographic data were collected (age, gender, year in school, etc.). Within this demographic section, participants were asked to indicate their overall (cumulative) GPA by selecting one of the following seven choices: less than 1.50; 1.50-1.99; 2.00-2.49; 2.50-2.99; 3.00-3.49; 3.50-3.99; and 4.00. Data for this study were collected during a spring semester session; participants had been enrolled at the university during the previous fall semester, providing a basis for their knowledge (in the case of freshmen) of their cumulative GPA. In addition, students were asked to participate only if they had already completed at least one full semester of college work prior to the semester in which data were collected. (Data were collected during a spring semester.) This control procedure was utilized to minimize the potential impact of students who had a cumulative GPA consisting of only the semester within which the data were collected. Therefore, the intent of the study was to gather data for students who had at least one semester of academic experience in college, and to include students who would most likely have knowledge of their cumulative GPA for self-report purposes.

The self-report section of the cumulative GPA is contained in the opening section of the PSI.

Single Course Grade. Within the informed consent form (Information/Consent Form, Appendix 1), presented to participants at the commencement of data collection, participants authorized the release of their introductory psychology course grade for study purposes. Letter grades (A, B, C, D, and F) were converted to numerical data (5, 4, 3, 2, and 1, respectively) for statistical analysis. Control procedures for maintaining the confidentiality of participants consisted of preserving course grade data on a file that was cross-referenced with student identification numbers. Original documents containing students' names with course grades were destroyed after data entry was completed.

CHAPTER III: RESULTS AND DISCUSSION

Results

Overview

We examined correlational relationships among study variables and descriptive statistics; these results are provided in Table 1. Next, hierarchical multiple regression analysis was performed to analyze significantly correlated variables' unique variance contribution to the prediction of both dependent variables. Three different regression scenarios were performed for each dependent variable. Regression analysis for GPA is provided in Table 2, and parallel regression analysis (for each of the three scenarios) for course grade is provided in Table 3. One scenario (Part 1) of Tables 2 and 3 is summarized in Table 4 to present rank orderings of the unique variance contributions of study variables. This study also analyzed the utility of academic performance criteria by comparing validities obtained for GPA and course grade; these results are provided in Table 5.

Predictive Value of Study Variables

Conscientiousness. Conscientiousness correlated significantly with GPA (r=.15, p<.05), but not with course grade. Significant correlation between Conscientiousness and Work Drive was found (r=.52, p<.01), and Conscientiousness correlated r=-.14 (p<.05)

with general intelligence. Conscientiousness did not correlate significantly with Emotional Stability.

Emotional Stability. Emotional Stability correlated significantly with GPA (r=.14, p<.05), but not with course grade.

Work Drive. Work Drive correlated significantly with GPA (r=.42, p<.01) and course grade (r=.20, p<.01). Work Drive also correlated significantly with Conscientiousness (r=.52, p<.01), but not with Emotional Stability. Work Drive did not correlate significantly with general intelligence (r=.12, n.s.).

General Intelligence. General intelligence correlated significantly with GPA (r=.40, p<.01) and course grade (r=.35, p<.01). As noted above, general intelligence and Work Drive did not achieve a significant relationship (r=.12, n.s.). General intelligence correlated significantly with Conscientiousness (r=.-.14, p<.05).

Incremental Variance Contribution of Study Variables

Using hierarchical multiple regression analyses, the incremental validity of all four significant variables was assessed in various combinations, with results summarized in Tables 2 and 3 for the criteria of GPA and course grade, respectively. Determining which combination of variables to analyze was dependent, in part, on whether the variables were significantly correlated with the dependent variables, with the overarching strategy of holding general intelligence constant as step 1 for one part of the regression analysis. In addition, two other strategies were utilized in performing regression analysis: one examined the impact of entering general intelligence after other variables;

another aggregated Big Five traits. Each of these three strategies (Parts 1, 2, and 3 within Tables 2 and 3) is discussed below.

Within Tables 2 and 3 (for each dependent variable), three sets (Parts 1, 2, and 3) of regression analyses were performed. Tables 2 and 3 contain the results of hierarchical multiple regression analysis for GPA and course grade, respectively. Table 4 summarizes Part 1 findings for Tables 2 and 3. Part 1 of Tables 2 and 3 contains the following order of regression analysis: general intelligence is entered as step 1, and all variables significantly relating to the dependent variables (GPA for Table 2, and course grade for Table 3) are entered in all possible combinations. This scenario involves three variables being entered after general intelligence: Work Drive, Conscientiousness, and Emotional Stability, or 6 regression manipulations (3 x 2 x 1 = 6). Part 2 of Tables 2 and 3 contains an exploratory approach to challenge traditional notions regarding the entering of general intelligence first; in Part 2, other significant variables are entered as step 1, followed by general intelligence as step 2. Part 3 addresses the Big Five as a group, with general intelligence entered first, followed by two manipulations: the Big Five as a group entered as step 2, followed by Work Drive as step 3; and Work Drive entered as step 2, followed by the Big Five as a group entered as step 3.

Parts 1, 2, and 3 will be discussed separately, for each criterion. Within Part 1, variables are discussed in order of significance (Work Drive, Conscientiousness, and Emotional Stability), as the study investigated which variables add substantial incremental variance in predicting the dependent variables. It is noted from the outset of this discussion that Work Drive proved to be the strongest contributor of incremental variance among all personality variables; and Parts 1 and 2, Table 2 (GPA) provide

evidence to support Work Drive's superiority over general intelligence in incremental variance in the prediction of GPA.

Regression Analysis After General Intelligence. After controlling for general intelligence, Work Drive added an additional 14.5% to the prediction of GPA ($R^2\Delta$ = .145, p<.01) and an additional 6.5% to the prediction of single course grade ($R^2\Delta$ = .065, p<.01). For all manipulations of entry, this variance was the highest attributed to Work Drive. When general intelligence and Work Drive were entered as steps 1 and 2, respectively, none of the other variables added significant unique variance, except in one manipulation (for single course grade), when Conscientiousness added an additional 1.6% to the prediction of single course grade ($R^2\Delta$ = .016, p<.05), after general intelligence and Work Drive. In all order manipulations, regardless of the step in which Work Drive was entered (even as step 4, the last step), Work Drive added a significant portion of unique variance, each time at the p<.01 level. Depending on order of entry (as step 3 or 4), Work drive added the following unique variance portions when it was entered after the following variables were entered as step 2: after Emotional Stability, Work Drive added additional unique variance in the range of 9.8% to 13.8% to the prediction of GPA ($R^2\Delta$ = .098 - .138, p<.01); and an additional 6.4% to 7.9% to the prediction of single course grade ($R^2\Delta$ = .064 - .079, p<.01). After Conscientiousness, Work Drive added additional unique variance in the range of 9.8% to 10.3% to the prediction of GPA ($R^2\Delta$ = .098 - .103, p<.01); and 7.9% to 8.0% to the prediction of single course grade ($R^2\Delta$ = .079 - .080, p<.01). Work Drive added significant incremental variance in all 12 of the 12 possible manipulations, all at the p<.01 level.

After controlling for general intelligence, Conscientiousness added an additional 4.2% to the prediction of GPA ($R^2\Delta = .042$, $p<.01$); Conscientiousness did not add significant additional variance to the prediction of single course grade ($R^2\Delta = .000$, n.s.). Of the 12 manipulations, there were 4 other instances when Conscientiousness added unique variance: as step 3, after General Intelligence (step 1) and Emotional Stability (step 2), when Conscientiousness added an additional 4.0% to the prediction of GPA ($R^2\Delta = .040$, $p<.01$) when step 4 was Work Drive; as step 3, after general intelligence (step 1) and Work Drive (step 2), when Conscientiousness added an additional 1.6% to the prediction of single course grade ($R^2\Delta = .016$, $p<.05$), when step 4 was Emotional Stability; as step 4, after general intelligence (step 1), Work Drive (step 2), and Emotional Stability (step 3), when Conscientiousness added an additional 1.6% to the prediction of single course grade ($R^2\Delta = .016$, $p<.05$); and as step 4, after general intelligence (step 1), Emotional Stability (step 2), and Work Drive (step 3), when Conscientiousness added an additional 1.6% to the prediction of single course grade ($R^2\Delta = .016$, $p<.05$). Except for one, each of these additional four scenarios considered Conscientiousness *before* Work Drive. Conscientiousness is viewed as a moderate contributor of unique variance. In total, Conscientiousness added incremental variance in six of the 12 manipulations.

After controlling for general intelligence, Emotional Stability added an additional 1.3% to the prediction of GPA ($R^2\Delta = .013$, $p<.05$); Emotional Stability did not provide significant additional variance to the prediction of single course grade ($R^2\Delta = .000$, n.s.). Emotional Stability did not add unique variance in any other scenario; that is, Emotional Stability only added unique variance, for GPA, when it was entered as step 2 (after

General Intelligence). Emotional Stability did not add significant variance in any manipulation for which the single course grade was the dependent variable. Emotional Stability proved to be a weak contributor of unique variance. In total, Emotional Stability added incremental variance in 2 of the 12 manipulations.

These statistics allow conclusions to be drawn regarding the rank order of significance of personality variables' unique variance contribution. See Table 4 for a summary of this rank ordering, a summary of Part 1 regression analyses. By considering (in descending order) the percentage of incremental variance, the total number of times the variables contributed significant additional variance, and relative p-values, it is clear that *after* taking into account general intelligence, Work Drive contributes the most additional unique variance in the prediction of both dependent variables (percentage range was $R^2\Delta$ = 6.4% to 14.5%, $p<.01$); followed by Conscientiousness (range was $R^2\Delta$ = 1.6% to 4.2%, $p<.01$ and $p<.05$). The variable which contributed least in unique variance, and only in the prediction of GPA, was Emotional Stability ($R^2\Delta$ = 1.3% contribution, $p<.05$).

Regression Analysis Before General Intelligence. When general intelligence was entered as step 2, after Work Drive as step 1, there are several noteworthy results. We will consider Part 2 of Table 2 first, which presents regression analysis for the prediction of GPA. After controlling for Work Drive, general intelligence added an additional 12.2% to the prediction of GPA ($R^2\Delta = .122$, $p<.01$). As step 1, Work Drive accounted for 17.9% of the variance in predicting GPA ($R^2\Delta = .179$, $p<.01$). After controlling for the Big Five as a group, general intelligence added an additional 16.6% to the prediction of GPA ($R^2\Delta = .166$, $p<.01$). As step 1, the Big Five accounted for 4.6% of the variance

in predicting GPA ($R^2\Delta = .046$, $p<.05$). After controlling for Conscientiousness, general intelligence added an additional 17.7% to the prediction of GPA ($R^2\Delta = .177$, $p<.01$). As step 1, Conscientiousness accounted for 2.2% of the variance in predicting GPA ($R^2\Delta = .022$, $p<.05$). After controlling for Emotional Stability, general intelligence added an additional 15.1% to the prediction of GPA ($R^2\Delta = .151$, $p<.01$). As step 1, Emotional Stability accounted for 1.9% of the variance in predicting GPA ($R^2\Delta = .019$, $p<.05$).

In each manipulation, all personality variables are significant at the p<.01 level; this is not surprising, as each is entered as step 1, and each had a significant relationship with GPA. As step 1, each of the personality variables contributed unique variance in percentages similar to, though somewhat higher than, their step 2 contributions after general intelligence (in Part 1): Work Drive accounted for 17.9% of the variance in predicting GPA ($R^2\Delta = .179$, $p<.01$) as step 1, and added an additional 14.5% to the prediction of GPA ($R^2\Delta = .145$, $p<.01$) as step 2; and Conscientiousness accounted for 4.2% of the variance in predicting GPA ($R^2\Delta = .042$, $p<.01$) as step 1, and added an additional 2.2% to the prediction of GPA ($R^2\Delta = .022$, $p<.05$) as step 2. Emotional Stability accounted for 1.9% of the variance in predicting GPA ($R^2\Delta = .019$, $p<.05$) as step 1, and added an additional 1.3% to the prediction of GPA ($R^2\Delta = .013$, $p<.05$) as step 2.

However, in the prediction of GPA, Work Drive is the only personality variable that contributed a higher portion in Part 2 regression analysis than general intelligence's contribution, also in Part 2 ($R^2\Delta = .179$, $p<.01$, compared to $R^2\Delta = .122$, $p<.01$, respectively). In addition, general intelligence's contribution in Part 2 declined, compared to its contribution in Part 1, by more percentage points when entered after

Work Drive than when entered after other personality variables: the additional contribution added by general intelligence in the prediction of GPA decreased from 15.7% to 12.2% when entered after Work Drive ($R^2\Delta = .157$, $p<.01$, compared to $R^2\Delta = .122$, $p<.01$, respectively); and from 15.7% to 15.1% in the prediction of GPA when entered after Emotional Stability ($R^2\Delta = .157$, $p<.01$, compared to $R^2\Delta = .151$, $p<.01$, respectively). Furthermore, the additional portion added by general intelligence in the prediction of GPA, in Part 2, *increased* from its contribution in Part 1 when entered after Conscientiousness, up to 17.7% from 15.7% ($R^2\Delta = .177$, $p<.01$, compared to $R^2\Delta = .157$, $p<.01$, respectively).

A comparison of the portions of variance contributed by the variables, when examining each one's contribution in the same steps (each as step 1, each as step 2), reveals different patterns for Work Drive and general intelligence than for other personality variables and general intelligence. As step 1, Work Drive's contribution to the prediction of GPA (see Part 2) is 17.9%, higher than general intelligence's step 1 contribution of 15.7% in Part 1 ($R^2\Delta = .179$, $p<.01$, compared to $R^2\Delta = .157$, $p<.01$, respectively). In addition, similar results are evident when steps 2 are compared between Part 1 and Part 2: Work Drive added an additional 14.5% to the prediction of GPA, while General Intelligence added an additional 12.2% to the prediction of GPA ($R^2\Delta = .145$, $p<.01$, compared to $R^2\Delta = .122$, $p<.01$, respectively).

We turn next to Part 2, Table 3, which presents regression analyses for the prediction of single course grade. After controlling for Work Drive, general intelligence added an additional 9.8% to the prediction of course grade ($R^2\Delta = .098$, $p<.01$). As step 1, Work Drive accounted for 8.6% of the variance in predicting course grade ($R^2\Delta = .086$,

$p<.01$). After controlling for the Big Five as a group, general intelligence added an additional 10.9% to the prediction of course grade ($R^2\Delta = .109$, $p<.01$). As step 1, the Big Five accounted for 1.5% of the variance in predicting course grade ($R^2\Delta = .015$, n.s.). After controlling for Conscientiousness, general intelligence added an additional 11.9% to the prediction of course grade ($R^2\Delta = .119$, $p<.01$). As step 1, Conscientiousness did not account for any of the additional variance in predicting course grade ($R^2\Delta = .000$, n.s.). After controlling for Emotional Stability, general intelligence added an additional 11.7% to the prediction of course grade ($R^2\Delta = .117$, $p<.01$). As step 1, Emotional Stability accounted for less than 1% of the variance in predicting course grade ($R^2\Delta = .003$, n.s.).

Several relationships among the variables were noted in Part 2, above, in the regression analysis for the prediction of GPA. Only one of these interesting relationships was evident in the prediction of single course grade: as step 1, each personality variable contributed unique variance in percentages similar to their respective step 2 contributions after general intelligence in Part 1. Work Drive accounted for 8.6% of the variance in predicting course grade ($R^2\Delta = .086$, $p<.01$) as step 1, and added an additional 6.5% to the prediction of course grade ($R^2\Delta = .065$, $p<.01$) as step 2; and Conscientiousness accounted for none of the variance in predicting course grade ($R^2\Delta = .000$, n.s.) as step 1, and added an additional amount less than 1% to the prediction of course grade ($R^2\Delta = .001$, n.s.) as step 2. Emotional Stability accounted for an additional amount less than 1% of the variance in predicting course grade ($R^2\Delta = .003$, n.s.) as step 1, and added an additional amount less than 1% to the prediction of course grade ($R^2\Delta = .1$, n.s.) as step 2.

Regression Analysis With The Big Five. Regression analysis for variables included in the Big Five is included in Part 3 of Tables 2 and 3. The Big Five as a group was entered, after general intelligence, as both step 2 and step 3 (before and after Work Drive) to predict GPA and single course grade. The Big Five added an additional 5.5% to the prediction of GPA ($R^2\Delta = .055$, $p<.01$) as step 2; however, when entered as step 3 (after general intelligence and Work Drive), the Big Five added an additional nonsignificant 2.3% to the prediction of GPA ($R^2\Delta = .023$, n.s.). The reverse order resulted when for the prediction of single course grade: as step 2, the Big Five added an additional 1.0% ($R^2\Delta = .010$, n.s.), while this portion increased to 3.2% in predicting single course grade ($R^2\Delta = .032$, $p<.05$) when the Big Five was entered as step 3 (after general intelligence and Work Drive).

In predicting both GPA and single course grade, Work Drive's unique variance contribution was higher than the Big Five. Work Drive added an additional 11.3% to the prediction of GPA ($R^2\Delta = .113$, $p<.01$) as step 3; and Work Drive added an additional 14.5% to the prediction of GPA ($R^2\Delta = .145$, $p<.01$) as step 2. Work Drive added an additional 9.1% to the prediction of single course grade ($R^2\Delta = .091$, $p<.01$) as step 3; and 6.5% ($R^2\Delta = .065$, $p<.01$) as step 2.

Comparison of Criterion Validity

For the third objective of this study, we compared correlation coefficients obtained, for each variable, of the two dependent measures (GPA and single course grade) to determine if they were similar to one another. We used Hotelling's *t*-test (Guilford & Fruchter, 1978) to determine t_{dr} for each variable, or the standard score for

evaluating differences between two correlated correlation coefficients. In each calculation, the correlation between GPA and single course grade (r=.52, p<.01) was considered; results are presented in Table 5. All significant predictor variables are included in this comparison: Work Drive, Conscientiousness, Emotional Stability, and general intelligence.

As displayed in Table 5, all of the correlations between personality traits and GPA and single course grade were found to be not significantly different from one another except for Conscientiousness. The t_{dr} score for Conscientiousness exceeded the accepted threshold; therefore, we conclude that the correlation coefficients between Conscientiousness and GPA and Conscientiousness and course grade are significantly different from one another. The correlation between Conscientiousness and GPA was r=.153, p<.05; and the correlation between Conscientiousness and single course grade was r=-.015 (n.s.). Like Conscientiousness, one of the correlations between Emotional Stability and academic performance was significant (for GPA, r=.14, p<.05), and one was not significant (for single course grade, r=.05, n.s.). However, unlike Conscientiousness, Emotional Stability's correlations with the dependent variables were not found to be significantly different from one another.

Additional Comments

As described in Method, this study included two sections of undergraduate students enrolled in an introductory psychology course. Data for the two sections was compiled for analytic purposes in this study. We also examined correlation coefficients and results of regression analysis for the separate course sections (with no compilation)

and found that the results were not significantly different from the results produced by the combined sections' data. We therefore conclude that the compilation of two course sections of data was appropriate and in all likelihood presents little to no probability of suppression effects.

Discussion

Work Drive's Predictive Capability

With respect to this study's first objective, Work Drive was found to be a robust predictor of both dependent variables, GPA and course grade. Work Drive, a more narrow construct than the Big Five traits, proved to be a stronger predictor than any of the other independent personality variables. While this adds to the body of knowledge concerning narrow versus broad traits, it also provides a new finding regarding the construct Work Drive, which has not previously been compared to broader traits.

These findings lend support to Paunonen and Jackson's (2000) proposition that much important variance in human behavior is not accounted for within the Big Five personality model. In fact, they argued that various factors are "not well represented in the language of personality" and recommended that such lack of inclusion be disregarded in favor of examining incremental utility as the true test of whether a variable should be considered as important to the understanding of human behavior. The present study's findings, based on regression analysis, of the significant incremental variance provided by Work Drive support Paunonen and Jackson's (2000) point of view.

In addition, Tett et al. (1991) emphasized the value of conceptual links between predictor and criterion. The Work Drive scale was tailored for students, and it was designed to include items that conceptually matched the academic success criteria. This aspect of the present study addresses Tett et al.'s (1991) observations, and it offers evidence of the importance of such conceptual linkage between predictor and criteria.

Contrary to conventional wisdom, some evidence provided by regression analyses (Part 3 of Table 2 as compared to Part 1 of Table 2) points to Work Drive as a stronger predictor of academic performance, when operationalized as GPA, than general intelligence. However, evidence provided by regression analyses in the prediction of single course grade leads to the conclusion that general intelligence is a stronger predictor than Work Drive.

These conclusions indicate that there is value in considering personality variables prior to cognitive variables when performing regression analyses. The primary value stems from the ability to compare incremental contributions between scenarios: to compare the level of unique variance provided by personality and cognitive variables when they are each entered as step 1, and to compare how stable their contributions remain in all entry orders. These findings suggest that in the prediction of GPA, when each (Work Drive and General Intelligence) have been accounted for first, there is less "left" for general intelligence than for Work Drive, because the variance contributed by Work Drive is higher as step 2 than general intelligence as step 2; and Work Drive is higher as step 1 than general intelligence as step 1. In the prediction of single course grade, the reverse pattern is observed.

Because personality variables correlated differently with GPA and single course grade, it is not surprising that regression analysis resulted in different conclusions for personality variables. However, as both Work Drive and general intelligence correlated significantly with the dependent variables, the conflicting results noted above offer the opportunity for several interpretations.

On one hand, it is possible that students may potentially "make up for" with Work Drive what they "lack" in general intelligence. This explanation addresses the evidence that Work Drive is a stronger predictor of GPA than general intelligence. From another perspective, the variance in single course grade might reflect individual differences of the two different instructors of the two course sections, especially given that course grades resulted from students' performance on exams that were different from one another and were based on different styles of lecturing.

Not only is Work Drive the strongest personality predictor, it may be described as robust in its validity. The following forms of evidence provide support for the predictive generalizability of Work Drive. First, after considering general intelligence and Work Drive, other personality variables provided no significant unique variance (with one minor exception, when Conscientiousness contributed modest unique variance when added after Work Drive in the prediction of course grade). Second, Work Drive was significant in its incremental variance contribution regardless of the step entered; whether entered as step 1, 2, 3, or 4, Work Drive provided significant unique variance. Third, whether entered as step 1, 2, 3, or 4, Work Drive was always significant at the highest probability level. Although Conscientiousness was consistently significant at the highest level for the prediction of GPA, it was significant at a lower level for course grade and

was not significant in one-half of the manipulations; Work Drive was significant at the highest level in all of the manipulations.) Fourth, the gap between the percentage unique variance contributions of Work Drive and the next highest predictor is much wider than the gap between Conscientiousness and Emotional Stability. Fifth, it is noteworthy that, for the prediction of GPA, after Emotional Stability is entered as step 2 (after general intelligence as step 1) and determined to be significant at a lower probability level, Work Drive's significance, entered as step 3 or 4, is at the highest probability level; in addition, for course grade, Emotional Stability is not significant when entered as step 2 (after general intelligence as step 1), while Work Drive's significance, entered as step 3 or 4, is significant at the highest probability level. Sixth, Work Drive outperformed the Big Five as a group when each was entered after general intelligence, providing higher incremental variance in all cases, and proving significant at the highest probability level in all manipulations, while the Big Five was not significant in one-half of the manipulations. Finally, seventh (and perhaps most importantly), Work Drive exceeded general intelligence in unique contribution, in the prediction of GPA, when each was entered as step 1 and also when each was entered as step 2.

Within the context of the current broad-narrow fidelity bandwidth discussion, this study confirmed a previous key finding that narrow constructs may have some specificity or reliable (nonrandom) variance independent of the Big Five traits (Goldberg, 1999; Jang et al., 1998; Mershon & Gorsuch, 1988; and Paunonen, 1998). In his argument that narrow measures predict better, Paunonen (1998) also concluded that aggregating into factors could result in decreased predictive accuracy due to loss of trait-specific but criterion-valid variance; this study's findings echo Paunonen's (1998) observation, with

respect to comparing the predictive capability of Work Drive to individual Big Five traits and the Big Five as a group.

The Big Five's Continuing Contribution

The second objective of this study was to examine the validity of the Big Five traits in predicting academic success. In this regard, some previous findings were confirmed while others were not. Two Big Five traits were found to significantly correlate with GPA (Conscientiousness and Emotional Stability), but none of the Big Five traits correlated significantly with course grade. Conscientiousness was also found to be significantly related to academic performance by Fritzche et al. (2002); Busato et al. (2000); Goff and Ackerman (1992); Musgrave-Marquart et al. (1997); Paunonen and Ashton (2001); and Wolfe and Johnson (1995). In addition, this study's findings echo those of Lounsbury, et al. (in press), who found that Emotional Stability was significantly related to academic performance.

Previous studies have concluded that two other Big Five traits predict academic success in addition to Conscientiousness and Emotional Stability: Openness and Agreeableness (Fritzche et al., 2002; Lounsbury et al., in press; Paunonen & Ashton, 2001; and Rothstein et al., 1994). In contrast to this study, Lounsbury et al (in press) found that Openness was positively related to course grade (the only dependent variable for that study); however, that study's participants were comprised entirely of upperclassmen, while the present study included primarily freshmen and sophomores.

Thus, while the present study supports the usefulness of the Big Five model in the prediction of academic performance, the predictive power of the Big Five was surpassed

by the more narrow measure Work Drive, lending support for the view of narrow measures' superior capability when compared to the more broad traits subsumed within the Big Five. The superiority of Work Drive is emphasized by its performance in regression analysis; it consumes almost all significant unique variance when Work Drive is considered prior to Big Five traits. This echoes the findings of Lounsbury et al. (in press), and adds to the body of knowledge that is seeking to understand the relative predictive power of narrow measures such as Work Drive as compared to the Big Five. This study clearly concludes that the Big Five traits add smaller unique variance than the narrow trait Work Drive in the prediction of academic performance.

Selection of Valid Criteria for Examining Academic Performance

The third objective of this study focused on a comparison of the validities obtained for each of the two dependent variables (GPA and course grade) to determine if they were significantly different from one another. Lounsbury et al. (in press) had previously argued that cumulative GPA incorporates instructor and course variability as uncontrolled sources of variance, and that using a single course grade might avoid such variability, potentially serving as a better validity criterion for research on both personality and cognitive predictors. In this sense, GPA would be analogous to a multi-item scale or test, whereas a single course grade would correspond to a single-item scale or test. Each could prove to be a valid measure, but more variability would be expected from GPA than from a single course grade.

While this is a logical approach and may yet be upheld in future research, this study found more significant relationships and additional unique variance provided by

variables in the prediction of GPA rather than in the prediction of a single course grade. This conclusion held for both for personality and cognitive variables. It is perhaps noteworthy that there were differences and similarities in comparing the two course sections included in this study. Although the two course sections were taught by different instructors and the instructors administered different exams for grading, instructors used identical textbooks and utilized a standard psychology department course syllabus. (Therefore, subject areas were covered in identical sequential order during the semester.) Also, the grading philosophy was based on a standard psychology department point-based system; students earned points for each exam, and the same number of points was required for each letter grade in each course section.

This study's findings relate directly to the ongoing discussion regarding which measures of academic performance provide the most valid and relevant criteria. Validities examined in this study included Work Drive, Conscientiousness, Emotional Stability, and general intelligence. Except for Conscientiousness, all variables' correlation coefficients for GPA and course grade were not found to be significantly different from one another. While it is important that most validities were not significantly different from one another (providing argument that a single course grade might offer a valid criterion, which is also reinforced by the strong correlation between GPA and course grade), this is balanced with two other findings: (1) not all personality variables significantly correlated with both GPA and course grade, and (2) one variable's (e.g., Conscientiousness) correlations with GPA and course grade were found to be significantly different from one another.

At least two observations might be considered; first, only one Conscientiousness coefficient (of the two Conscientiousness coefficients to the dependent variables) was significant – while Conscientiousness related significantly to GPA, its correlation to single course grade was not significant. Secondly, the pair of coefficients contained one positive and one negative correlation coefficient. The relationship with course grade was not significant, and slightly negative, while the relationship with GPA was mildly positive. All other coefficients with GPA and single course grade reflected positive relationships.

Although these findings provide evidence for concluding that there are significant differences between GPA and course grade for two variables, three other variables were found to correlate about the same to GPA and course grade. A conclusion favoring the equality of GPA and course grade is further complicated, however, by the differences in significant correlations to GPA and course grade: while Work Drive, Emotional Stability, Conscientiousness, and general intelligence correlated significantly with GPA, only Work Drive and general intelligence correlated significantly with course grade. In light of these findings, we conclude that further research is needed to determine the reliability of course grade as a valid alternate dependent measure to GPA.

CHAPTER IV: CONCLUSION

Implications for Future Research

Findings from this study begin to answer recent calls for more specific, more narrow personality constructs (such as Work Drive) than the Big Five in predicting college academic success (Lounsbury et al., 2003; Paunonen & Ashton, 2001; Paunonen & Nicol, 2001). It also adds to a growing body of knowledge regarding the influence of personality traits on academic performance. Future work should continue to study the impact of Work Drive and possibly other more narrow constructs and their roles in adding incremental unique variance in academic success in relation to Big Five traits.

This study also sheds light on a concern raised by Lounsbury et al. (in press) regarding generalizability to a more global criterion of academic performance: GPA. By including both course grade and GPA in the analysis, this study found that these two different criteria produced similar and also a few dissimilar validities when general intelligence, Big Five personality traits, and Work Drive were used as predictors. Regrettably, this study's findings do not provide conclusive evidence for the equivalent use of GPA and course grade. Future research could investigate whether differential validity patterns can be found using course grade or GPA as criteria.

Perhaps the strongest implication for future research is offered by this study is the need for further investigation of differences between cognitive and personality variables' capability in predicting academic performance as well as other important outcomes. As demonstrated by regression analysis in Parts 1 and 2 of Table 2, Work Drive out-

performed general intelligence in predicting GPA by adding larger amounts of unique variance, both as step 1 and step 2. Given the extensive history of general intelligence's dominance as the strongest predictor of academic success, it is critical that future research examine whether Work Drive (or perhaps other high-performing narrow traits) will add unique variance that is superior to general intelligence in other populations. In particular, for studies that focus on the measurement of academic success, future research might include student populations more diverse in grade category than the present study, which was heavily weighted with college freshmen and sophomores.

Limitations

This study had several limitations. Participants were lower-division students in an introductory psychology class, which leaves open the question of whether these results would generalize to a more robust student sample, including those taking courses in other fields. While the predominantly freshman makeup of the sample was mitigated, with regard to validity of GPA, to those freshmen who were in their second semester (data were collected during the second semester of the year, and students were told that they could not participate if they were in their first semester of college), another aspect of the students being relatively new in their college tenure could have impacted the results. It is possible that academic performance, for lower-division students, might be influenced more by other factors than personality traits, such as maturation, study habits, involvement in other activities on campus, and adjusting to the role of student during the first year or two at college.

Also, the measure of GPA was based on self-report data using a seven-category scale; this limits the conclusions in at least two ways: (1) self-report data often has an inherent social desirability bias (Assor & Connell, 1992), potentially rendering it less reliable than actual GPA; and (2) a seven-category scale is not an objective index of actual GPA using the full range of possible values for grade-point-average. In addition, the present study was conducted in a single university located in the Southeastern United States; results may differ if other colleges and universities in other geographic regions were sampled.

Summary

To summarize, this study provided new evidence to support the continuing debate about the predictive capabilities of narrow versus broad personality traits, and it conclusively found that a narrow trait predicted better than broader traits. In fact, Work Drive was a stronger predictor than general intelligence for the dependent variable GPA. This study also confirmed previous findings of significant validities between General Intelligence and Work Drive in relation to academic performance. The validity of the Big Five personality traits for academic performance in the present study both confirmed and differed from prior findings. Finally, the present results indicated conflicting evidence concerning the differential validity pattern using either course grade or GPA as a criterion for collegiate academic performance, and conclusive statements about the appropriateness of substituting course grade for GPA cannot be made on the basis of this study. Future research could examine these issues in the context of other personality and cognitive ability measures as well as other criteria for academic performance.

REFERENCES

REFERENCES

Allport, G.W. (1937). *Personality: A psychological interpretation.* New York: Holt.

Anastasi, A. & Urbina, S. (1997). *Psychological testing*. Upper Saddle River, NJ: Prentice Hall.

Ashton, M.C. (1998). Personality and job performance: the importance of narrow traits. *Journal of Organizational Behavior, 19*, 289-303.

Assor, A. & Connell, J.P. (1992). The validity of students' self-reports as measures of performance affecting self-appraisals. In D.H. Schunk and J.L. Meece (Eds.), *Student perceptions in the classroom* (pp. 25-47). Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc.

Barrick, M.R. & Mount, M.K. (1991). The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44*, 1-26.

Block, J. (1995). A contrarian view of the five-factor approach to personality description. *Psychological Bulletin, 117*, 187-215.

Bono, J.E. & Judge, T.A. (2003). Core self-evaluations: A review of the trait and its role in job satisfaction and job performance. *European Journal of Personality, 17*, 5-18.

Borkenau, P. & Ostendorf, F. (1990). Comparing exploratory and confirmatory factor analysis: A study on the 5-factor model of personality. *Personality and Individual Differences, 11*, 515-524.

Borman, W.C. & Penner, L.A. (2001). Citizenship performance: Its nature, antecedents, and motives. In R.T. Hogan and B.W. Roberts (Eds.), *Personality psychology in the workplace* (pp. 45-61). Baltimore: United Book Press.

Brand, C.R. & Egan, V. (1989). The 'big five' dimensions of personality? Evidence from ipsative, adjectival self-attributions. *Personality and Individual Differences, 10*, 1165-1171.

Busato, V.V., Prins, F.J., Elshout, J.J., and Hamaker, C. (2000). Intellectual ability, learning style, personality, achievement motivation and academic success of psychology students in higher education. *Personality and Individual Differences, 29*(6), 1057-1068.

Carson, R.C. (1989). Personality. *Annual Review of Psychology, 40*, 227-248.

Cattell, R.B. (1943). The description of personality: Basic traits resolved into clusters. *Journal of Abnormal and Social Psychology, 38*, 476-506.

Cattell, R.B., Eber, H.W. & Tatsuoka, M.M. (1970). *Handbook for the sixteen personality factor questionnaire*. Champaign, IL: Institute for Personality Ability Testing.

Christopher, A.N. & Jones, J.R. (2002). How is the Protestant work ethic related to the need for cognition? A factor analytic answer. *Social Behavior and Personality, 30*(8), 741-750.

Cohen, A. (1999). Relationships among five forms of commitment: An empirical assessment. *Journal of Organizational Behavior, 20*, 285-308.

Costa, P.T. Jr. & McCrae, R.R. (1988). From catalog to classification: Murray's needs and the five factor model. *Journal of Personality and Social Psychology, 55*, 258-265.

Cronbach, L.J. (1960). *Essentials of psychological testing*. New York: Harper & Row.

Digman, J.M. (1985). *The big five factors of personality: Some efforts after meaning*. (Paper presented at the meeting of the Society of Multivariate Experimental Psychology, Berkeley, CA).

Digman, J.M. (1988). *Classical theories of trait organization and the big five factors of personality*. Presented at Annual Meeting of American Psychological Association, Atlanta, GA.

Digman, J.M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology, 41*, 417-440.

Digman, J.M. (1997). Higher-order factors of the big five. *Journal of Personality and Social Psychology, 73*(6), 1246-1256.

Erez, A. & Judge, T.A. (2001). Relationship of core self-evaluations to goal setting, motivation, and performance. *Journal of Applied Psychology, 86*(6), 1270-1279.

Eysenck, H.J. (1947). *Dimensions of personality.* London: Routledge.

Eysenck, H.J. (1970). *The structure of human personality*. London: Methuen.

Farsides, T. & Woodfield, R. (2003). Individual differences and undergraduate academic success: The roles of personality, intelligence, and application. *Personality and Individual Differences, 34*(7), 1225-1243.

Fiske, D.W. (1949). Consistency of the factorial structures of personality ratings from different sources. *Journal of Abnormal and Social Psychology*, 44, 329-344.

Fritzche, B.A., McIntire, S.A. & Yost, A.P. (2002). Holland type as a moderator of personality-performance predictions. *Journal of Vocational Behavior, 60*(3), 422-436.

Goff, M. & Ackerman, P.L. (1992). Personality-intelligence relations: Assessment of typical intellectual engagement. *Journal of Educational Psychology, 84*(4), 537-552.

Goldberg, L.R. (1993). The structure of phenotypic personality traits. *American Psychologist, 48*, 26-34.

Goulet, L.R. & Singh, P. (2002). Career commitment: A reexamination and an extension. *Journal of Vocational Behavior, 61*, 73-91.

Guilford, J.P. (1975). Factors and factors of personality. *Psychological Bulletin, 82*, 802-814.

Guilford, J.P. & Fruchter, B. (1978). *Fundamental statistics in psychology and education.* New York: McGraw-Hill.

Guion, R.M. & Gottier, R.F. (1965). Validity of personality measures in personnel selection. *Personnel Psychology, 18*, 135-164.

Hartshorne, H. & May, M.A. (1928). *Studies in deceit*. Oxford, England: Macmillan.

Hirschfeld, R.R. & Field, H.S. (2000). Work centrality and work alienation: Distinct aspects of a general commitment to work. *Journal of Organizational Behavior, 21*(7), 789-800.

Hogan, F. & Roberts, B.W. (1996). Issues and non-issues in the fidelity-bandwidth trade-off. *Journal of Organizational Behavior, 17*(6), 627-637.

Hogan, R.T. (1986). *Hogan personality inventory*. Minneapolis, MN: National Computer Systems.

Hogan, R.T. & Roberts, B.W. (2001). Introduction: Personality and industrial and organizational psychology. In R.T. Hogan and B.W. Roberts (Eds.), *Personality psychology in the workplace* (pp. 3-16). Baltimore: United Book Press.

John, O.P. (1989). Towards a taxonomy of personality descriptors. In D. Buss & N. Cantor's (Eds.) *Personality Psychology: Recent trends and emerging directions*. New York: Springer-Verlag.

John, O.P. (1990). The "big-five" taxonomy: Dimensions of personality in the natural language and in questionnaires. In L. Pervin (ed.), *Handbook of personality theory and research* (pp. 66-100). New York: Guilford Press.

John, O.P., Hampson, S.E., & Goldberg, L.R. (1991). The basic level in personality-trait hierarchies studies of trait use and accessibility in different contexts. *Journal of Personality and Social Psychology, 60*(3), 348-361.

Judge, T.A., Locke, E.A., Durham, C.C., & Kluger, A.N. (1998). Dispositional effects on job and life satisfaction: The role of core evaluations. *Journal of Applied Psychology, 83*(1), 17-34.

Judge, T.A., Bono, J.E., & Locke, E.A. (2000). Personality and job satisfaction: The mediating role of job characteristics. *Journal of Applied Psychology, 85*(2), 237-249.

Judge, T.A., Erez, A., Bono, J.E., & Thoresen, C.J. (2002). Are measures of self-esteem, neuroticism, locus of control, and generalized self-efficacy indicators of a common core construct? *Journal of Personality and Social Psychology, 83*(3), 693-710.

Kendrick, D.T. & Funder, D.C. (1988). Profiting from controversy: Lessons from the person-situation debate. *American Psychologist, 43*, 23-34.

Leary, T. (1957). *Interpersonal diagnosis of personality*. New York: Ronald Press.

Lounsbury, J.W. & Gibson, L.W. (2002). *Personal style inventory: A work-based personality measurement system*. Knoxville, TN: Resource Associates.

Lounsbury, J.W., Gibson, L.W., & Hamrick, F.L. (in press). The development and validation of a personological measure of work drive. *Journal of Business and Psychology*.

Lounsbury, J.W., Sundstrom, E., Loveland, J.M. & Gibson, L.W. (2003). Intelligence, "Big Five" personality traits, and work drive as predictors of course grade. *Personality and Individual Differences, 35*, 1231-1239.

Lounsbury, J.W., Tatum, H.E., Chambers, W., Owens, K. & Gibson, L.W. (1999). An investigation of career decidedness in relation to "Big Five" personality constructs and life satisfaction. *College Student Journal, 33*(4), 646-652.

McAdams, D.P. (1992). The five-factor model *in* personality: A critical appraisal. *Journal of Personality, 60*(2), 329-361).

McCrae, R.R. (1989). Why I advocate the five-factor model: Joint factor analyses of the NEO-OI with other instruments. In D.M. Buss & N. Cantor (Eds.), *Personality*

psychology: recent trends and emerging directions (pp. 237-245). New York: Springer-Verlag.

McCrae, R.R. & Costa, P.T., Jr. (1987). Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology, 52*, 81-90.

McDougall, W. (1932). Of the words character and personality. *Character Personality, 1*, 3-16.

Mershon, B. & Gorsuch, R.L. (1988). Number of factors in the personality sphere: Does increase in factors increase predictability of real-life criteria? *Journal of Personality and Social Psychology, 55*(4), 675-680.

Miller, M.J., Woehr, D.J., & Hudspeth, N. (2002). The meaning and measurement of work ethic: Construction and initial validation of a multidimensional inventory [Monograph]. *Journal of Vocational Behavior, 60*, 451-489.

Mischel, W. (1968). *Personality and assessment*. New York: Wiley.

Moon, H., Hollenbeck, J.R., Humphrey, S.E., & Maue, B. (2003). The tripartite model of neuroticism and the suppression of depression and anxiety within an escalation of commitment dilemma. *Journal of Personality, 71*(3), 347-368.

Munson, H.L. & Rubenstein, B.J. (1992). School IS work: Work task learning in the classroom. *Journal of Career Development, 18*(4), 289-297.

Musgrave-Marquart, D., Bromley, S.P. & Dalley, M.B. (1997). Personality, academic attrition, and substance abuse as predictors of academic achievement in college students. *Journal of Social Behavior & Personality, 12*(2), 501-511.

Niles, F.S. (1999). Toward a cross-cultural understanding of work-related beliefs. *Human Relations, 52*(7), 855-867.

Norman, W.T. (1963). Toward an adequate taxonomy of personality attributes: Replicated factor structure in peer nomination personality ratings. *Journal of Abnormal and Social Psychology*, 66, 574-583.

Ones, D.S. & Viswesvaran, C. (1996). Bandwidth-fidelity dilemma in personality measurement for personnel selection. *Journal of Organizational Behavior, 17*(6), 609-626.

Otis, A.S. & Lennon, R.T. (1969). *Otis-Lennon Mental Ability Test Technical Handbook*. New York: Harcourt, Brace.

Paunonen, S.V. (1998). Hierarchical organization of personality and prediction of behavior. *Journal of Personality and Social Psychology, 74*(2), 538-556.

Paunonen, S.V., Rothstein, M.G., & Jackson, D.N. (1999). Narrow reasoning about the use of broad personality measures for personnel selection. *Journal of Organizational Behavior, 20*, 389-405.

Paunonen, S.V. & Jackson, D.N. (2000). What is beyond the big five? Plenty! *Journal of Personality, 68*(5), 821-835.

Paunonen, S.W. & Ashton, M.C. (2001). Big five factors and facets and the prediction of behavior. *Journal of Personality and Social Psychology, 81*(3), 524-539.

Paunonen, S.V. & Ashton, M.C. (2001). Big five predictors of academic achievement. *Journal of Research in Personality, 35*, 78-90.

Paunonen, S.V. & Nicol, A.A.M. (2001). The personality hierarchy and the prediction of work behaviors. In R.T. Hogan and B.W. Roberts (Eds.), *Personality psychology in the workplace* (pp. 161-191). Baltimore: United Book Press.

Peabody, D. & Goldberg, L.R. (1989). Some determinants of factor structures from personality-trait descriptors. *Journal of Personality and Social Psychology, 57*, 552-567.

Peterson, D.R. (1965). Scope and generality of verbally defined personality factors. *Psychological Review, 72*, 48-59.

Pogson, C.E., Cober, A.B., Doverspike, D., & Rogers, J.R. (2003). Differences in self-reported work ethic across three career stages. *Journal of Vocational Behavior, 62*(1), 189-201.

Rau, W. & Durand, A. (2000). The academic ethic and college grades: Does hard work help students to "make the grade"? *Sociology of Education, 73(1),* 19-38.

Roth, M.G., Paunonen, S.V., Rush, J.C. & King, G.A. (1994). Personality and cognitive ability predictors of performance in graduate business school. *Journal of Educational Psychology, 86*(4), 516-530.

Rothstein, M.G., Paunonen, S.V., Rush, J.C. & King, G.A. (1994). Personality and cognitive ability predictors of performance in graduate business school. *Journal of Educational Psychology, 86*(4), 516-530.

Ryan, J.J. (2002). Work values and organizational citizenship behaviors: Values that work for employees and organizations. *Journal of Business and Psychology, 17*(1), 123-132.

Saucier, G. & Goldberg, L.R. (1998). What is beyond the big five? *Journal of Personality, 66*(4), 495-524.

Schneider, R.J., Hourh, L.M. & Dunnette, M.D. (1996). Broadsided by broad traits: How to sink science in five dimensions or less. *Journal of Organizational Behavior, 17*(6), 639-655.

Shannon, C. & Weaver, W. (1949). *The mathematical theory of communication*, Urbana, IL: University of Illinois Press.

Spector, P.E. (1996). Introduction, point/counterpoint. *Journal of Organizational Behavior, 17*(6), 607.

Stagner, R. (1937). *Psychology of personality*. New York: McGraw-Hill.

Stewart, G.L. (1999). Trait bandwidth and stages of job performance: Assessing differential effects for conscientiousness and its subtraits. *Journal of Applied Psychology, 84*(6), 959-968.

Tellegen, A. (1985). Structures of mood and personality and their relevance to assessing anxiety with an emphasis on self-report. In A. Tuma and J. Maser (Eds.), *Anxiety and the anxiety disorders* (pp. 681-706). Hillsdale, New Jersey: Erlbaum.

Tett, R.P., Jackson, D.N, & Rothstein, M. (1991). Personality measures as predictors of job performance: A meta-analytic review. *Personnel Psychology, 44*, 703-742.

Tupes, E.C. & Christal, R.E. (1961). Recurrent personality factors based on trait ratings. *Journal of Personality, 60*, 225-251.

Weiten, W. (1995). *Psychology: Themes and variations* (3rd ed.). Pacific Grove, California: Brooks-Cole.

Wiggins, J.S. & Trapnell, P.D. (1997). Personality structure: The return of the big five. In R. Hogan, J.A. Johnson, & S.R. Briggs (Eds.), *Handbook of Personality Psychology* (pp. 737-765), San Diego, CA: Academic Press.

Wolfe, R.N. & Johnson, S.D. (1995). Personality as a predictor of college performance. *Educational and Psychological Measurement, 55*, 177-185.

Yousef, D.A. (2001a). Organizational commitment as a mediator of the relationship between Islamic work ethic and attitudes toward organizational change. *Human Relations, 53*(4), 513-537.

Yousef, D.A. (2001b). Islamic work ethic: A moderator between organizational commitment and job satisfaction in a cross-cultural context. *Personnel Review, 30*(1-2), 152-169.

APPENDICES

TABLES 1 THROUGH 5

Table 1: Descriptive Statistics and Intercorrelations for Study Variables

		(1)	(2)	(3)	(4)	(5)	(6)
Emotional Stability	(1)	---					
Conscientiousness	(2)	.05	---				
Work Drive	(3)	.10	.52**	---			
General intelligence	(4)	.06	-.14*	.12	---		
Course grade	(5)	.05	-.02	.29**	.35**	---	
Grade Point Average	(6)	.14*	.15*	.42**	.40**	.52**	---
Mean		3.13	3.34	2.86	0.53	3.70	4.12
Standard Deviation		0.75	0.64	0.64	0.15	1.08	1.46

n = 286
*p<.05 **p<.01

Table 2: Hierarchical Multiple Regression Results for Significant Variables
Dependent Variable: Cumulative Grade Point Average (GPA)

Part 1: General intelligence entered first; all possible combinations entered for variables that significantly correlated with dependent variables

Step	Variable	Multiple *R*	R^2	R^2 Change
1	General intelligence	0.396**	0.157**	0.157**
2	Work Drive	0.549**	0.302**	0.145**
3	Conscientiousness	0.549	0.302	0.000
4	Emotional Stability	0.555	0.307	0.006
1	General intelligence	0.396**	0.157**	0.157**
2	Work Drive	0.549**	0.302**	0.145**
3	Emotional Stability	0.555	0.307	0.006
4	Conscientiousness	0.555	0.307	0.000
1	General intelligence	0.396**	0.157**	0.157**
2	Conscientiousness	0.446**	0.199**	0.042**
3	Work Drive	0.549**	0.302**	0.103**
4	Emotional Stability	0.555	0.307	0.006
1	General intelligence	0.396**	0.157**	0.157**
2	Conscientiousness	0.446**	0.199**	0.042**
3	Emotional Stability	0.457	0.209	0.010
4	Work Drive	0.555**	0.307**	0.098**
1	General intelligence	0.396**	0.157**	0.157**
2	Emotional Stability	0.412*	0.169*	0.013*
3	Work Drive	0.555**	0.307**	0.138**
4	Conscientiousness	0.555	0.307	0.000
1	General intelligence	0.396**	0.157**	0.157**
2	Emotional Stability	0.412*	0.169*	0.013*
3	Conscientiousness	0.457**	0.209**	0.040**
4	Work Drive	0.555**	0.307**	0.098**

n = 286
*p< .05 **p<.01

Table 2: Continued

Part 2: Variables that significantly correlated with dependent variables entered, separately, prior to general intelligence

Step	Variable	Multiple *R*	R^2	R^2 Change
1	Work Drive	.423**	.179**	.179**
2	General intelligence	.549**	.302**	.122**
1	Big Five	0.214*	0.046*	0.046*
2	General intelligence	0.460**	0.212**	0.166**
1	Conscientiousness	.149*	.022*	.022*
2	General intelligence	.446**	.199**	.177**
1	Emotional Stability	.137*	.019*	.019*
2	General intelligence	.412**	.169**	.151**

Part 3: General intelligence entered first; Big Five personality traits (as a group) and Work Drive entered subsequently

Step	Variable	Multiple *R*	R^2	R^2 Change
1	General intelligence	0.396**	0.157**	0.157**
2	Big Five	0.460**	0.212**	0.055**
3	Work Drive	0.570**	0.325**	0.113**
1	General intelligence	0.396**	0.157**	0.157**
2	Work Drive	0.549**	0.302**	0.145**
3	Big Five	0.570	0.325	0.023

n = 286
*p< .05 **p<.01

Table 3: Hierarchical Multiple Regression Results for Significant Variables
Dependent Variable: Single Course Grade

Part 1: General intelligence entered first; all possible combinations entered for variables that significantly correlated with dependent variables

Step	Variable	Multiple *R*	R^2	R^2 Change
1	General intelligence	0.344**	0.118**	0.118**
2	Work Drive	0.429**	0.184**	0.065**
3	Conscientiousness	0.447*	0.199*	0.016*
4	Emotional Stability	0.447	0.199	0.000
1	General intelligence	0.344**	0.118**	0.118**
2	Work Drive	0.429**	0.184**	0.065**
3	Emotional Stability	0.429	0.184	0.000
4	Conscientiousness	0.447*	0.199*	0.016*
1	General intelligence	0.344**	0.118**	0.118**
2	Conscientiousness	0.346	0.119	0.001
3	Work Drive	0.447**	0.199**	0.080**
4	Emotional Stability	0.447	0.199	0.000
1	General intelligence	0.344**	0.118**	0.118**
2	Conscientiousness	0.346	0.119	0.001
3	Emotional Stability	0.347	0.120	0.001
4	Work Drive	0.447**	0.199**	0.079**
1	General intelligence	0.344**	0.118**	0.118**
2	Emotional Stability	0.345	0.119	0.001
3	Work Drive	0.429**	0.184**	0.064**
4	Conscientiousness	0.447*	0.199*	0.016*
1	General intelligence	0.344**	0.118**	0.118**
2	Emotional Stability	0.345	0.199	0.001
3	Conscientiousness	0.347	0.120	0.001
4	Work Drive	0.447**	0.199**	0.079**

n = 286
*p< .05 **p<.01

Table 3: Continued

Part 2: Variables that significantly correlated with dependent variables entered, separately, prior to general intelligence

Step	Variable	Multiple *R*	R^2	R^2 Change
1	Work Drive	.293**	.086**	.086**
2	General intelligence	.429**	.184**	.098**
1	Big Five	0.122	0.015	0.015
2	General intelligence	0.353**	0.124**	0.109**
1	Conscientiousness	0.015	0.000	0.000
2	General intelligence	0.346**	0.119**	0.119**
1	Emotional Stability	0.052	0.003	0.003
2	General Intelligence	0.345**	0.119**	0.117**

Part 3: General intelligence entered first; Big Five personality traits (as a group) and Work Drive entered subsequently

Step	Variable	Multiple *R*	R^2	R^2 Change
1	General intelligence	0.344**	0.118**	0.118**
2	Big Five	0.353	0.124	0.006
3	Work Drive	0.465**	0.216**	0.091**
1	General intelligence	0.344**	0.118**	0.118**
2	Work Drive	0.429**	0.184**	0.065**
3	Big Five	0.465*	0.216*	0.032*

n = 286
*p< .05 **p<.01

Table 4: Summary of Tables 2 and 3, Part 1
Rank Ordering of Personality Variables Contributing Unique Variance

Dependent Variable: Combined GPA and Single Course Grade

Rank Order	**Variable**	**Percent Contribution Range**	**Number of Occurrences As Significant**	***p*-values**
1	Work Drive	6.4% - 14.5%	12 of 12	$p<.01$
2	Conscientiousness	1.6% - 4.2%	6 of 12	$p<.01$ and $p<.05$
3	Emotional Stability	1.3%	2 of 12	$p<.05$

Dependent Variable: GPA

Rank Order	**Variable**	**Percent Contribution Range**	**Number of Occurrences As Significant**	***p*-values**
1	Work Drive	9.8% - 14.5%	6 of 6	$p<.01$
2	Conscientiousness	4.0% - 4.2%	3 of 6	$p<.01$
3	Emotional Stability	1.3%	2 of 6	$p<.05$

Dependent Variable: Single Course Grade

Rank Order	**Variable**	**Percent Contribution Range**	**Number of Occurrences As Significant**	***p*-values**
1	Work Drive	6.4% - 8%	6 of 6	$p<.01$
2	Conscientiousness	1.6%	3 of 6	$p<.05$
3	Emotional Stability	-	0 of 6	-

n = 286
*$p< .05$ **$p<.01$

Table 5: Calculation of Differences Between Correlation Coefficients
All Big Five Variables and Significant Variables

Variable	***r*xy**	***r*xz**	***r*yz**	t_{dr}
Extraversion	.515	-.070	.038	1.458[1]
Agreeableness	.515	-.067	.046	1.337[1]
Conscientiousness	.515	-.015	.153*	2.922[2]
Emotional Stability	.515	.063	.154**	1.466[1]
Openness	.515	.032	.064	0.496[1]
Work Drive	.515	.293**	.424**	2.482[1]
General intelligence	.515	.351**	.404**	1.007[1]

n = 286
*p < .05 **p<.01

*r*xy = *r* course grade to GPA
*r*xz = *r* variable to course grade
*r*yz = *r* variable to GPA

$$t_{dr} = (r_{xz} - r_{yz}) \sqrt{\frac{(N-3)(1+r_{xy})}{2(1-r_{xy}^2-r_{xz}^2-r_{yz}^2+2r_{xy}r_{xz}r_{yz}}}$$

Where t is interpreted as a regular standard normal t value with (N-3) degrees of freedom; special *t*-test developed by Hotelling (Guilford & Fruchter, 1978).

[1] t_{dr} < 2.56 (p<.01 cutoff); correlations are not significantly different from one another
[2] t_{dr} > 2.56 (p<.01 cutoff); correlations are significantly different from one another

APPENDIX 1

Appendix 1

Information/Consent Form

This survey is part of an ongoing research program concerned with the personality traits of people in different types of jobs and academic settings. In this particular project, we are interested in how different personality variables compare with aptitude factors in the prediction of academic achievement. In order for us to obtain the latter information, you are asked to authorize the release of your course grade information from your instructor.

Your participation in this research is voluntary. You are, therefore, under no obligation whatsoever to answer any question you do not wish to answer. Your Social Security number is required in order for us to match your questionnaire information with your course grade. However, your instructor will not have access to your responses to these questions and the research assistants will not have access to your name. Therefore, your responses will remain anonymous. If you want to receive feedback on your results, however, please give your name and mailing address to the interviewer/research assistant.

If you have any questions please contact Prof. John Lounsbury at (865) 974-3423 or 577-6089. Address: Department of Psychology, University of Tennessee, Knoxville, TN 37996-0900.

Statement of Consent

I understand that my participation is voluntary and that I may withdraw from participation at any time without penalty. I authorize the release of my course grade for the purposes of the current research project and understand that any identifiers will be removed once all of the information has been matched.

_____ _____

Signature of Participant Date

_____

Print Name

VITA

Susan D. Ridgell was born in Memphis, Tennessee, on October 3, 1960. She attended public schools in Memphis, Tennessee; Overton County, Tennessee; and Monterey, Tennessee; and graduated from Carson-Newman College in Jefferson City, Tennessee, in May of 1981, with a Bachelor of Science in Accounting. During the period September 1981 through June 2000, Ms. Ridgell worked in several positions at the Tennessee Valley Authority (TVA) in Knoxville, Tennessee, in accounting, auditing, and finance. She became a Certified Public Accountant in 1987. When Ms. Ridgell left the TVA in 2000 to pursue a Ph.D. in Experimental Psychology at the University of Tennessee in Knoxville, she was Manager, Finance, and supervised the regulation of TVA's electrical distributors' rate change actions as well as various credit risk assessment activities.

At the University of Tennessee, Ms. Ridgell served as Teaching Assistant and Research Assistant. During three semesters (summer 2001, fall 2001, and spring 2002), she taught Introductory Psychology in the Psychology Department. She pursued research in the area of personality. While in her Ph.D. program, Ms. Ridgell conducted several industrial-organizational consulting projects; these included work at a large manufacturing corporation with which she coordinated corporate policy with its German headquarters, and a local manufacturing plant which also has global operations. After receiving her Ph.D., Ms. Ridgell plans to teach part-time at the University of Tennessee and pursue industrial-organizational psychology consulting projects.