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A STRUCTURAL EQUATIONS ANALYSIS OF THE RELATIONSHIP BETWEEN PERSONALITY AND PERFORMANCE IN A SUPERVISORY ASSESSMENT CENTER

A Dissertation

Presented for the

Doctor of Philosophy

Degree

The University of Tennessee, Knoxville

David W. Denton

August 1996

To the Graduate Council:

I am submitting a dissertation written by David W. Denton entitled "A Structural Equations Analysis of the Relationship Between Personality and Performance in a Supervisory Assessment Center." I have examined the final copy of this dissertation and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Industrial/Organizational Psychology.

Robert T. Ladd, Major Professor

We have read this dissertation
and recommend its acceptance:

Accepted for the Council:

Associate Vice Chancellor and
Dean of The Graduate School

ACKNOWLEDGMENTS

This has been a "long time coming." I began my journey toward this moment in September 1987 with my enrollment in the doctoral program in industrial/organizational psychology. Work on the dissertation itself began in early 1991. So many people have played a part in any professional success I've enjoyed over the last nine years, it's hard to know where to begin to offer thanks.

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Tom Ladd agreed to replace Joyce as chair. Tom was there to provide me with invaluable experience as a member of the Tennessee Assessment Center team, to write "specials" questions for me, to help me conceptualize my dissertation research and prepare a proposal, and to review numerous drafts of the document. I've worked on this research while living in three different cities--Knoxville, Birmingham, and Clarksville. I've also held a full time professional level position during this period. Doing a "distance dissertation" while holding down a full time job has been extremely challenging. Tom could have easily written me off as someone who was unlikely to ever finish. Instead, I feel our relationship has grown stronger over the years. Tom, thanks for

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ABSTRACT

This research proposed and tested a factorial model of the personality-job performance relationship. The factorial model for personality was based on the factor structure of the California Psychological Inventory (CPI). There are some apparent conceptual similarities between the factors that emerge from the CPI and the five-factor model of personality. Specifically, two of the "Big-Five" factors, conscientiousness and extraversion, are conceptually similar to the two largest factors from the CPI and were so named in this study. A third Big-Five factor, openness to experience, bears some resemblance to flexibility, the third personality factor used in this study.

Job performance was operationally defined as performance in a managerial assessment center. Specifically, this research hypothesized the existence of four assessment center performance factors--influencing others, interpersonal effectiveness, decision making, and resource allocation. This is consistent with empirical research findings showing that assessors tend to cognitively reduce a larger number of assessment center dimensions to a more manageable number when rating assessment center performance (Schmitt, 1977). A measure of cognitive ability was also included in this study to enable an assessment of the incremental validity of the personality factors for predicting the assessment center performance factors.

This research was intended to overcome two major weaknesses in previous research in this area--the failure to operationally define both personality and job

performance at the appropriate level of specificity, and the failure to hypothesize any theoretically meaningful relationships between these two variables.

Participants in this study were internal candidates for supervisory positions at four regional locations of a manufacturing organization. Data from 101 candidates, of whom 71% were male, was available for analysis. The Analysis of Moment Structures (AMOS) software package was employed to test the proposed measurement and structural models. The results of the analyses failed to support the viability of the proposed factorial model of personality for predicting the assessment center performance factors. Post hoc regression analyses of the relationship between individual personality scales and individual assessment center dimensions revealed some significant relationships. Implications for future research in this area are discussed.

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Chapter 1

INTRODUCTION

The role of personality in predicting job performance has been viewed with suspicion for some time. Research in the '50s and '60s (e.g., Ghiselli & Barthol, 1953; Guion & Gottier, 1965) resulted in the conclusion that the use of personality measures to predict job performance was futile. For example, the seminal article by Guion and Gottier (1965) concluded that "it is difficult ... to advocate, with a clear conscience, the use of personality measures in most situations as a basis for making employment decisions" (p. 160).

However, there has been a recent resurgence of interest in this topic. A search of the PsycLIT database for the descriptor "personality and job performance" yielded nearly twice as many citations for the period 1986-1996 as for the preceding ten years. This renewed interest can be attributed in part to concerns about previous conceptualizations of the personality-job performance relationship, the data analysis approaches used in previous studies in this area, and the impact these factors had on previous research conclusions.

Given these concerns, the present study revisited the relationship between personality and job performance. This chapter will attempt to highlight some of the major weaknesses of previous studies of the personality-job performance relationship

and provide an overview of the present study, which attempted to overcome these weaknesses.

Weaknesses in Previous Studies of the Personality-Job Performance Relationship

Both qualitative (e.g. Guion & Gottier, 1965) and quantitative (e.g. Schmitt, Gooding, Noe & Kirsch, 1984) reviews of the relationship between personality and job performance have seemingly offered little reason for continued study in this area. However, in most cases, the studies examined for these reviews had one or more weaknesses that contributed to the overall negative findings. These weaknesses relate to the manner in which job performance and personality were conceptualized., and to the theoretical basis for data analysis.

Dimensionality of job performance. Though Guion and Gottier (1965) are often cited as major critics of the continued study of the personality-job performance relationship, a careful reading of their work reveals that they were aware of a problem that limited the meaningfulness of much of the early research. The problem lies with the criterion measures used in the validation studies on which previous personality-job performance findings have been based. In most personality-job performance studies, both past and present, job performance has been operationalized through the use of a global criterion measure. However, most scholars believe that job performance is not a unitary construct but is instead multi-dimensional in nature (e.g., Campbell, McCloy, Oppler, & Sager, 1993).

Campbell et al (1993) argue that a general factor cannot possibly represent the best fit to the totality of job performance. For example, the personality dimension extraversion would be expected to predict a more narrow criterion measure such as interpersonal skills but be less successful at predicting overall job performance for sales people. The use of a uni-dimensional criterion measure would most likely mask the true value of extraversion in predicting an important component of job performance in this case.

Dimensionality of personality. Though most measures of personality represent the construct as multi-dimensional, many studies of the personality-job performance relationship treat personality as if it were a unitary construct. A decision to treat personality as uni-dimensional necessitates combining individual personality dimensions into some omnibus personality measure. Such an aggregate measure may involve combining some dimension measures that relate positively to a criterion with others that might relate negatively with that same criterion (Tett, Jackson, & Rothstein, 1991). The effect might be to mask significant relationships between aspects of personality and a criterion measure. This problem is exacerbated when many studies are combined for a cumulative review (Tett et al, 1991).

Researchers in many fields dealing with human behavior grapple with the issue of prediction versus explanation when operationalizing independent and dependent variables. In the personality-job performance literature, it is unfortunate that, in many cases, neither goal has been achieved. Some success at both prediction and explanation may be possible by examining the predictive and explanatory power of a collection of

personality factors that represent a middle ground between the use of very specific personality dimensions or scales and aggregate, global measures of personality.

Theoretical basis for data analysis. In addition to the inappropriate conceptualization of both predictors and criteria, previous studies have used a purely exploratory approach in assessing the personality-job performance relationship. Guion and Gottier (1965) note that examining the overall relationship between personality and job performance in an exploratory sense should be replaced by an attempt to hypothesize theoretical relationships between personality dimensions and relevant criteria. Earlier research was plagued by our relatively limited knowledge of the role of job analysis in attempting to establish such theoretical relationships (Day & Silverman, 1989). Given the atheoretical approach of previous research and the use of uni-dimensional predictor and criterion measures, it is not surprising that little relationship has been found between personality and job performance.

These problems, inherent in many individual studies, have been compounded when the studies have been assembled for review. The conclusions drawn in the qualitative review by Guion and Gottier (1965) were based on the relative frequency of statistically significant findings across personality scales. Two problems exist with this approach. First, the aggregation of studies across personality dimensions may mask the effects of specific constructs. As mentioned previously, personality is not a unitary construct. Second, the qualitative assessment of individual significance tests as the basis for evaluating the personality-job performance relationship fails to recognize the very real possibility of committing Type II errors (Schmidt, 1992). Recent work in the area of

meta-analysis suggests that over-reliance on significance testing ignores the influence of sample size, criterion unreliability, predictor unreliability, and range restriction on the outcome of these tests (Hunter & Schmidt, 1990).

The use of meta-analysis as an alternative to basing results on the frequency of statistically significant findings is not without problems, however (Tett, Jackson, & Rothstein, 1991). The aggregation of correlations that takes place when a meta-analysis is performed can have a biasing effect on the final results. If no theoretical basis has been advanced for the relationship between personality and performance, some researchers recommend averaging the absolute value of correlations across studies, rather than averaging the actual correlation values, to avoid the possibility that positive and negative correlations will cancel each other out (Tett, Jackson, & Rothstein, 1991). However, the researcher runs the risk of overestimating rho if he aggregates absolute values, or underestimating rho if instead he prefers to average positive and negative values. Clearly, theory-driven research is necessary concerning the personality-job performance relationship given these data analysis problems.

Summary. The failure of previous studies to develop a theoretical framework in which to assess the personality-job performance relationship, the failure to appropriately dimensionalize both personality and job performance, and the potential for a misleading interpretation of cumulative reviews in this area, provide a significant justification for revisiting the personality-job performance relationship. The next section describes the present study and the way in which it attempted to respond to the weaknesses of previous research in this area.

The Present Study

The present study was designed to assess the personality-performance relationship in a way that minimizes the limitations of previous work in this area. This relationship was assessed within the context of a managerial assessment center. The primary goal of this research was to test an a priori structural model of the relationship between three stable personality factors and four assessment center performance factors.

*Performance factors and the assessment center context.*The assessment center context offers an excellent opportunity to examine the personality-job performance relationship (Bray & Howard, 1983). While it does not constitute job performance itself, assessment center performance can be viewed as a work sample that closely approximates actual job performance (Gatewood & Feild, 1994).

The performance of assessees in an assessment center is rated on a number of dimensions that have been identified by a job analysis as important for successful job performance. These dimensions provide the kind of focused criteria against which personality factors should be validated (Day & Silverman, 1989). The use of job analysis to identify specific performance dimensions and the associated knowledge, skills, abilities, and other attributes permits the development of personality-job performance hypotheses based on some underlying model of successful job performance. Research suggests that such an approach improves the chances of finding meaningful relationships between predictor and criterion measures (Day & Silverman, 1989; Tett, Jackson, & Rothstein, 1991).

Assessment center research suggests that assessors classify individual dimensions into a smaller number of performance factors for evaluation purposes (Gaugler & Thornton, 1989). The present study suggested the existence of four assessment center performance factors--influencing others, decision making, resource allocation, and interpersonal effectiveness.

*Personality factors and the California Psychological Inventory.*The multi-dimensional nature of personality has received renewed interest recently, particularly with the emergence of the "Big-Five" personality factors (Tupes & Christal, 1961). One of the problems that may have driven researchers to treat personality as a uni-dimensional construct has been the limited reliability of the scales from many personality instruments. The instrument used in this study, the California Psychological Inventory (CPI) (Gough, 1987), does not appear to have this problem. Overall, the scales from the CPI have higher reliabilities than the scales from competing instruments such as the Guilford-Zimmerman Temperament Inventory and the Jackson Personality Research Form (Buros, 1992).

The California Psychological Inventory is "... one of the better, frequently used personality tests..." (Murphy & Davidshoffer, 1994, p. 404). "Its technical development is of a high order, and it has been subjected to extensive research and continuous improvement" (Anastasi, 1982, p. 508). Gough (1984) notes that the 20- scale inventory is designed "to predict what an individual will do in a specified context" (p. 56). Factor analytic work on the CPI has repeatedly yielded three strong factors--extraversion (or surgency), conscientiousness (or control), and flexibility (Megargee, 1972). These

factors bear some similarity to the extraversion, conscientiousness, and openness to experience factors from the five-factor model of personality (Loehlin, 1987; McCrae, Costa, Piedmont, in press). There is a dearth of research on the external validity of this factor structure and the extent to which it has any predictive utility (John, 1990). The present study attempted to address this question.

It is important to note that this study is not suggesting that the self-report personality measure employed is representative of the totality of personality. It has been suggested that some elements of personality are unlikely to ever emerge from a self-report instrument (James, 1994). Nevertheless, there is ample evidence that substantial variability exists among those who complete self-report instruments. While some might argue that such variability is an artifact of the self-report methodology, this is still an open question.

Any study that addresses the validity of personality for predicting job performance must confront the validity generalization finding regarding measures of general cognitive ability (e.g., Schmidt & Hunter, 1981). A true test of the validity of personality for predicting job performance is the extent to which personality can provide predictive utility beyond that available from intellectual ability alone. Consequently, the present study employed a measure of cognitive ability in an attempt to establish the predictive utility of personality.

Chapter 2

LITERATURE REVIEW AND RESEARCH HYPOTHESES

This chapter reviews the literature concerning the relationship between personality and job performance and posits the nature of a structural model that may explain this relationship for the position of supervisor. The first section is an analysis of a collection of literature reviews completed prior to 1990. These reviews have effectively limited the amount of research in the personality-job performance domain. More recent reviews are then analyzed and some conclusions are drawn concerning the most appropriate approach for studying the personality-job performance relationship. The second section proposes a structural model of the relationship between personality and job performance for the job of supervisor and offers empirical and rational support for this conceptualization.

Earlier Reviews

An early review of the personality-job performance relationship conducted by Ghiselli and Barthol (1953) had a significant impact on research in this area. This review examined the validity of personality tests used in industrial settings from 1919 to 1953. The finding, based on 113 validity studies, revealed overall mean validities for personality tests ranging from .14 for supervisory positions to .36 for sales positions. The overall mean validity of personality measures, calculated across job categories,

personality dimensions, and criteria, was .22. Ghiselli and Barthol (1953) cautioned against drawing any sweeping conclusions about the value of personality in predicting job performance based on this figure because there was great variability in the validity coefficients used in the analysis (i.e., a number of studies yielded negative or nonsignificant results).

A number of points should be made about this review and the conclusions to be drawn from it. The concern about the presence of some negative and nonsignificant validity coefficients in the data set should not be allowed to detract from the overall finding. Such variability in validity coefficients is to be expected when the population value and the sample sizes are relatively small (Tett et al, 1991). The more important issue, however, is the interpretation of the overall finding. The overall mean validity of .22 may be attenuated because the individual validity coefficients selected for the study were chosen somewhat haphazardly.

Ghiselli and Barthol posited that the size of correlation between personality and job performance could be increased by selecting predictors having conceptual links with important criterion measures (Ghiselli & Barthol, 1953). These researchers examined job titles as the basis for the development of these conceptual links. Unfortunately, job titles are not a good substitute for job analysis information when developing such linkages (Gael, 1983). Consequently, this approach may have resulted in an uneven selection of validity coefficients for inclusion in the review (i.e., some based on sound conceptual links and others based on weak links). This may well have resulted in an underestimation of the personality-job performance relationship.

A final caveat concerning the interpretation of the Ghiselli and Barthol result centers on the predictor and criterion measures employed in the individual studies included in the review. Both predictors and criteria were overall omnibus measures and were somewhat less sophisticated than such measures are today. Recent advances in understanding the dimensionality of job performance and the development of predictor and criterion measures offer some hope that the personality-job performance relationship might be stronger than suggested by Ghiselli and Barthol.

The review that has had the most profound impact on the study of the relationship between personality and job performance was conducted by Guion and Gottier (1965). Reviewing articles published in the *Journal of Applied Psychology* and *Personnel Psychology* from 1952-1963, they found that only 10% of the reported validity coefficients were significant. Their conclusion was that the validity of personality was situation specific at best--"... in some situations, for some purposes, some personality instruments can offer helpful prediction" (p. 161). Not surprisingly, Guion and Gottier (1965) found that the studies included in their review suffered from some of the same problems noted by Ghiselli and Barthol (1953). Research designs used for most of the studies reviewed were consistently inadequate, and little attempt was made to hypothesize theoretical relationships between specific personality instruments and measures of job performance.

It is important to note that this review (Guion & Gottier, 1965), unlike the one conducted by Ghiselli and Barthol (1953) is a qualitative one. Guion and Gottier focused on the frequency of statistically significant findings. To the extent that the true effect

size in the population is greater than zero, the use of individual significance tests to draw general conclusions may lead to significant increases in the Type II error rate (Schmidt, 1992).

In 1966, Ghiselli published the results of a comprehensive review of tests designed to predict managerial effectiveness. This review included hundreds of studies published between 1919 and 1964. Because of the tremendous amount of data and the varying quality of the instruments used in conducting the studies, Ghiselli chose to average the validities of all studies by converting r's to Fischer's z, averaging the z values, and converting them back to r's. The average reported validity coefficient for predicting job performance using measures of personality was .27 for executives and .15 for foremen.

Once again, these validity coefficients should be viewed as underestimates of the true relationship between personality and job performance (Campbell, Dunnette, Lawler, & Weick, 1970). In aggregating validity coefficients, no attempt was made to account for study design (predictive or concurrent), to control for range restriction, or to assess the reliability of measures. In addition, only a minimal attempt was made to hypothesize any theoretical relationships between personality and job performance. As has been the case so often in the past, the criterion measure was a general measure of job performance (Ghiselli, 1966).

One of the first meta-analyses performed to review the personality-job performance relationship appeared in 1984 (Schmitt, Gooding, Noe, & Kirsch, 1984). The personality-job performance relationship was one of several predictor-criterion

relationships studied. This review analyzed studies published in the *Journal of Applied Psychology* and *Personnel Psychology* from 1964 - 1982. The sample-weighted mean validity for the relationship between personality and performance ratings was .21 based on 32 validity coefficients and total sample of 4,065. This result seems to support the earlier finding of Ghiselli and Barthol (1953). As with that study, however, the Schmitt et al (1984) analysis is open to question.

The aggregation of validity coefficients for this meta-analysis appears to be problematic. Schmitt et al (1984) aggregated a collection of studies in which different validation strategies had been employed. The choice of a validation strategy moderated the observed predictor-criterion relationship across all predictor and criterion measures. The specific effect on the personality-performance ratings relationship was not reported. In addition, the reliabilities of the personality instruments used in these studies varied widely. These factors could certainly have had the effect of underestimating the true relationship between personality and job performance.

A second concern regarding aggregation is a mathematical one. Positive and negative correlations were averaged together with little theoretical support. In the absence of a theoretical basis for assessing the personality-job performance relationship, it is customary to average absolute values of validity coefficients and correct for the expected upward bias rather than run the risk that the positive and negative correlations will cancel each other out and obscure a true relationship (Tett et al, 1991). Thus, the mean validity estimate of .21 is most likely an underestimate of the true personality-job performance relationship.

In summary, the early reviews of the personality-job performance relationship were methodologically biased against finding significant and meaningful results. Three problems seem to be common to these reviews. First, each review analyzed studies that were overwhelmingly exploratory in nature. That is, little attempt was made on the part of researchers to hypothesize specific relationships between personality and job performance. Despite the advice from Guion and Gottier (1965), this appeared to change little over the years.

A second problem concerns the lack of dimensionality in conceptualizing both predictors and criteria. Researchers tended to treat both personality and job performance as uni-dimensional constructs. Though many common personality measures are multi-dimensional (e.g., MMPI, CPI), an aggregate personality score was often used to predict performance. Similarly, on the criterion side, the rating of overall job performance by a supervisor was the most common criterion measure. While this is an often-used criterion measure, recent advances in the conceptualization of job performance (e.g., Campbell et al, 1993) suggest that this is not always the most appropriate criterion.

Finally, these earlier reviews suffer from some data analysis weaknesses. Whether it be an over-reliance on the collective meaning of individual significance tests or the failure to aggregate personality-job performance validity coefficients correctly, the results reported in these reviews tend to underestimate the value of using personality measures to predict job performance.

Later Reviews

By 1990, articles began to appear that attempted to address some of the weaknesses of previous reviews of the personality-job performance relationship. Because the decision to aggregate validity coefficients across personality constructs obscured the true relationship between personality and job performance, Hough, Eaton, Dunnette, Kamp and McCloy (1990) attempted to examine this relationship by correlating meaningful personality dimensions or constructs with job performance. To assess these personality constructs, Hough et al developed an instrument called the Assessment of Background and Life Experiences (ABLE) Inventory.

This inventory consisted of ten scales, six of which focused on what Hough et al referred to as temperament. Development of these scales was based on a review of 12 multi-scale temperament inventories and was grounded in the taxonomy of personality known as the "Big Five" (e.g., Tupes & Christal, 1961). Hough et al (1990) focused on the constructs of adjustment, agreeableness, surgency, dependability, and achievement for further study. The internal consistency reliabilities for the scales ranged from .69 to .84, with a median of .81. Test-retest reliabilities ranged from .69 to .85, with a median of .78.

The researchers assessed the validity of these constructs for predicting job performance on a large sample of military personnel (N = 9,359). Five composite criterion measures were identified--core technical proficiency, general soldiering proficiency, effort and leadership, personal discipline, and physical fitness and military bearing. The standing of each soldier on these criteria was made on the basis of test

results, ratings, disciplinary records, and awards. The results confirmed that specific temperament/personality constructs can predict job performance successfully (Hough et al, 1990). Specifically, the *un*corrected correlation between two measures of surgency, and effort and leadership were .15 and .22 respectively. The *un*corrected correlation between two measures of achievement, and effort and leadership were .20 and .23, respectively (Hough et al, 1990). Though certainly not overwhelming, these results do suggest that further study of the personality-job performance relationship is warranted.

McHenry, Hough, Toquam, Hanson, and Ashworth (1990) analyzed a large sample of data (N = 4,039) from Project A, a major research project funded by the U.S. Army Research Institute, to improve the prediction of job performance of enlisted personnel. They found substantial corrected correlations between a temperament/ personality composite and the criterion measures mentioned above, ranging from .26 for core technical proficiency to .37 for physical fitness and military bearing. In this instance, however, they used a general personality measure to predict relatively specific criterion measures. As Pulakos, Borman, and Hough (1988) suggest, stronger relationships are likely to be found when specific predictors are used.

Barrick and Mount (1991) focused on the validity of specific dimensions of personality. They conducted a meta-analysis of the relationship between the "Big Five" personality factors and measures of job proficiency, training proficiency, and personnel data across different occupational groups. The personality dimensions were labeled extraversion, emotional stability, agreeableness, conscientiousness, and openness to experience (Digman, 1990). Their review included 117 studies conducted from 1952 -

1988. The total N ranged from 7,611 to 11,335, depending on the personality factor being assessed. The number of validity coefficients available ranged from 37 to 59.

For the occupational group "Managers," which is of greatest interest in the context of the present study, the estimated true correlation between extraversion and all three criteria was .18, and for conscientiousness it was .22. Again, these results, while significant, may underestimate the true relationships, because the validity coefficients from individual studies were averaged without using absolute values. This tends to obscure the true size of the relationship between personality and job performance (Tett et al, 1991). In addition, the criterion measure used in this instance combined job proficiency, training proficiency, and personnel data into a global criterion. It is difficult to posit any theoretically meaningful relationships with such a multi-dimensional criterion.

A more recent attempt to investigate the relationship between personality and job performance is the study conducted by Tett, Jackson, and Rothstein (1991). These investigators conducted a meta-analysis that assessed both the overall validity of personality for predicting job performance and the validity of the "Big Five" personality factors. The review included 97 independent samples gathered from 1968 to 1991 (N = 13,521). Tett and colleagues (1991) found the corrected mean correlation between personality and job performance to be .24. Validities for the "Big Five" personality factors ranged from .16 for extraversion to .33 for agreeableness, across both job types and criterion measures. (The absolute values of individual validity coefficients were used in the aggregation and a correction factor was applied to avoid a positive bias in the

findings.) The relatively modest size of these coefficients can most likely be attributed to the fact that an aggregate measure of job performance was employed.

In addition to the findings cited above, this study also addressed two important factors that can affect the personality-job performance relationship--the use of a confirmatory versus an exploratory approach for generating hypotheses, and the use of job analysis as the basis for selecting relevant personality constructs. When only those studies that employed a confirmatory strategy are examined, the corrected mean validity coefficient cited above improves from .17 to .24 (Tett, Jackson, Rothstein, & Reddon, 1994).

As for the effects of basing the selection of personality constructs on a job analysis, Tett et al (1991, 1994) suggest that the validity of personality for predicting job performance will improve significantly for those confirmatory studies in which a job analysis is employed. Some controversy surrounds this proposition. In the original Tett et al study published in 1991, they found that the validity coefficient for the relationship between personality and job performance increased when a confirmatory approach using job analysis had been employed, However, a re-examination of the data led to the conclusion that the observed differences were non-significant (Tett et al, 1994). This is not a closed issue, however, as these findings were based on only seven studies. Furthermore, Day and Silverman (1989) demonstrated that conceptually similar predictor and criterion measures, necessary if one is to find meaningful relationships between personality and job performance, are most likely to be uncovered as the result of a job analysis. It is important to note that the overall conclusions reached by Tett et al

were realized while aggregating across both personality dimensions and job performance dimensions, a limitation that has already been addressed.

The reviews summarized to this point suggest that a meaningful relationship between personality and job performance can be realized if the following are true:

- the construct of personality is treated as multi-dimensional,
- the construct of job performance is treated as multi-dimensional,
- the choice of predictor and criterion measures is based on rational, empirical, or theoretical grounds where job analysis has been employed,
- the hypotheses to be tested are confirmatory rather than exploratory, and
- the chosen approach to data analysis is free from bias against finding meaningful relationships between personality and job performance.

The present study attempted to address each of these recommendations.

The Present Study

The present study assessed the personality-job performance relationship among supervisors by testing a structural model of the relationship between specific personality factors and specific factors of managerial performance common to a variety of first-line supervisory positions. Part one of this section discusses the ways in which this study attempted to address some of the weaknesses of previous studies in this area. Part two consists of a discussion of the individual components of the model and provides rational and empirical support for the specific linkages proposed. (It should be noted that many

of the studies cited suffer from some of the weaknesses mentioned previously. Nevertheless, they provide indirect support for the proposed structural model.)

Dimensions of personality. One of the principle weaknesses of previous studies assessing the personality-job performance relationship concerns the dimensionality of personality. Many early studies in this area operationalized personality as uni-dimensional, despite the fact that most major personality instruments (e.g., MMPI, CPI) are multi-dimensional. Psychologists wrestle constantly with the need to predict behavior in specific situations versus the need to offer more general explanations of behavior across situations. The use of an overall measure of personality accomplishes neither objective. While it may be possible to use individual scales from specific personality instruments to make predictions about behavior, one runs the risk of being unable to generalize from those predictions to explain behavior in a variety of situations.

Over the years, psychologists have proposed various personality taxonomies to aid in predicting behavior in specific situations and yet also provide some explanations of behavior across situations. A recent attempt to identify such a taxonomy of personality dimensions can be found in the five-factor model of personality (e.g., John, 1990). Other taxonomies of personality factors include those by Eysenck (1990), Hogan and Hogan (1992), and Peabody (1984).

Work in a variety of "research camps" has provided clear support for the emergence of a small number of robust personality constructs. Chief among them is the dimension named extraversion or surgency (e.g., Fiske, 1949; Tupes & Christal, 1961; Norman, 1963; Borgatta, 1964; Goldberg, 1981, 1989; McCrae & Costa, 1985; John,

1989). The extraversion factor is similar to Eysenck's Extraversion/Introversion construct (Digman, 1990). This factor reflects an orientation toward others. Terms typically associated with the positive end of this dimension include self-assured, sociable, gregarious, and talkative (Barrick & Mount, 1991). This factor is clearly represented in the California Psychological Inventory (Gough, 1987).

Another personality dimension that has received interest of late, particularly among proponents of the five-factor model of personality, is a dimension that has been labeled conscientiousness (McCrae & Costa, 1985). Schmidt and Hunter (1992) have gone so far as to say that "conscientiousness may eventually be viewed as the most important trait motivation variable in the work domain." While not as clearly defined as extraversion, this dimension seems to suggest an individual who is thorough, diligent, rule-abiding, and perseverant (McCrae & John, in press). Terms used to describe persons high on this dimension might include responsible, organized, planful, dependable, prudent, hard-working, and achievement-oriented (John, 1989). Support for the existence of the elements of this dimension can be found in research outside the domain of the "Big Five" including the Hogan Personality Inventory (1992), Gough's Work Orientation Scale (1985), and recent research on integrity testing (e.g., Ones, Viswesvaran, & Schmidt, 1993). Pre-dating the "discovery" of the "Big Five," the foundations of the conscientiousness scale in the California Personality Inventory can be traced to early factor analyses of the instrument cited in Megargee (1972). Recent work by McCrae and Costa (McCrae, Costa, & Piedmont, in press) and Loehlin (1987) suggest the existence of this factor in the CPI.

Another personality dimension of interest is flexibility. Flexibility refers to adaptability, openness to new ideas and experiences, and independence. This dimension has received a limited amount of research attention. It is probably most closely aligned with the dimension labeled "openness to experience" from the "Big-Five" taxonomy. This dimension has a certain amount of intuitive appeal, particularly in regard to the occupational group of interest in this study: supervisors. Such terms as broad-minded, curious, intelligent, original, and flexible are often mentioned in connection with flexibility (Digman, 1990). One would find little argument from managers that flexibility in dealing with people and resources is one of the keys to managerial success (Eccles & Nohria, 1992).

While various dimensions of personality have begun to emerge in the literature through taxonomic research, little attention has been paid to the predictive utility of these dimensions. The present research proposed to examine the structural properties of the dimensions of extraversion (surgency), conscientiousness, and flexibility in relation to specific dimensions of job performance. A discussion of the important dimensions of job performance for managers follows.

Dimensions of job performance. The "criterion problem" has plagued the field of industrial psychology for some time. Traditionally, much more emphasis has been devoted to predictor measures; criterion measures are considered only as an afterthought in most validation research (Borman & Motowidlo, 1993). However, the present study specifically considered the dimensionality of managerial job performance.

The structure of managerial jobs has been a topic of intense interest for some time (Campbell et al, 1970). A researcher faced with determining the most important dimensions of managerial job performance has many conceptualizations from which to choose (e.g., Flanagan, 1951; Hemphill, 1959; Prien, 1963; Campbell et al, 1970; Mintzberg, 1973; Pinto & Tornow, 1976; Luthans, Rosenkrantz, & Hennessey, 1985; Yukl, 1987; Kraut, Pedigo, McKenna, & Dunnette, 1989). Recent theoretical work by Campbell et al (1993) describes a taxonomy of performance components, across all types of jobs. This taxonomy consists of eight performance factors: 1) job-specific task proficiency, 2) non-job-specific task proficiency, 3) written and oral communication task proficiency, 4) demonstrating effort, 5) maintaining personal discipline, 6) facilitating peer and team performance, 7) supervision/leadership, and 8) management/administration. The present study focused on the last two components.

Borman and Brush (1993) developed a taxonomy of managerial performance dimensions by examining the published and unpublished managerial behavior literature over the last fifty years. A panel of 30 industrial and organizational psychologist reviewed a large number of empirical studies and identified 246 specific dimensions of managerial performance. It was suggested that the 246 original dimensions be sorted into six to twenty categories based on dimension similarity. A similarity matrix was constructed and factor analyzed to yield eighteen "mega-dimensions." These dimensions included planning and organizing; guiding, directing, and motivating subordinates; decision making/problem solving; selling/influencing; and handling crises and stress.

The Borman and Brush (1993) analysis focuses on managerial behavior in the context of performance. Because the resulting taxonomy was based on an analysis of empirical studies across a wide range of managerial jobs, it is among the more robust taxonomies available.

Assessment center research represents an important body of empirical work for understanding the dimensionality of managerial job performance (Thornton & Byam, 1982). Assessment center work has operationalized the dimensions of managerial job performance in a laboratory-like setting, i.e., an assessment center. Thornton and Byam (1982) define a dimension as "a cluster of behaviors that are specific, observable, and verifiable, and that can be reliably and logically classified together" (p. 117). A number of important managerial dimensions have been hypothesized in assessment center research, including but not limited to leadership, initiative, judgment, analysis, decisiveness, stress tolerance, confrontation, oral communication, written communication, and delegation skills (Thornton & Byam, 1982). (A detailed discussion of the operation of an assessment center can be found in Chapter 3.) The overlap between the assessment center work on managerial performance and the Borman and Brush taxonomy is substantial.

Assessment center research suggests that raters reduce these dimensions to a more manageable number when evaluating managerial performance (Thornton & Byam, 1982). Schmitt (1977), for example, conducted a principal components analysis of the assessment center ratings of 101 potential middle managers on 17 judgmental dimensions of managerial performance. Three broad factors that Schmidt labeled

administrative skills, interpersonal skills, and activity level emerged from this analysis. The administrative skills factor was defined by such dimensions as organizing and planning, decision making, and decisiveness. The interpersonal skills factor consisted of such dimensions as leadership skill, awareness of social environment, and self-objectivity. The activity level factor included such dimensions as resistance to stress, energy, forcefulness, and need for advancement.

Additional support for the tendency of raters to reduce a large number of dimensions to a more manageable number can be found in the work of Sackett and Hakel (1979), Russell (1985), and Shore, Thornton, and Shore (1990). Shore and colleagues (1990) hypothesized the existence of two broad assessment center performance factors--interpersonal style and performance style. They found support for this dichotomy in a sample of 441. In addition, the data provided some evidence for the convergent and discriminant validity of these dimensions. For example, measures of cognitive ability correlated more highly with performance-style measures than with interpersonal-style indicators as hypothesized.

Gaugler and Thornton (1989) asked trained assessors to evaluate the performance of confederates in an assessment center simulation on three, six, or nine dimensions. They found that assessors evaluating performance on only three dimensions were more accurate in classifying behavior and provided more accurate ratings than those assessors evaluating six or nine dimensions. Gaugler and Thornton (1989) concluded that evaluations of three dimensions created less cognitive overload for raters.

The assessment center research reviewed here suggests that assessors, when faced with a large number of dimensions, will cognitively reduce this number to a more manageable size (Schmitt, 1977). And when assessors are asked to rate performance on a small number of dimensions a priori, research shows that the ratings are more accurate. These findings suggest that managerial performance, as operationalized by an assessment center, can be captured in relatively few dimensions. These dimensions are closely aligned with the "mega-dimensions" described in the Borman and Brush taxonomy.

In the present study, the assessment center methodology was used to assess behaviors of salient factors of managerial performance. These performance factors were labeled influencing others, decision making, resource allocation, and interpersonal effectiveness. Influencing others involves initiative, leadership, and oral communication. Decision making consists of such activities as analysis, judgment, and decisiveness. Resource allocation consists of such activities as planning and organizing, and delegation. And interpersonal effectiveness consists of confrontation, sensitivity, and stress tolerance.

The factors of managerial performance examined in this study represent approximately 41% of the variance in managerial performance as described by the Borman and Brush taxonomy. A further discussion of how these performance factors are operationalized can be found in Chapter 3.

Cognitive ability and the personality-job performance relationship. The study of personality and its relationship to job performance should be examined in the context of general mental ability or cognitive ability. Schmidt & Hunter (1981) argue that general mental ability is a valid predictor of job performance for all jobs across all settings. Some have even offered evidence that general mental ability is the *best* predictor of job performance across jobs and settings (e.g., Ree & Earles, 1992). Other researchers disagree (e.g., McClelland, 1993). Nevertheless, there appears to be ample evidence that some level of validity obtains for cognitive ability in many situations. In a validity generalization analysis conducted by Hunter, Schmidt, and Judiesch (1990), the average validity coefficient for general mental ability ranged from .58 for jobs of high complexity to .23 for jobs of low complexity. In light of the evidence supporting the validity of cognitive ability in predicting job performance, the present study examined the incremental validity of personality for predicting job performance in the presence of cognitive ability.

The Structural Model

In this section, the literature is reviewed as it relates to the proposed structural model (Figure 1). (The meaning of individual symbols in the model and the manner in which it was tested are addressed in Chapter 3.)

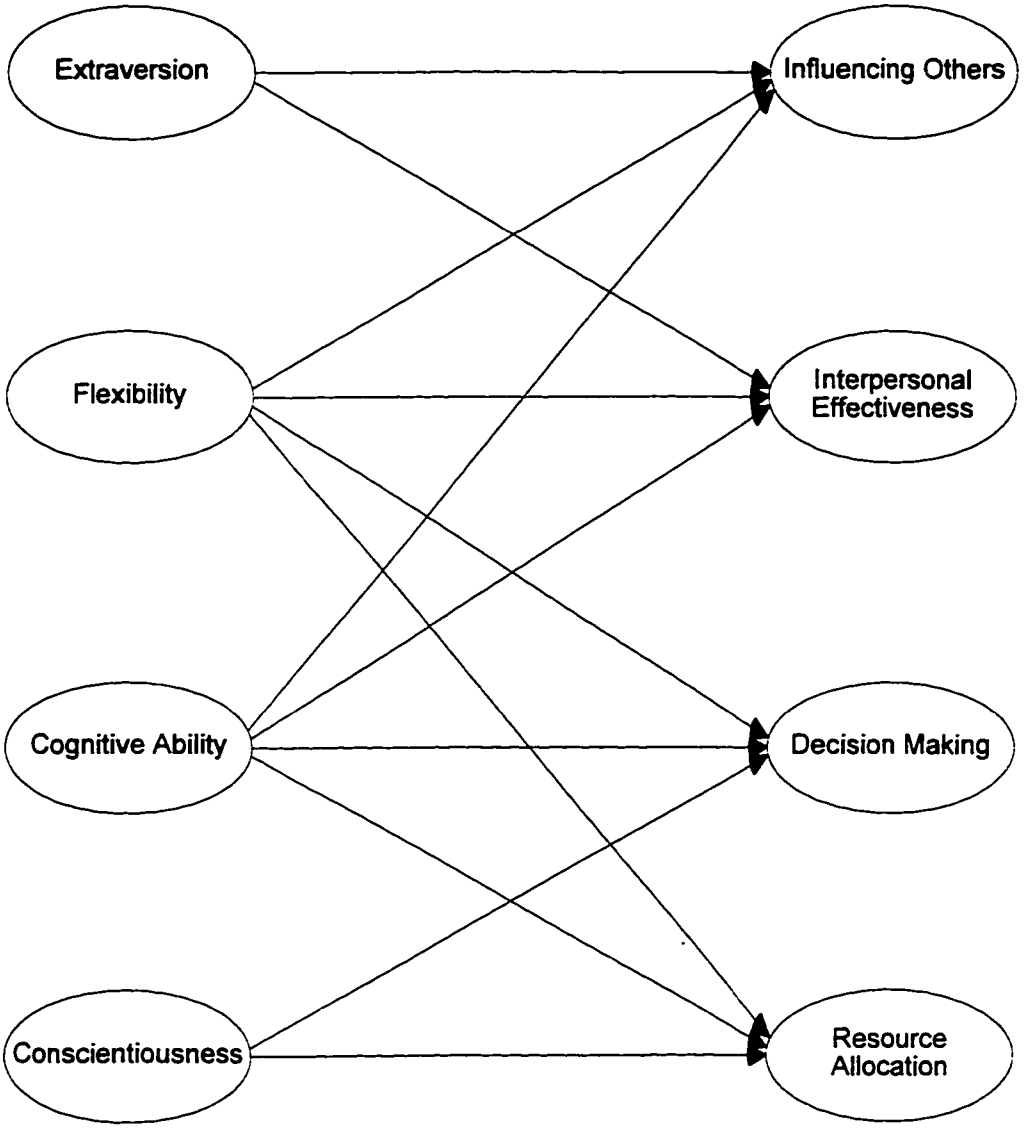


Figure 1: Structural Model

The hypothesized structural relationships between the personality dimensions (i.e., extraversion, conscientiousness, flexibility, and cognitive ability) and the job performance dimensions (i.e., decision making, interpersonal effectiveness, resource allocation, and influencing others) are outlined, along with rational and empirical support.

The review of the literature conducted for this paper found no comprehensive attempt to assess the structural properties of the personality dimensions mentioned above. However, some correlational work for individual dimensions can be cited as evidence to justify the linkages hypothesized by the structural model. Beginning with extraversion, the hypothesized links between the personality dimensions and the dimensions of managerial job performance are discussed. Both empirical and rational arguments are advanced in support of these links.

Extraversion and the structural model. The extraversion dimension of personality reflects a focus on interpersonal behavior (Gough, 1987). This dimension has a long history in psychology (John, 1990). Extraverted individuals tend to be comfortable in, and demonstrate initiative in, social settings. The proposed structural model hypothesizes links between extraversion and the criterion dimensions of interpersonal effectiveness and influencing others (Figure 2).

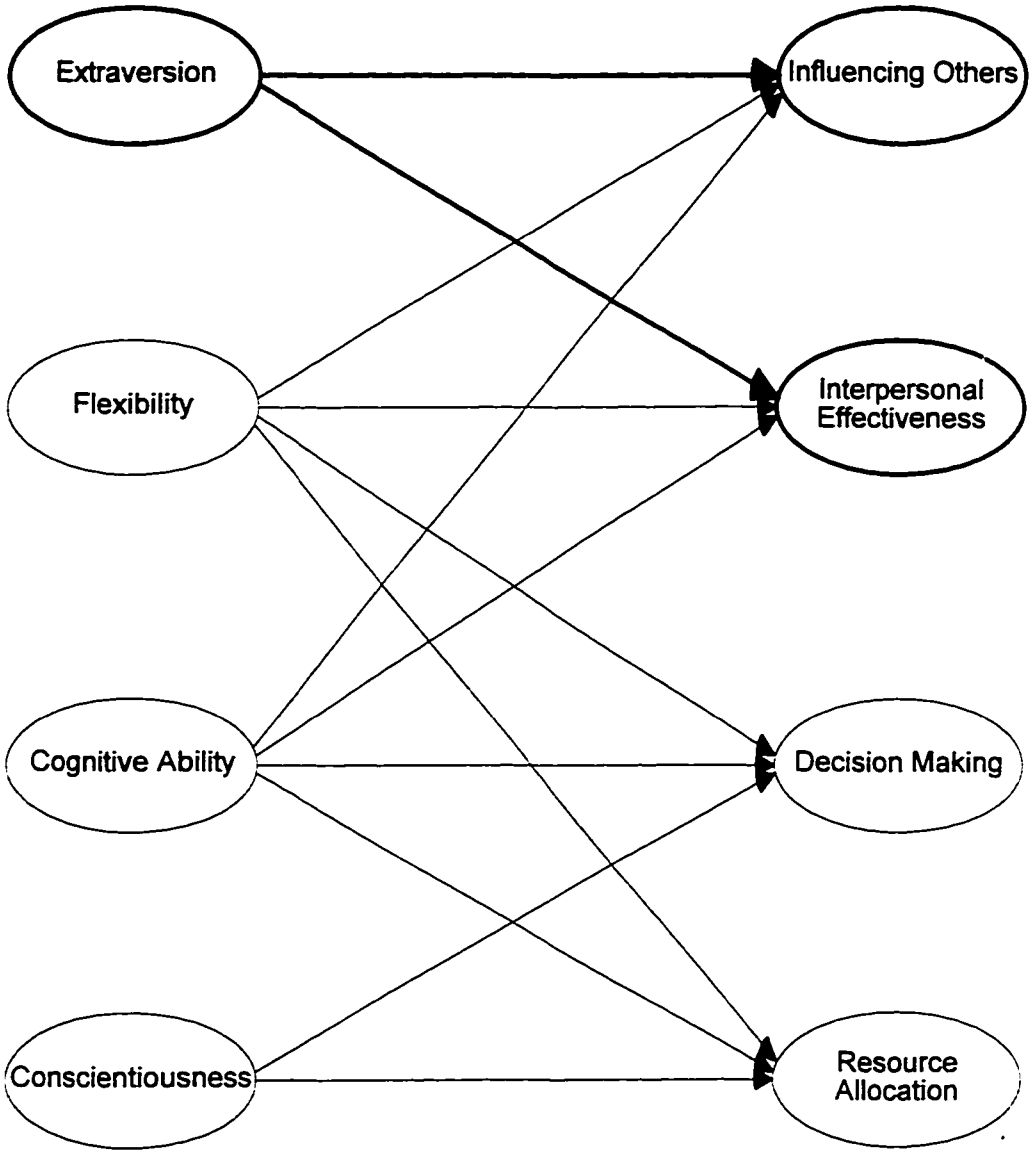


Figure 2. Extraversion Links

Day and Silverman (1989) found significant correlations between a measure similar to extraversion (i.e., quality of interpersonal relations) and measures of potential for success (.34), client relations (.36), cooperativeness (.45), and a global criterion (.36). As mentioned earlier, Hough et al (1990) found significant uncorrected correlations between components of extraversion (i.e., dominance and energy level) and effort & leadership (.15 and .22, respectively).

Crawley, Pinder, and Herriot (1990) uncovered significant uncorrected relationships between two measures of extraversion (i.e., Myers-Briggs E-I scale, Occupational Personality Questionnaire Assertiveness scale), and interpersonal sensitivity (.22 and .20) and persuasiveness (.16 and .19). While these correlations are small, they are significant and were derived without incorporating the recommendations outlined in an earlier section of this chapter. Using a criterion of career progress, Schippmann and Prien (1989) found correlations of .27 and .26, with two measures representing elements of extraversion (i.e., dominance and n power).

Two additional studies provide some support for the hypothesized links between extraversion and interpersonal effectiveness and influencing others. Hakstian, Woolsey, and Schroeder (1987) assessed the validity of a large-scale assessment battery in an industrial setting. For a sample of female managers, Hakstian and colleagues found significant uncorrected correlations between a measure of extraversion (i.e., social ascendancy) and ambition (.28); overall interpersonal skills (.29); and self-confidence (.32). Pulakos et al (1988) found that elements of extraversion (i.e., dominance, sociability, and social closeness) were correlated with a measure of human relations

skills (.22, .14, and .17, respectively) among a sample of Navy Recruiters. These uncorrected empirical correlations agreed with the a priori hypothesized pattern of relationships suggested by a panel of industrial and organizational psychologists having at least ten years experience in personnel selection research (Pulakos et al, 1988). The expert panel estimated the true correlation between dominance, socialibility, and social closeness and a measure of human relations to be .38, .59, and .58, respectively.

These studies appear to provide some direct and indirect empirical support for the structural relationships indicated in Figure 2. Rational arguments can also be made for the proposed linkages in the model. The ability to influence others as a manager requires strong oral communication skills, the ability to motivate individuals to accomplish goals, and initiative in making work assignments and interacting with employees. It is at least plausible to assume that a person who is high on the extraversion dimension will demonstrate a greater level of influence over others than one who is not. Similarly, managers must exhibit interpersonal effectiveness as they deal with employees performing at all points along the performance continuum from poor to outstanding. The ability to confront effectively, tolerate the stress that often accompanies confrontation, and remain sensitive to employee's concerns would seem to be greatest in those who are sociable, outgoing, poised, and self-assured.

Conscientiousness and the structural model. The personality dimension of conscientiousness may be the most important trait motivation variable in the work domain (Schmidt & Hunter, 1992). Individuals scoring high on this dimension are described as planful, responsible, dependable, hardworking, rule-abiding, and ambitious (Schmidt & Hunter, 1992). The proposed structural model hypothesizes links between conscientiousness and the criterion dimensions of decision making and resource allocation (Figure 3).

Elements of the conscientiousness dimension have received increasing attention in the literature in recent years. As is the case with many personality dimensions, criterion-related validity studies have focused on more global criterion measures. The results of studies reported below will, in many cases, represent an underestimate of the true relationship between measures of conscientiousness and specific, focused criterion measures.

The Mount and Barrick (1990) meta-analysis cited earlier also addressed the relationship between conscientiousness and the criterion measures of overall job proficiency, training proficiency, and personnel data. The estimated true score correlation across all criterion types was .22. For the measure of overall job proficiency, the correlation was .21 and for the training proficiency criterion it was .30.

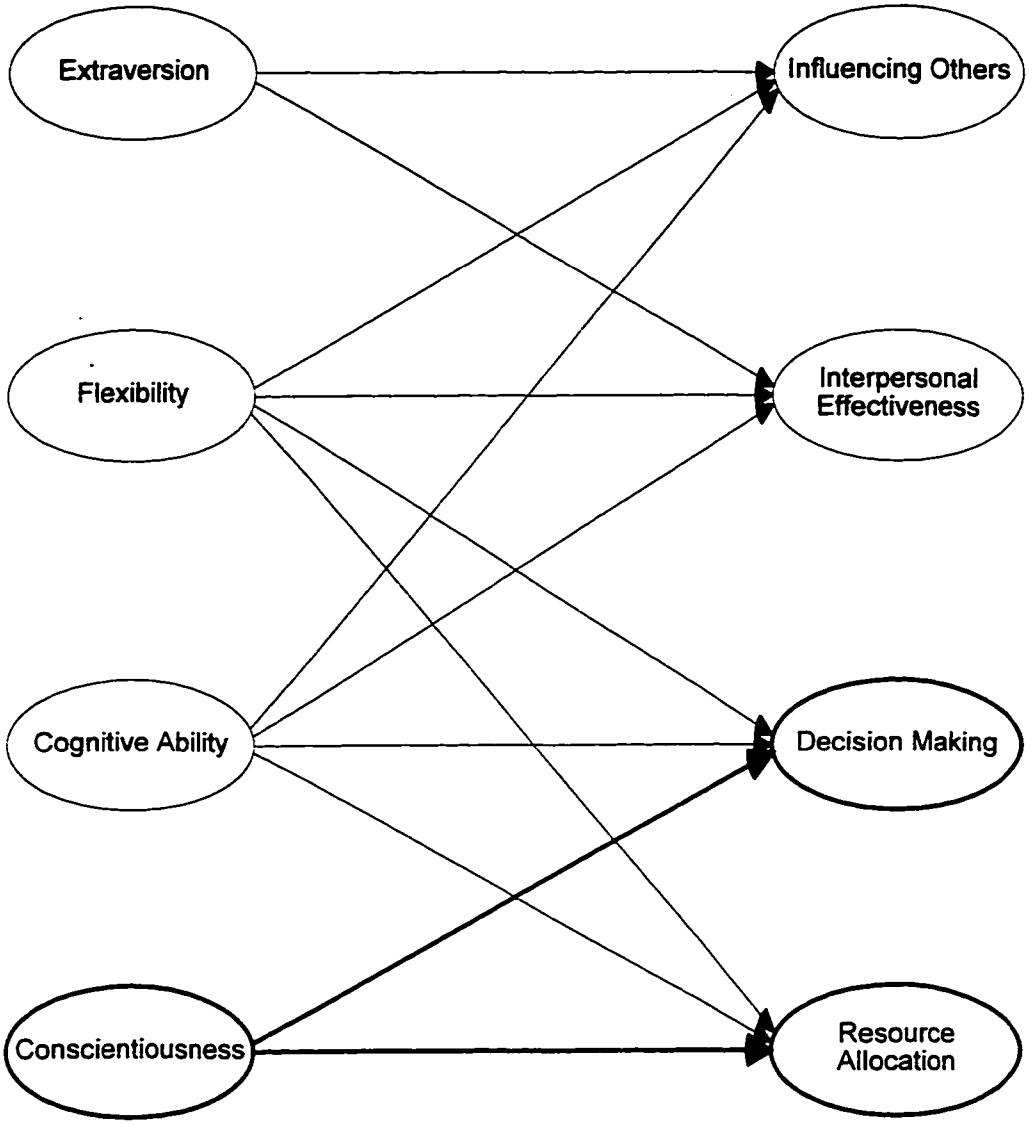


Figure 3. Conscientiousness Links

Again, it is important to remember that the observed correlations were aggregated for the purpose of arriving at the estimated true correlation. As Tett el al (1991) have cautioned, this may result in a downward bias in the estimate of the true score correlation for measures of personality.

As part of their analysis of the Project A database, McHenry et al (1990) examined the relationship between measures of conscientiousness (i.e., achievement orientation, and dependability) and a criterion of effort & leadership. The correlations were .30 for achievement orientation and .22 for dependability. Borman, White, Pulakos, and Oppler (1991) tested a model of supervisory job performance ratings on a sample of military personnel. This model was designed to assess the effect of various factors--including measures of achievement orientation and dependability--on overall supervisory ratings of job performance.

Borman et al (1991) found significant corrected path coefficients with supervisory ratings and achievement orientation (.12) and dependability (.15). The correlation between achievement orientation and dependability was .54. In addition, achievement orientation had an indirect effect on supervisory ratings through a measure of awards. The corrected path coefficient from achievement orientation to awards was .21 and from awards to supervisory ratings .15. Similarly, dependability had a significant though indirect effect on supervisory ratings through a measure of disciplinary action. The corrected path coefficient from dependability to disciplinary action was -.23 and from disciplinary action to supervisory ratings -.27 (Borman et al, 1991).

Pulakos et al (1988) examined the estimated and empirical correlations between several personality scales and specific criterion measures for a sample of Navy recruiters. They found significant correlations between the criterion measure organizing skills, defined as planning ahead and organizing time effectively, and personality scales measuring aspects of conscientiousness, including hard work (.24), order (.40), good impression (.34), socialization (.35), and achievement via conformance (.32). An expert panel of industrial and organizational psychologists and selection experts estimated the true correlations with organizing skills to be .36 for hard work, .64 for order, .16 for good impression, .31 for socialization, and .50 for achievement via conformance.

Work by Day and Silverman (1989) also supports the predictive utility of conscientiousness. These researchers examined the relationship between a measure of conscientiousness (i.e., work orientation) and a number of criterion measures for a sample of accountants. The specific relationships examined were determined based on a job analysis. Day and Silverman found significant uncorrected relationships between work orientation and technical proficiency (.28), client relations (.37), timeliness (.29), and a global performance measure (.29). Schippmann and Prien (1989) examined the correlation between measures of conscientiousness and a criterion of career progress for managers. They found significant uncorrected correlations between career progress and measures of achievement (.17) order (.27), and achievement motive (.32). And Hakstian et al (1987) found a significant uncorrected correlation between disciplined achievement and overall interpersonal skills for men (.26), and between disciplined achievement and overall management potential for women (.28).

A recent meta-analysis of the integrity testing literature by Ones et al (1993) provides additional support for the predictive utility of conscientiousness. Their analysis suggests that integrity tests measure the broad construct of conscientiousness. The estimated mean validity of integrity tests for selection, based on a criterion of supervisory ratings of job performance, was .41 (N = 7,550).

From the studies cited above, there appears to be sufficient empirical evidence to hypothesize a structural relationship between conscientiousness and decision making and resource allocation. From a rational point of view, the hypothesized relationships seem at least plausible. Someone who is success-oriented, hardworking, planful, orderly, and dependable would most likely be more successful in making decisions in which analysis and judgment are important. And certainly, conscientious individuals will be responsible and orderly in allocating physical and human resources to meet management responsibilities.

Flexibility and the structural model. While there may be a great deal of intuitive support for the hypothesized relationship between flexibility and measures of job performance (Eccles & Nohria, 1992), the empirical evidence is much less substantial than for extraversion or conscientiousness. The flexibility dimension is somewhat more difficult to define than either extraversion or conscientiousness (Digman, 1990). Common to most definitions, however, is the notion of intellectual and aesthetic flexibility with respect to feelings, thoughts, and experiences. Those who score high on this dimension can be described as imaginative, curious, intelligent, open-minded,

perceptive, and independent (John, 1989). The proposed structural model hypothesizes links between flexibility and the criterion factors of influencing others, decision making, resource allocation, and interpersonal effectiveness (Figure 4).

Rawls and Rawls (1968) examined the extent to which certain personality scales differentiated successful from less successful executives in a utility company. They found that measures of flexibility (i.e., intellectual efficiency, psychological-mindedness, and flexibility) distinguished successful from less successful executives. Hakstian et al (1987) assessed the validity of a large-scale assessment battery in an industrial setting. Significant uncorrected correlations were uncovered between a measure of flexibility (i.e., average ideational flexibility) and the criterion measures of written work (.30) and overall work performance (.32) for men, and with the criterion measure of ambition (.25) for women.

Mount and Barrick (1991) examined the validity of the openness to experience factor (i.e., the flexibility analog in the Five Factor Model) as part of a meta-analytic review of the Five-Factor Model of personality. While there was essentially no relationship between the openness to experience factor and the criterion measure of general job proficiency for managers (-.02), the relationship between this factor and a measure of training proficiency was a healthy .38.

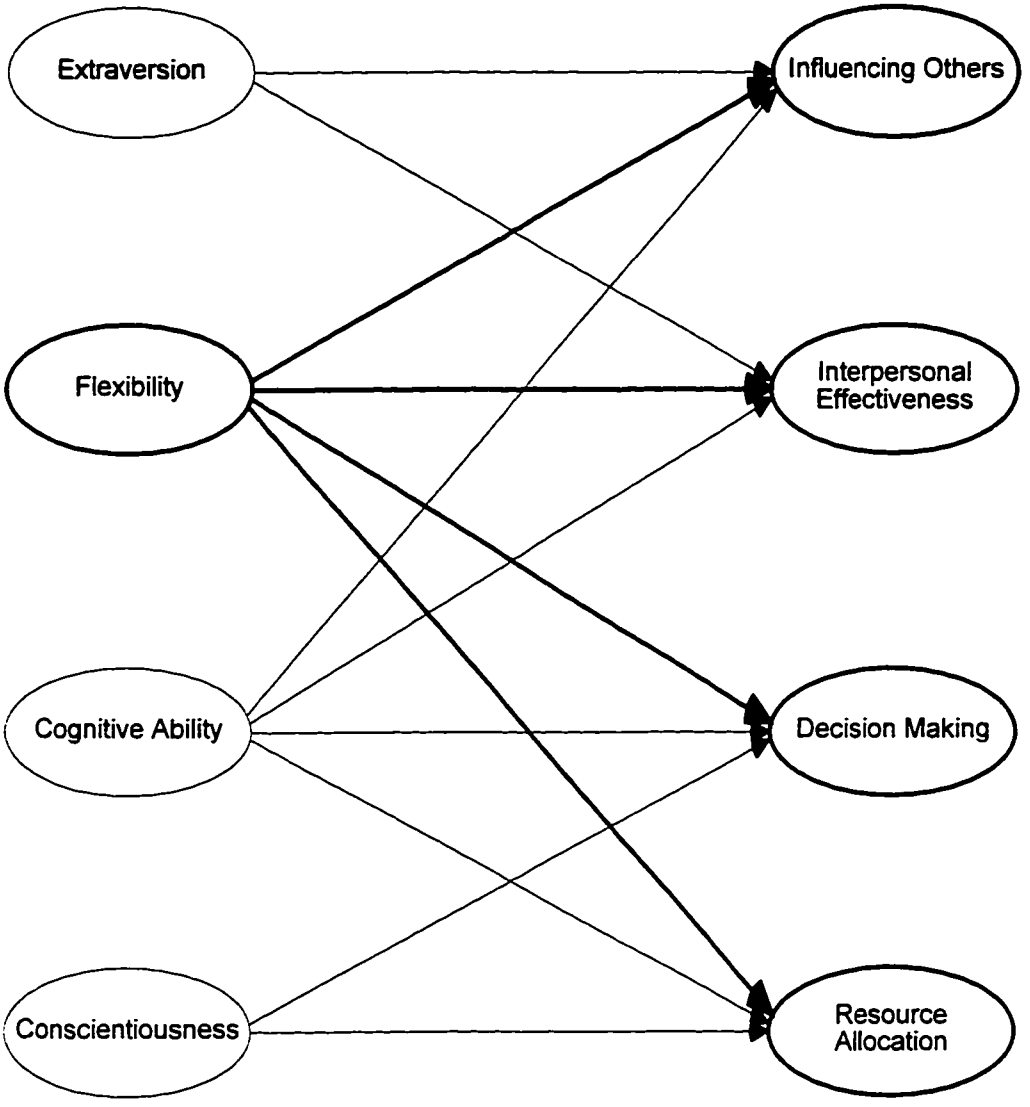


Figure 4. Flexibility Links

Once again, it is important to point out that the measure of training proficiency used for this study was derived from managerial performance in an assessment center. Mount and Barrick (1991) suggest that this relationship may reflect a predisposition toward open-mindedness when confronted with the type of problem-solving activities present in an assessment center.

Work in leadership research also suggests the importance of a personality trait labeled flexibility. In general, contingency theories of leadership lend some support to the notion that effective leaders must be flexible in selecting the most appropriate behaviors from a range of choices (Yukl, 1989). Research examining trait-situation leadership models (e.g., VDL/LMX), French and Raven's bases of power work, and the Ohio State leadership research describing consideration and initiating structure seem to suggest that some cognitive and/or behavioral flexibility is an important element of managerial effectiveness (Bass, 1990). Kenny and Zaccaro (1983) suggests that flexibility is an important element of leader emergence. They did not address the value of flexibility in predicting leader effectiveness, however.

On rational grounds, the hypothesized correlations between flexibility and the criterion dimensions of influencing others, decision making, resource allocation, and interpersonal effectiveness are defensible. To successfully solve problems in a business setting, one must be open to new ideas and alternative points of view (Eccles & Nohria, 1992). "We've always done it this way" thinking is less likely to result in effective problem resolution. Individuals who are flexible and open-minded are more likely to make decisions and solve problems effectively.

Finally, effectiveness in management often requires one to challenge the views of others in a tactful manner in the face of potential opposition. We know that disagreements with one's supervisor and co-workers can be a situational contributor to workplace stress (Ironson, 1992). To the extent that one can remain flexible and open to the ideas of others, interpersonal difficulties and the stress that can accompany them may be tolerated more easily.

Cognitive ability and the structural model. Any attempt to assess the structural relationship between aspects of personality and job performance must address the validity generalization finding that cognitive ability is predictive of a variety of job performance factors across populations and settings (e.g., Hunter & Hunter, 1984). The question that must be answered is, "To what extent can measures of personality contribute to the prediction of job performance over and above measures of cognitive ability?" Consequently, the proposed structural model assessed the relationship between cognitive ability and all criterion factors (Figure 5).

This chapter concludes by focusing on the incremental validity of personality for predicting job performance while controlling for cognitive ability.

Empirical evidence does exist for the incremental validity of personality for predicting job performance over and above cognitive ability. McHenry et al (1990) investigated the incremental validity of four temperament/personality composites from the ABLE Inventory for predicting a number of job performance factors.

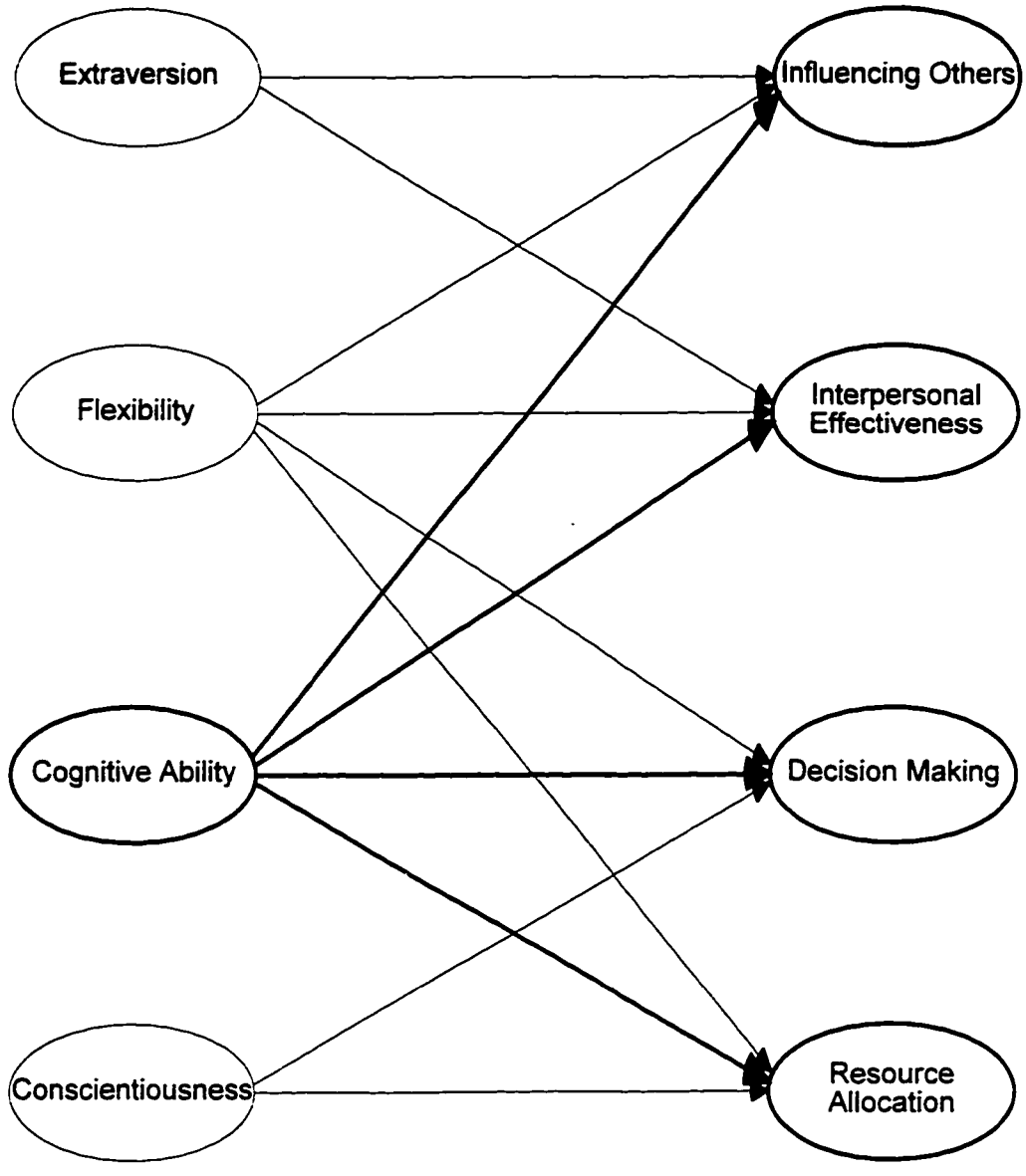


Figure 5. Cognitive Ability Links

Their results indicated that these temperament/personality composites added .11 to the validity for predicting the criterion effort & leadership, .19 to the validity for predicting the criterion personal discipline, and .21 to the validity for predicting the criterion physical fitness and military bearing. Similarly, Baehr and Orban (1989) found an increase in validity of .17 for predicting current earnings of line executives, managers, and supervisors by using a collection of personality factors over and above measures of cognitive ability.

Concerning some specific personality factors, Borman et al (1991) tested a structural model of supervisory ratings on a large sample of Army enlisted personnel. They found significant direct path coefficients to supervisory ratings for two measures of conscientiousness (i.e., achievement orientation and dependability). These significant coefficients occurred in the presence of significant direct path coefficients for disciplinary action, task proficiency, and awards. General ability had an indirect effect on supervisory ratings through job knowledge and task proficiency. Both achievement orientation and dependability had indirect effects on supervisory ratings through awards and disciplinary action respectively (Borman et al, 1991). Also, Schippmann and Prien (1989) found that a measure of conscientiousness (i.e., ascendancy) contributed .11 to the prediction of a criterion of career progress over and above cognitive ability.

Other studies illustrative of the incremental validity of personality for predicting job performance over and above cognitive ability include Day and Silverman (1989) and Hakstian et al (1987). Day and Silverman (1989) specifically addressed the incremental validity question in a sample of accountants by examining the results of hierarchical

regression analyses and partial correlations between personality measures and job performance criterion, while controlling for two measures of cognitive ability.

The hierarchical regression analyses provided support for the incremental validity of personality. With p <= .079, the following increases in R^2 were observed, over and above any increases attributable to cognitive ability: for the criterion potential for success: .112 for ascendancy, and .063 for interpersonal orientation; for the criterion technical ability: .060 for work orientation; for the criterion timeliness of work: .085 for work orientation; for the criterion client relations: .142 for work orientation, and .079 for interpersonal orientation; and for the criterion cooperation: .184 for interpersonal orientation.

The examination of partial correlations revealed significant relationships between a measure of conscientiousness (i.e., orientation toward work) and the criterion measures technical ability (.28), timeliness of work (.30), client relations (.38), and a global criterion (.29). The ascendancy dimension also had significant partial correlations with the criterion measures potential for success (-.35), cooperation (-.31), and a global criterion (-.27). Finally, a measure of extraversion (i.e., interpersonal orientation) had significant partial correlations with the criterion measures potential for success (.34), technical ability (.30), client relations (.36), cooperation (.45), and a global criterion (.36) (Day & Silverman, 1989).

Hakstian et al (1987) performed several multiple regression analyses to assess the validity of a collection of predictor measures for predicting a variety of criterion measures in a sample of supervisors. The personality factors of disciplined achievement

(i.e., conscientiousness), considerate sensitivity, social ascendancy (i.e. extraversion), and extraversion all were judged the "most highly weighted" dimensions for predicting a variety of criterion measures.

Finally, the meta-analysis of integrity tests by Ones et al (1993) suggests that the use of integrity tests--conceptualized as measures of general conscientiousness--can result in an increase in validity of 27% over the use of measures of general mental ability alone.

Summary

This chapter has attempted to accomplish the following objectives:

1) review the literature addressing the overall relationship between personality and job performance,
2) distill from the review some recommendations for improving research in this area,
3) propose a structural model of the relationship between personality and job performance in light of the aforementioned recommendations, and
4) review the literature that addresses each of the components of the model and the structural links hypothesized.

While the research reviewed does not provide conclusive support for the hypothesized structural model, enough empirical evidence and rational arguments have been advanced to warrant an empirical assessment of the viability of the model.

The following chapter describes the operationalization of the predictor and criterion constructs, the operation of the managerial assessment center from which the data has been derived, and a discussion of the data analysis strategy as it relates to assessing both the measurement model and the structural model in a casual framework.

Chapter 3

METHODOLOGY AND DATA ANALYSIS

Subjects

Participants in this study were internal candidates for supervisory positions at seven regional locations of a manufacturing organization with headquarters in the Midwestern United States. Subjects were identified by their plant management as likely candidates for promotion into supervision. Each subject participated in an assessment center to assist management in determining their suitability for promotion. Data from 101 candidates, of whom 71% were male, was available for analysis.

Assessment Center

The assessment center technique is used to evaluate performance on multiple dimensions using multiple assessment methods (Thornton & Byam, 1982). To determine the dimensions of performance that were to be assessed, two senior-level industrial psychologists from the University of Tennessee interviewed members of management from the manufacturing organization. Table 1 lists the resulting performance dimensions, along with a brief definition. To assess each of these dimensions, several exercises were developed. These exercises are listed and described in Table 2. Table 3 is an exercise-by-dimensions matrix.

Table 1. Tennessee Assessment Center Dimension Definitions

Dimension	Definition
Oral Communication (OC)	Effective expression in individual or group situations; includes gestures and nonverbal communications
Planning & Organizing (P&O)	Establishing a course of action for self or others to accomplish a specific goal; planning proper assignments of personnel and appropriate allocation of resources
Delegation (DEL)	Utilizing subordinates effectively; allocating decision making and other responsibilities to appropriate subordinates
Sensitivity (SEN)	Actions that indicate a consideration of the feelings and needs of others
Leadership (LEA)	Utilization of appropriate interpersonal styles and methods in guiding individuals (subordinates, peers, superiors, or groups) toward task accomplishment
Analysis (ANA)	Identifying problems, securing relevant information, relating data from different sources, and identifying possible causes of problems
Judgment (JUD)	Developing alternative courses of action and making decisions based on logical assumptions that reflect factual information
Decisiveness (DEC)	Readiness to make decisions, render judgements, take action, or commit oneself
Initiative (INI)	Active attempts to influence events to achieve goals; self-starter rather than passive acceptance. Taking action to achieve goals beyond those called for; originating action (energy, independence)
Stress Tolerance (STR)	Stability of performance under pressure and/or opposition
Confrontation (CON)	Willingness to disagree or present opinions in a tactful manner. Willingness to stand up for thoughts and beliefs even when challenged

Table 2. Exercises Used in the Tennessee Assessment Center

Exercises	Description
Background Interview	Structured interview designed to gather information regarding assessee's educational background, work experiences, career decisions and goals, and general views regarding participative management
Leaderless Group Discussion Three Person Assigned Role (LGD-3)	Small group interaction exercise in which assessees assume assigned roles as the group attempts to resolve an organizational problem.
Leaderless Group Discussion Six Person Unassigned Role (LGD-6)	Small group interaction exercise in which assessees attempt to resolve an organizational problem based on shared information.
Simulation	A situational exercise in which a single assessee interacts with a member of the assessment team in a role-play activity.
Case Analysis	An exercise in which each assessee is provided with written materials that describe a problem faced by the organization and is told to prepare a set of recommendations for addressing the problem.
In-Basket	A simulation in which the assessee is confronted with an in-basket full of materials that might cross the desk of a manager and is asked to respond appropriately.

Table 3. Dimensions x Exercises Matrix

Dimensions	Exercises				
	LGD-3	LGD-6	Simulation	Case Analysis	In-Basket
Oral Communication	✓	✓	✓		
Planning & Organizing				✓	✓
Delegation			✓		✓
Sensitivity	✓	✓	✓		✓
Leadership	✓	✓	✓		
Judgment	✓	✓	✓	✓	✓
Analysis	✓	✓	✓	✓	✓
Decisiveness			✓	✓	✓
Initiative	✓	✓			
Stress Tolerance			✓		
Confrontation	✓	✓	✓		

The assessment team consisted of six assessors--two senior-level industrial psychologists and four advanced graduate students in industrial and organizational psychology. The student's education and training met the requirements for assessors as set forth by the Task Force on Assessment Center Standards (1989). In accordance with these standards, student assessor education and training attempted to develop the ability to:

- understand the behavioral dimensions used in the assessment center,
- observe the behavior of assessees with regard to these dimensions,
- categorize assessee behavior as to appropriate behavioral dimensions,

- judge the quality of assessee behavior on these dimensions,
- determine the dimension x exercise ratings for each assessee, and
- determine the overall assessment center rating (OAR) for each assessee.

These objectives were achieved in a series of meetings in which assessment center dimensions were behaviorally defined. In addition, practice in observing, categorizing, and rating behaviors was provided by having assessors participate in mock assessment centers using undergraduate students as the assessees. These assessment centers were followed by consensus meetings in which practice was provided in integrating information for the purpose of arriving at overall dimension ratings across exercises and an overall assessment center rating across dimensions.

Procedure

Six employees participated in each assessment center. The employees arrived at the assessment center location the evening prior to their participation, at which time they were asked to complete a data sheet, a measure of cognitive ability, and a personality measure. The assessment center was one day long and consisted of the exercises identified in Table 2.

Each participant was assessed by at least two assessors in all exercises. A five-point scale was employed for rating each dimension, with scores of three and above representing fully acceptable performance and scores below three reflecting some deficiency in performance. Each assessor recorded behavioral incidents during each exercise and arrived at the appropriate dimension ratings before viewing another

exercise. These dimension ratings were discussed in a consensus meeting held within 48 hours of the assessment center. Summary ratings across all exercises were determined for each dimension, a summary rating across all dimensions was made for each participant, and then the assessees were rank-ordered across all dimensions.

Measures

In addition to the assessment center, the following measures were employed:

Personality. The personality factors (i.e., Extraversion, Conscientiousness, and Flexibility) were measured using a sub-set of scales from the California Psychological Inventory (CPI) (Gough, 1987). This instrument consists of 20 scales derived from 462 true-false items.

The personality factors essentially correspond to the three largest factors of the CPI as derived from repeated exploratory factor analyses over the last 30 years (Megargee, 1972; Gough, 1987). The specific scales used to represent each factor were chosen based on a scale's factor loading (i.e., greater than .50) and its conceptual similarity to the factor definition. Reported coefficient alphas for the scales used in this study range from .52 for Self-Acceptance (Sa) to .81 for Self-Control (Sc) (Gough, 1987). The scales that define each factor are listed in Table 4.

Cognitive ability. Cognitive ability was measured using the Watson-Glaser Critical Thinking Assessment (WG-CTA) (Watson & Glaser, 1980). This instrument consists of 80 items that assess an individual's ability regarding inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. These abilities

collectively address an individual's analysis and problem-solving skills. This factor represents both general cognitive ability and critical thinking skills. The manual for the instrument reports coefficient alpha to be .89.

Job performance. Job performance factors (e.g., interpersonal effectiveness, decision making, resource allocation, and influencing others) were measured using ratings of the 11 assessment center dimensions described in Table 1. Table 5 lists the job performance factors and the assessment center dimensions hypothesized to measure each factor. As noted in Chapter 2, research suggests that assessors tend to reduce a large number of assessment dimensions to a more manageable number (Thornton & Byam, 1982; Schmitt, 1977; Gaugler & Thornton, 1989). Consequently, each performance factor was operationalized based on the extent to which an individual dimension definition reflected an important element of a larger factor definition. The actual assignment of dimensions to factors has received some support in the assessment center literature (e.g., Schmitt, 1977; Thornton & Byam, 1982) as well as the general management literature (e.g., Borman & Brush, 1993).

Wherever possible, three or more indicators were used in defining all factors in an attempt to minimize sampling error for factor correlations and promote model identification (Harris & Schaubroeck, 1990).

Table 4. Operational Definition of Personality Factors

Personality Factors	California Psychological Inventory Scales
Extraversion	Dominance (Do) Sociability (Sy) Self-Acceptance (Sa) Social Presence (Sp) Capacity for Status (Cs) Independence (In)
Conscientiousness	Responsibility (Re) Socialization (So) Self-Control (Sc) Achievement via Conformance (Ac)
Flexibility	Achievement via Independence (Ai) Flexibility (Fx) Tolerance (To)

Table 5. Operational Definition of Performance Factors

Performance Factors	Assessment Center Dimensions
Influencing Others	Initiative (INI) Leadership (LEA) Oral Communication (OC)
Decision Making	Analysis (ANA) Judgment (JUD) Decisiveness (DEC)
Resource Allocation	Planning & Organizing (PO) Delegation (DEL)
Interpersonal Effectiveness	Confrontation (CON) Sensitivity (SEN) Stress Tolerance (STO)

Data Analysis

Two types of components can be identified in the full structural equations model--the measurement component and the structural component. The measurement component specifies the relationship between the latent variables or factors and the manifest variables intended to operationalize those factors. The structural component contains two types of variables--exogenous variables and endogenous variables. The structural equations model to be tested in thus study is shown in Figure 6. The exogenous variables shown in ovals, on the left side of the model, have causes outside the scope of the model. The endogenous variables shown in ovals, on the right side of the model, are hypothesized to be "caused" by the exogenous variables. To simplify Figure 6, the errors in measurement for the observed variables and the errors in measurement for the structural equations have been omitted.

AMOS, the Analysis of Moment Structures program, was used to assess the fit of the measurement and structural components (Arbuckle, 1994). One advantage of using a structural equations approach that incorporates the measurement component into the model is that it accounts for unreliability in the manifest variables used to represent the underlying latent variables (Widamen, 1985).

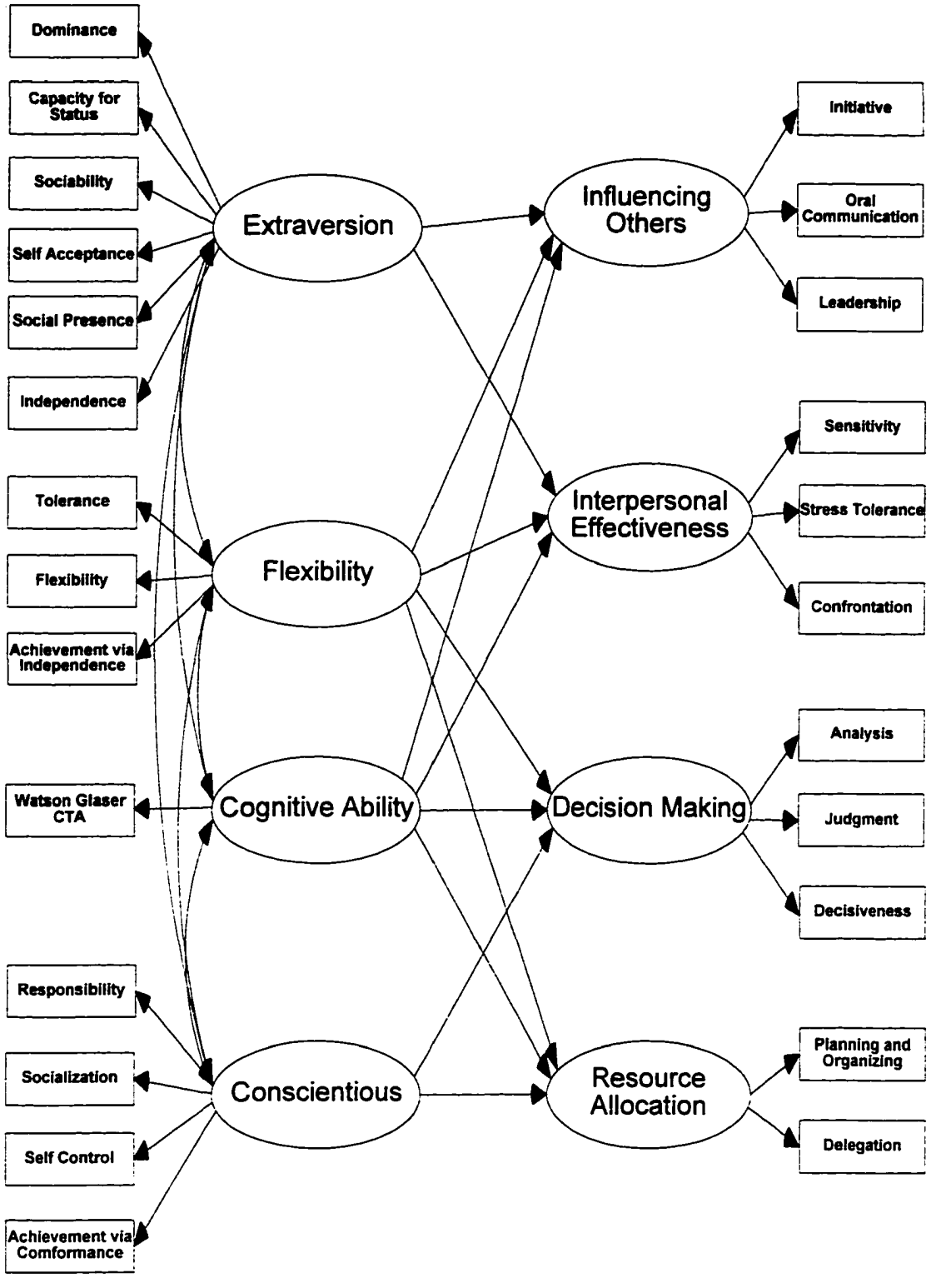


Figure 6. Structural Equations Model

An attempt was made to derive full information maximum likelihood parameter estimates for the model. A maximum likelihood approach is preferred over other approaches (e.g., generalized least squares or asymptotic distribution-free estimation methods) because it avoids the problem of scale dependency in the data (i.e., the minimum of the fitting function being dependent on the scale of the data) and it provides relatively unbiased parameter estimates and standard errors when sample sizes are relatively small (Chou & Bentler, 1995). The use of a maximum likelihood fitting function assumes a multivariate normal distribution of the variables. However, maximum likelihood parameter estimates and standard errors are robust to moderate violations of this assumption (Chou & Bentler, 1995).

In general, AMOS enabled a test of the magnitude of the differences between the covariance matrix of the observed variables and the covariance matrix predicted by the model. Specifically, the analyses used the covariance matrix of the observed variables and consisted of the following steps. First, an overall measurement model, including both personality and assessment center data, was tested to confirm the hypothesized relationships between the latent and observed variables (Anderson & Gerbing, 1988). This step essentially corresponded to conducting a confirmatory factor analysis. Modification indices provided by AMOS were reviewed, and changes in the measurement model were made consistent with theory in the field. Using the revised measurement model, the hypothesized relationships in the structural model were tested simultaneously to determine their viability. Further details regarding the analyses conducted are reported in Chapter 4.

In evaluating the fit of the model to the data, several fit indices were examined. The χ^2 test statistic is reported. This "absolute index" evaluates the statistical lack of fit of the proposed model by implicitly comparing it to a perfectly fitting or saturated model (Hu & Bentler, 1995). Consequently, a statistically significant χ^2 suggests that a model does not adequately capture all of the relationships among the observed variables (Bollen, 1989). However, the χ^2 statistic is particularly sensitive to sample size. Therefore, as sample size increases, so does the likelihood of obtaining a significant χ^2, even if the model does an adequate job of describing the underlying relationships among the observed variables (Hu & Bentler, 1995). In exploratory model building, Joreskog and Sorbom (1979) recommend using the ratio of χ^2 to its degrees of freedom for evaluating models. This measure is also reported. This relative χ^2 measure is viewed as supporting a proposed model when its value does not exceed 2.00, though some researchers suggest that it may go as high as 5.00 (Marsh & Hocevar, 1985).

Hoyle and Panter (1995) recommend that other conventional fit indices be examined, including the goodness-of-fit index (GFI), Bollen's incremental fit index (IFI) (Bollen, 1989), and Bentler's comparative fit index (CFI) (Bentler, 1990). The goodness-of-fit index carries an intuitive interpretation because it is analogous to the familiar R^2 value from regression analysis. Bollen's incremental fit index compares the fit of the proposed model to a baseline model of independence in which the observed variables are assumed to be uncorrelated with each other. This comparison model is appropriate for exploratory model building purposes. The IFI index is believed to be more appropriate (i.e., less variable) for small samples sizes ($N < 150$) (Hoyle & Panter,

1995). Finally, Bentler's comparative fit index is reported. This index is particularly appropriate for small sample sizes as sampling variability of the index is minimal. This advantage is only slightly offset by the fact that values for the CFI are downward biased (Bentler, 1990).

While both the IFI and the CFI measures are appropriate for small samples, they are not viewed as redundant indices. Values for the IFI are designed to range between 0 and 1.00, but may exceed 1.00, while values for the CFI will remain between 0 and 1.00 as a result of the downward bias mentioned above. In addition, the IFI index assumes that the test statistic for evaluating the model is distributed as a central χ^2 variate. This is appropriate if the null hypothesis is true. However, if the null hypothesis is not true, the test statistic will be distributed as a "noncentral" χ^2 variate. The CFI uses information under the relevant noncentral χ^2 distribution (Hu & Bentler, 1995). In evaluating the level of the GFI, IFI, and CFI indexes, a "critical value" of .90 was used. Bentler and Bonett (1980) suggested the use of such a value for evaluating normed indexes that are not parsimony adjusted. Values of these indexes above .90 were interpreted as representing an adequate fit between the data and the model being evaluated.

Finally, the root-mean square error of approximation (RMSEA) and the root mean-square residual (RMSR) are reported. The RMSEA is a df-adjusted population discrepancy function in which a model is fitted to the population moments rather than the sample moments. Browne and Cudeck (1993) suggest that RMSEA values of .10 are acceptable, though preferred values should not exceed .08. The RMSR is the average squared amount by which the sample variances and covariances differ from their

estimates obtained assuming the null hypothesis is true (i.e., the proposed model is "correct"). The smaller the RMSR is, the better, with a value of 0 indicating a perfect fit.

No single measure of model fit is considered definitive; therefore, it is important to consider all fit indices simultaneously when assessing the adequacy of a model (James & James, 1989).

Chapter 4

RESULTS

This chapter presents the results of the data analysis. It begins with descriptive statistics and a consideration of univariate and multivariate normality. This is followed by separate sections describing the analysis results from the measurement model and the structural model.

Descriptive Statistics

Table 6 presents descriptive statistics for the manifest variables that operationalize the latent exogenous variables (i.e., personality factors) and for the manifest variables that operationalize the latent endogenous variables (i.e., assessment center performance factors). The mean and standard deviation are reported for each variable. In addition, the manifest variable zero-order correlations are also reported in Appendix A.

Assessing univariate and multivariate normality. Analyzing the exogenous and endogenous portions of the measurement model using a maximum likelihood estimation technique requires that the distribution of the variables be univariate and multivariate normal. To test this assumption, the univariate skewness and kurtosis values reported in Table 7 were examined for all variables.

Table 6. Variable Means and Standard Deviations

	Variable	Mean	SD
1.	Achievement via Conformance	55.911	6.355
2.	Achievement via Independence	51.475	7.716
3.	Capacity for Status	50.693	8.754
4.	Dominance	59.436	9.995
5.	Flexibility	42.089	8.239
6.	Independence	53.010	6.308
7.	Responsibility	54.554	7.255
8.	Self-Acceptance	50.337	9.731
9.	Self-Control	59.554	8.004
10.	Socialization	56.297	6.789
11.	Social Presence	47.069	9.167
12.	Sociability	52.000	7.200
13.	Tolerance	51.218	7.810
14.	Analysis	2.918	0.734
15.	Confrontation	3.128	0.840
16.	Decisiveness	3.393	0.656
17.	Delegation	2.794	0.728
18.	Initiative	3.087	0.806
19.	Judgment	3.036	0.675
20.	Leadership	2.811	0.812
21.	Oral Communication	2.954	0.623
22.	Planning & Organizing	2.688	0.904
23.	Sensitivity	3.206	0.674
24.	Stress Tolerance	2.894	0.844
25.	Cognitive Ability	56.693	9.492

Table 7. Variable Skewness and Kurtosis

Variable	Skewness	c.r.	Kurtosis	c.r
1. Achievement via Conformance	-.97	-3.98	1.26	2.58
2. Achievement via Independence	-.17	-.69	-.12	-.29
3. Capacity for Status	-.66	-2.73	.61	1.24
4. Dominance	-.78	-3.21	.30	.63
5. Flexibility	.50	2.04	.56	1.15
6. Independence	-.10	-.39	-.13	-.26
7. Responsibility	-.78	-3.21	.39	.80
8. Self-Acceptance	-.33	-1.34	-.39	-.79
9. Self-Control	-.79	-3.23	1.14	2.33
10. Socialization	-.42	-1.70	-.46	-.94
11. Social Presence	-.00	-.02	-.53	-1.09
12. Sociability	-.16	-.65	-.80	-1.64
13. Tolerance	-.37	-1.50	-.12	-.25
14. Analysis	-.43	-1.77	-.25	-.51
15. Confrontation	-.69	-2.81	-.03	-.05
16. Decisiveness	-.09	-.35	-.43	-.88
17. Delegation	.18	.75	.76	1.56
18. Initiative	-.74	-3.05	.22	.44
19. Judgment	-.79	-3.25	.84	1.72
20. Leadership	-.45	-1.83	.26	.53
21. Oral Communication	-.49	-1.99	.60	1.23
22. Planning & Organizing	.01	.04	-.20	-.40
23. Sensitivity	-.25	-1.04	.68	1.40
24. Stress Tolerance	-.06	-.24	.40	.83
25. Cognitive Ability	-.42	-1.74	-.22	-.44

Values of zero for skewness and kurtosis indicate that the variable in question is perfectly univariate normal in its distribution. According to West, Finch, and Curran (1995), skewness values of two or greater and kurtosis values of seven or greater represent significant departures from univariate normality. An examination of Table 8 shows that no variable has a skewness value greater than +/-1.00 or a kurtosis value that exceeds +/- 1.50. This suggests that while moderate skewness and kurtosis are present for some variables, it is not significant enough to bias parameter estimates and standard errors when using a maximum likelihood estimation procedure.

Skewness and kurtosis can also be assessed under the assumption of univariate normality by computing a critical ratio (i.e., the skewness or kurtosis value divided by its standard error) and comparing it to the critical value of 1.96 to assess the extent to which any departure from univariate normality is statistically significant. These critical ratios are included in Table 8. While some variables appear to depart from a univariate normal distribution in a statistical sense, these departures are not viewed as practically significant in light of the actual values of skewness and kurtosis associated with the variables.

West and associates (1995) recommend assessing multivariate normality by examining Mardia's coefficient of multivariate kurtosis (Mardia, 1970). The distribution of all manifest variables taken together appears to depart only slightly from a multivariate normal distribution (Mardia's coefficient of multivariate kurtosis = 17.027, c.r. = 2.270). This slight departure can be attributed to the distribution of the manifest variables that operationalize the latent endogenous variables (i.e., the assessment center

dimensions) for which Mardia's coefficient is significant (Mardia's coefficient of multivariate kurtosis is 13.280, c.r. = 4.308). Mardia's coefficient for the manifest variables that operationalize the latent exogenous variables (i.e., the personality scales) does appear to have a multivariate normal distribution (Mardia's coefficient of multivariate kurtosis is 5.549, c.r. = 1.412). Given the fact that maximum likelihood estimates are robust to moderate departures from normality, the slight departures reported above were not viewed as problematic.

A final check on the assumption of multivariate normality was conducted by examining the entire data set simultaneously for the presence of outliers. Appendix B reports the Mahalanobis d^2 statistic for each data point. The column labeled p2 indicates the probability that any d^2_i value exceeds the d^2 value of the observation in question. P-values below .05 would suggest the presence of an outlier. No p2 values fall below the .05 level, which suggests that this data set does not contain outliers.

The analysis proceeded, based on the assumption that the observed departures from univariate and multivariate normality would not adversely impact the interpretability of the results.

The Overall Measurement Model

The overall measurement model was analyzed first to assess the magnitude of the differences between the covariance matrix of the observed variables and the covariance matrix hypothesized by the model.

The initial attempt to extract maximum likelihood parameter estimates for the overall measurement model yielded an inadmissable solution. The covariance matrix of the variables was determined to be not positive definite. An examination of the correlation matrix of the variables suggested that the linear dependency involved the latent variables decision making and resource allocation as evidenced by the out-of-range correlation of 1.088 between these two variables. This finding necessitated a respecification of this portion of the measurement model in order to proceed.

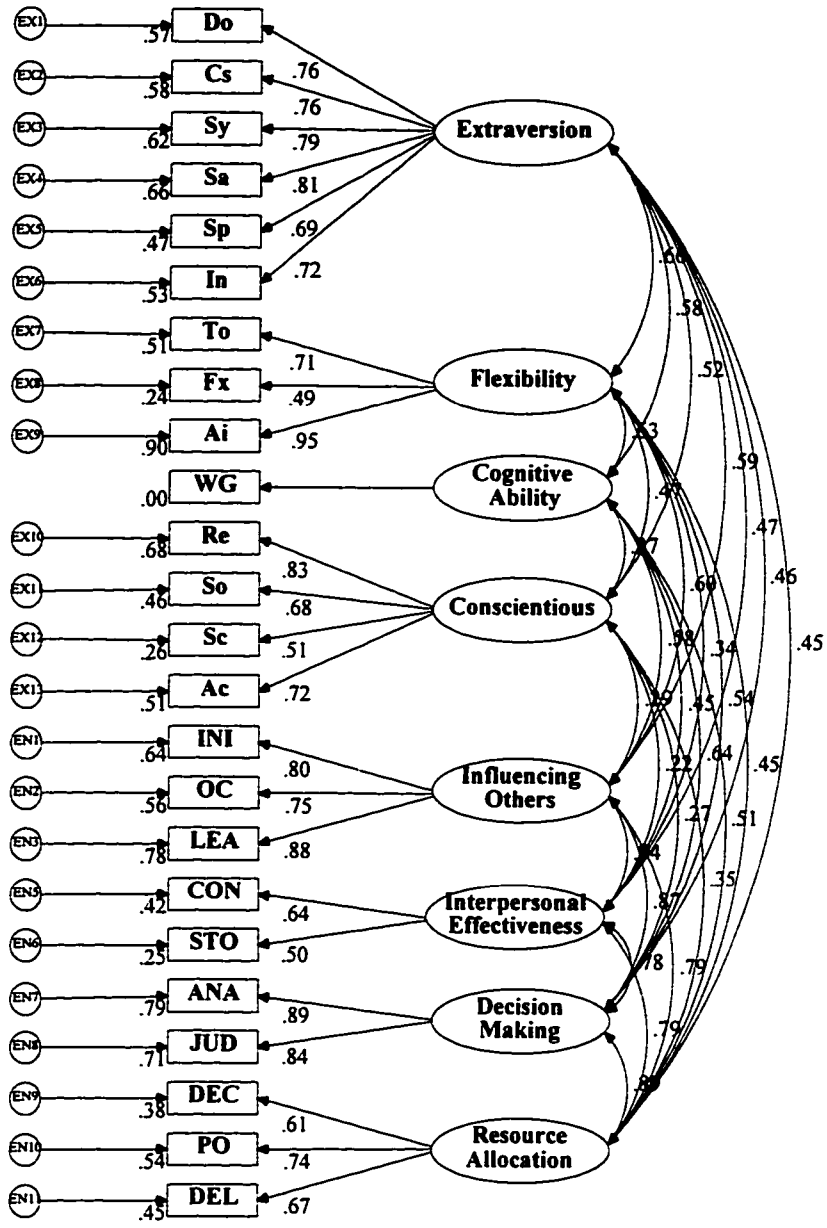
A reconsideration of the assessment center dimensions that defined both decision making and resource allocation suggested that the dimension of decisiveness might more appropriately define resource allocation than decision making. Situations requiring decision making in the assessment center focused more on the cognitive components of that construct (i.e., analysis and judgment) rather than on the action-oriented component (i.e., acting decisively based on such cognitions). The action-oriented component of decision making (i.e., decisiveness) was more easily observed in situations where immediate decisions regarding delegation were required. On the basis of these rational and theoretical beliefs, the dimension of decisiveness was reloaded on the resource allocation factor. A subsequent review of the correlation matrix of the observed variables offered some support for this decision. Decisiveness correlated more highly with planning and organizing ($r = .465$) and delegation ($r = .557$) than it did with analysis ($r = .414$) and judgment ($r = .385$).

The analysis was re-run with the loading change described above, and the resulting solution was again inadmissable. In an attempt to identify the problem, the measurement

model was analyzed in two separate parts--one that included only the personality variables and one that included only the assessment center variables.

Analysis of the measurement model for the personality factors (exogenous latent variables) yielded an admissible solution with all parameter estimates achieving statistical significance. Similarly, analysis of the measurement model for the assessment center factors (endogenous latent variables) as modified above also yielded an admissible solution. However, the parameter estimate for the dimension sensitivity did not achieve statistical significance. This dimension was not viewed as central to the definition of the latent variable influencing others; and, therefore a decision was made to drop this variable from the analysis in an attempt to generate an admissible overall measurement model.

Again the overall measurement model as respecified was analyzed, and the resulting solution was admissible. The overall measurement model, the values of selected goodness-of-fit indices, and the standardized maximum likelihood parameter estimates are presented in Figure 7. Overall, the fit of the model to the data is poor. The overall χ^2 goodness-of-fit test was significant--χ^2 (225, N = 101) = 435.277, $p < .0001$. While the χ^2 to degrees-of-freedom ratio of 1.935 would, in some contexts, tend to support the model, the overwhelming χ^2 value suggests that some problems exist. In addition, the other indices of model fit confirm the poor fit of the model to the data. The goodness-of-fit index (GFI) = .749, the incremental fit index (IFI) = .848, and the confirmatory fit index (CFI) = .842.



Chi-square = 435.277
df = 225
CMIN/df = 1.935
p < .001

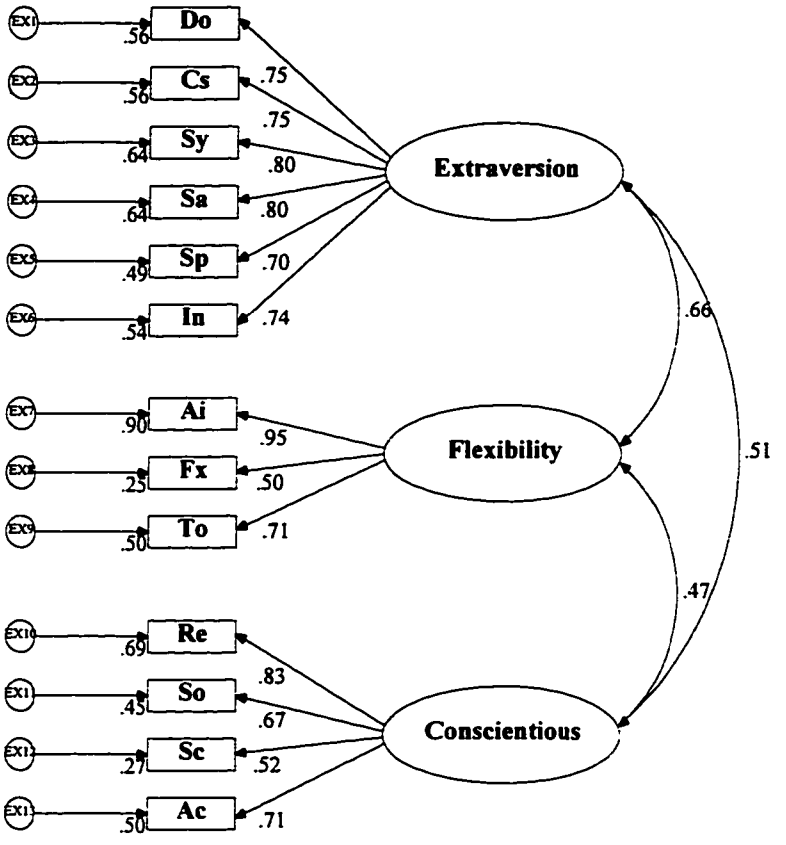
GFI = .749
IFI = .848
CFI = .842
RMSR = 4.887
RMSEA = .097

Figure 7. Full Measurment Model, including Exogenous and Endogenous Variables

In addition, the root mean square residual (RMSR) value of 4.887 suggests that the model is weak. While the root mean square error of approximation (RMSEA) value of .097 might be viewed favorably in some situations, there is too much evidence to suggest that it should not be so viewed in this context. Finally, in spite of the evidence suggesting that the model is not a viable explanation of the underlying relationships among the variables, all individual parameter estimates reached statistical significance.

In an effort to improve the fit of the measurement model, analyses of the separate components of the model cited above were re-examined (Bollen, 1989).

Measurement model for the exogenous latent variables. The measurement model for the exogenous latent variables (i.e., personality factors), the values of the goodness-of-fit indices, and the standardized maximum likelihood parameter estimates are presented in Figure 8. Overall, the fit of the model to the data is quite poor. The overall χ^2 goodness-of-fit test was significant--χ^2 (62, N = 101) = 227.212, $p < .001$, while the χ^2 to degrees-of-freedom ratio was 3.665, both of which suggest some problems with this portion of the measurement model. In addition, the other indices of model fit confirm the poor fit of the model to the data. The goodness-of-fit index (GFI) = .750, the incremental fit index (IFI) = .771, and the confirmatory fit index (CFI) = .766. The root mean square residual (RMSR) value of .163 and the root mean square error of approximation (RMSEA) value of 8.608 also speak to the poor fit of the model to the data. Finally, all individual parameter estimates reached statistical significance.



Chi-square = 227.212
df = 62
CMIN/df = 3.665
p < .001
GFI = .750
IFI = .771
CFI = .766
RMSR = 8.608
RMSEA = .163

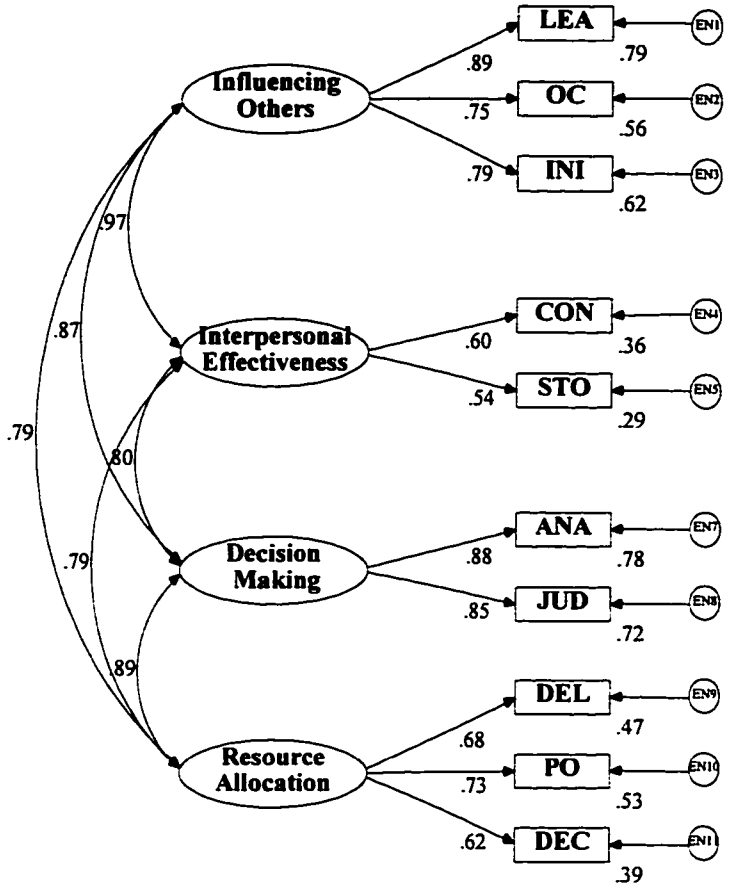
Figure 8. Measurement Model for the Exogenous Latent Variables

The results of the confirmatory factor analysis of the CPI may seem somewhat surprising in light of the many exploratory factor analyses which have suggested the factor structure proposed above. Megargee (1972) wrote that "... the results are so stable from one study to the next that little need exists for further (exploratory) factor analyses of the test" (p. 115). This contention is supported in the present research from the results of a principal components analysis of the CPI scales used in this study. These results suggest that three factors emerge from the data with eigenvalues of 5.518, 2.273, and 1.400, respectively. Nearly 71% of the variance is accounted for by these three factors. One might have assumed that the factor structure had been "confirmed" because these results conform with the results of repeated exploratory factor analyses with different populations over a number of years. The reason for the apparent lack of confirmation of the factor structure using a confirmatory technique has to do with the difference between exploratory and confirmatory factor analysis.

Exploratory factor analysis requires that all observed variables be affected by all common factors. Thus, the variation in an observed variable cannot be totally accounted for by the common factor on which it has the highest loading. Because a confirmatory factor analysis does not require such a restrictive assumption, it normally focuses on assessing the factorial purity of a collection common factors using a cleaner definition of simple structure. Because the scales of the CPI are highly correlated, which suggests that the instrument is not factorially pure, it was unlikely that a confirmatory factor analysis would capture all of the variance in the instrument. It is important to point out, however, that the factor loading pattern we have come to expect from repeated exploratory factor

analyses (i.e., the extent to which a scale had its highest loading on the most appropriate factor) was, in fact, reproduced using a confirmatory technique. In light of this finding, no modifications to this portion of the measurement model were undertaken.

Measurement model for the endogenous latent variables. The revised measurement model for the endogenous variables (i.e., assessment center factors), the values of the goodness-of-fit indices, and the standardized maximum likelihood parameter estimates are presented in Figure 9. The overall χ^2 goodness-of-fit index was significant, χ^2 (29, N = 101) = 44.803, p = .031. However, the χ^2 to degrees-of- freedom ratio is 1.545, which suggests an adequate fit of the model (Marsh & Hocevar, 1985). In addition, other fit indices suggest an acceptable level of fit between the data and this portion of the measurement model. The goodness-of-fit index (GFI) = .921, the incremental fit index (IFI) = .969, and the confirmatory fit index (CFI) = .968. These values exceed the .90 "critical value" suggested by Bentler and Bonnet (1980) and thus suggest that this portion of the measurement model is adequate. Also, the root mean square residual (RMSR) value of .027 and the root mean square error of approximation (RMSEA) value of .074 lend further support to this contention. Finally, all parameter estimates reached statistical significance ($p < .001$). Despite the fact that the performance factors were highly correlated (i.e., minimum r = .785), efforts to improve the fit of the model based on modifications indices were not pursued.



Chi-square = 44.803
df = 29
CMIN/df = 1.545
p = .031
GFI = .921
IFI = .969
CFI = .968
RMSR = .027
RMSEA = .074

Figure 9. Revised Measurement Model for the Endogenous Latent Variables

Conclusions regarding the overall measurement model. It seems clear that the major weakness in the overall measurement model can be found in the measurement portion for the exogenous latent variables, i.e., the personality factors. In light of the fact that the expected pattern of scale loadings from previous exploratory factor analyses of the CPI was essentially reproduced using the confirmatory technique, there appeared to be no justification for modifying the measurement model for personality. However, the poor fit of the measurement model for personality portended problems for the fit of the full structural model reported below.

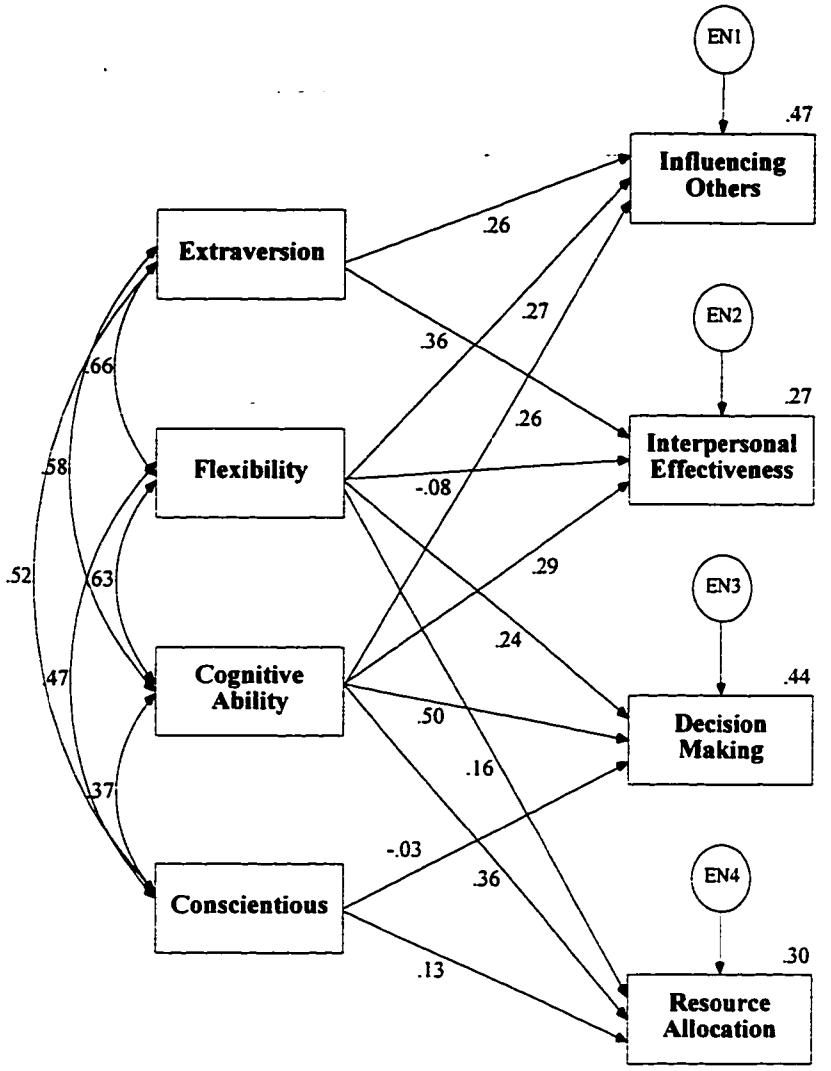
The Structural Model

The structural model parameters were estimated using a full information maximum likelihood technique. Five of the twelve structural paths being estimated took on out-of-range values, and four paths had signs opposite to those expected, suggesting that the estimation procedure may not have achieved a global minima. This may be the result of a specification error in the measurement portion of the model or an inadequate sample size. Bollen (1989) notes that using a limited information estimation technique may help isolate a specification problem to some extent. A limited information approach is also suggested by Lance, Cornwell, and Mulaik (1988). A specific approach, cited by Bollen (1989) and attributed to Joreskog and Sorbom (1986), involves using the covariance matrix for the latent variables, which is produced from estimating the full measurement model, as if it were the covariance matrix for the observed variables. This essentially

results in treating the latent variables as manifest variables in a path analysis. This analysis was run using the present data.

Limited information estimation of the structural model. The limited information path model, the values of the goodness-of-fit indices, and the standardized maximum likelihood parameter estimates are presented in Figure 10. The decision to treat the best fitting measurement model available as a path model for the purpose of testing the structural relationships between the personality and performance factors was unsuccessful. The path model accounted for little of the variation among the latent factors.

The overall χ^2 goodness-of-fit index was significant--χ^2 (10, N = 101) = 807.371, $p < .001$--while, the χ^2 to degrees-of-freedom ratio was 80.737, which suggests a completely inadequate fit of the model (Marsh & Hocevar, 1985). In addition, other fit indices also suggest the total inadequacy of the model for accounting for the variation among the variables. The goodness-of-fit index (GFI) = .502, the incremental fit index (IFI) = .298, and the confirmatory fit index (CFI) = .287. Neither the root mean square residual (RMSR) value of .108 nor the root mean square error of approximation (RMSEA) value of .893 leave any doubt regarding the deficiency of the path model. In the James, Mulaik, and Brett (1982) framework for evaluating structural equations model, this model fails to meet the condition 10 test regarding the ability of the proposed model to account for the structural relations among the latent variables.



Chi-square = 807.371
p < .001
CMIN/df = 80.737
GFI = .502
IFI = .298
CFI = .287
RMSR = .108
RMSEA = .893

Figure 10. Full Structural Path Model for Predicting Assessment Center Performance from Personality Data

Despite the fact that the overall model was found to be inadequate for explaining the underlying structural relationships among the variables, eight of the twelve individual path estimates reached statistical significance ($p < .001$). While this does in part meet James and colleagues condition 9 test regarding the significance of individual functional equations, these authors note that such a result is only meaningful when the full structural model has been found to be valid. This, of course, was not the case in this research. James et al (1982) demonstrate that it is possible for all structural parameters to be significantly different from zero and yet the overall model be invalid. The resulting parameter estimates are biased in such situations.

Supplementary Analyses

Given the complete failure of the factorially driven structural equations model for explaining the underlying relationships between the personality factors and the assessment center performance factors, several supplementary analyses were conducted.

Bivariate relationships between personality and assessment center performance. An attempt was made to consider relationships at the variable or scale level by examining a series of correlation matrices. Appendix A presents the intercorrelation between all manifest variables employed in this research. Appendix C presents the intercorrelation between the manifest personality variables (i.e., CPI scales) used in the study and the assessment center performance factors. Appendix D presents the intercorrelation between the personality factors and the manifest assessment center dimensions. And appendix E presents the intercorrelation between the manifest personality variables not

used in this research and the assessment center dimensions and the assessment center performance factors.

The factor scores were computed using the formula $W = S^{-1}B$, where W is the matrix of regression weights, S is the matrix of covariances between the manifest variables, and B is the matrix of covariances between the manifest and latent variables. The factor score weights are reported in Tables 8 and 9. Given the large number of correlations involved, a Bonferroni adjustment to the significance levels of the correlations was applied to create an experiment-wise alpha rate.

Eight of the twenty CPI scales (i.e., Ai, Ac, Cs, Do, Ie, Py, Sa, and To) had significant correlations, with at least one of the assessment center dimensions and one or more of the assessment center performance factors. Of these scales, all except the dominance (Do) scale were significantly correlated with the estimated factor scores for all assessment center performance factors (i.e., influencing others, interpersonal effectiveness, decision making, and resource allocation). Dominance (Do) was significantly correlated with influencing others and interpersonal effectiveness only.

Table 10 indicates the significant correlations found between the individual assessment center dimensions and the CPI scales. The table groups the CPI scales by the latent personality factor each scale was hypothesized to operationalize, and groups the assessment center dimensions by the assessment center performance factors they were intended to define.

Table 8. Factor Score Weights for Computing Estimated Factor Scores for Personality

Personality Factor	**California Psychological Inventory Scales**						
	In	Ai	Fx	To	Re	So	Sc
Conscientiousness	0.014	0.041	0.003	0.006	0.383	0.188	0.091
Flexibility	0.016	0.750	0.049	0.109	0.015	0.007	0.004
Extraversion	0.190	0.080	0.005	0.012	0.025	0.012	0.006

Personality Factor	**California Psychological Inventory Scales**					
	Ac	Do	Cs	Sy	Sa	Sp
Conscientiousness	0.233	0.009	0.011	0.017	0.013	0.008
Flexibility	0.009	0.011	0.012	0.019	0.015	0.009
Extraversion	0.015	0.128	0.146	0.227	0.172	0.111

Table 9. Factor Score Weights for Computing Estimated Factor Scores for Assessment Center Performance

AC Performance Factors	Assessment Center Dimensions						
	DEC	INI	OC	LEA	PO	DEL	JUD
Resource Allocation	0.126	0.024	0.026	0.049	0.139	0.144	0.116
Interpersonal Effectiveness	0.028	0.119	0.127	0.243	0.030	0.032	0.026
Influencing Others	0.021	0.173	0.185	0.353	0.023	0.024	0.097
Decision Making	0.052	0.050	0.054	0.103	0.058	0.060	0.284

AC Performance Factors	Assessment Center Dimensions			
	ANA	SEN	STO	CON
Resource Allocation	0.140	0.003	0.016	0.019
Interpersonal Effectiveness	0.031	0.012	0.057	0.068
Influencing Others	0.117	0.012	0.060	0.072
Decision Making	0.343	0.001	0.007	0.008

Table 10. Significant Relationships Between CPI Scales and Assessment Center Dimensions

CPI Factors & Scales	Influencing Others			Interpersonal Effectiveness			Decision Making		Resource Allocation		
	IN	OC	LEA	SEN	CON	STO	ANA	JUD	DEC	DEL	PO
Extraversion											
Do	.40										
Sa	.46		.48				.41				.39
Cs	.46	.48	.48					.40			.40
Flexibility											
To		.45	.37				.37				
Ai	.48	.42	.50				.49	.37			
Conscientious											
Ac							.39				.42
Cognition											
WG	.51	.40	.50				.57	.53			.45
Other Scales											
Ie	.47	.45	.47				.47	.44			.42
Py	.47	.43	.43				.49	.40			.46

Note: The CPI scales in italics were not used as part of the original measurement model for personality. Shaded areas represent hypothesized relationships in the structural model between personality factors and assessment center performance factors.

Multiple regression analyses. The analysis of the correlation matrix suggested that the use of personality factors may have masked the effects of the individual personality scales. Consequently, a series of multiple regression analyses were conducted. It was hoped that these analyses might prove useful in understanding the dismal results from the factorial model. The first set of analyses involved regressing the estimated factor scores for each of the assessment center performance factors onto the measure of cognitive ability and the relevant personality factors as hypothesized in the structural equations model. The second set of analyses involved regressing the estimated factor scores for the assessment center performance factors onto the measure of cognitive ability and the relevant personality variables (i.e., those CPI scales that operationalized the personality factors hypothesized to be related to each assessment center performance factor in the original structural equations model.) Bollen (1989) notes that while the use of regression models with estimated factor scores does reduce the measurement error associated with the individual components that define each factor, it does not eliminate that error.

The third set of analyses involved regressing the assessment center dimensions onto the measure of cognitive ability and the relevant collection of estimated factors scores for each personality factor (i.e., the estimated factor scores for those personality factors that were hypothesized to be related to each assessment center performance factor associated with each assessment center dimension). Following these analyses, further multiple regression analyses were conducted using the manifest variables only. Specifically, each assessment center dimension was regressed onto the measure of

cognitive ability and the individual personality variables that were hypothesized to define the relevant latent personality factors.

The results of regressing the estimated factor scores for the assessment center performance factors onto the measure of cognitive ability and the estimated factors scores for personality are presented in Tables 11 - 14. All four multiple regressions were significant, with multiple R^2 values ranging from . 402 (adjusted multiple R^2 = .384) for influencing others to .343 (adjusted multiple R^2 = .323) for resource allocation. The measure of cognitive ability was a significant predictor of all assessment center performance factors ($p <= .003$). The only other variable that was a significant predictor was the personality factor flexibility in the regression predicting decision making ($p = .027$). Flexibility was also a marginally significant predictor of resource allocation ($p = .069$) and influencing others ($p = .085$). Extraversion was a marginally significant predictor of interpersonal effectiveness ($p = .085$). The personality factor conscientiousness was not significant in any of the regression analyses.

Table 11. Multiple Regression Results for Factorial Predictors of the Estimated Factor Scores of the Assessment Center Performance Factor Influencing Others (N = 101)

Personality Factors		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.336	3.271	0.001
Extraversion		0.184	1.597	0.114
Flexibility		0.208	1.741	0.085
Multiple R	0.634		F = 21.761	P < .001
Multiple R^2	0.402			
Adjusted Multiple R^2	0.384			

Table 12. Multiple Regression Results for Factorial Predictors of the Estimated Factor Scores of the Assessment Center Performance Factor Interpersonal Effectiveness (N = 101)

Personality Factors		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.313	3.000	0.003
Extraversion		0.202	1.724	0.088
Flexibility		0.199	1.638	0.105
Multiple R	0.620		F = 20.197	P < .001
Multiple R^2	0.384			
Adjusted Multiple R^2	0.365			

Table 13. Multiple Regression Results for Factorial Predictors of the Estimated Factor Scores of the Assessment Center Performance Factor Decision Making (N = 101)

Personality Factor		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.451	4.504	0.001
Conscientiousness		0.001	0.013	0.989
Flexibility		0.244	2.241	0.027
Multiple R	0.632		F = 21.488	P > .001
Multiple R^2	0.399			
Adjusted Multiple R^2	0.381			

Table 14. Multiple Regression Results for Factorial Predictors of the Estimated Factor Scores of the Assessment Center Performance Factor Resource Allocation (N = 101)

Personality Factors		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.407	3.887	0.001
Conscientiousness		0.048	0.492	0.624
Flexibility		0.209	1.839	0.069
Multiple R	0.586		F = 16.898	P < .001
Multiple R^2	0.343			
Adjusted Multiple R^2	0.323			

The results of regressing the estimated factor scores for the assessment center performance factors onto the relevant personality variables are contained in Tables 15 - 18. The overall regression involving the estimated factor scores for the assessment center performance factor influencing others was significant ($R^2 = .445$; adjusted $R^2 = .383$). Both the CPI scale self-acceptance (Sa) and the measure of cognitive ability (i.e., Watson-Glaser) were significant predictors. The overall regression involving the estimated factor scores for interpersonal effectiveness was significant ($R^2 = .430$; adjusted $R^2 = .367$). Again, the CPI scale self-acceptance (Sa) and the measure of cognitive ability were significant predictors. The overall regression involving the estimated factor scores for decision making was also significant ($R^2 = .482$; adjusted $R^2 = .437$). For this dependent variable, the CPI scales of self-control (Sc) and achievement via conformance (Ac) and the measure of cognitive ability (i.e., Watson-Glaser) were significant predictors. Finally, the overall regression involving the estimated factor scores for the assessment center performance factor resource allocation was significant ($R^2 = .435$; adjusted $R^2 = .386$). And again, the CPI scales of self-control (Sc) and achievement via conformance (Ac) and the measure of cognitive ability were significant predictors.

Table 15. Multiple Regression Results for Scale-Level Predictors of the Estimated Factor Scores of the Assessment Center Performance Factor Influencing Others (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.287	2.630	0.010
Dominance		-0.070	-0.554	0.581
Capacity for Status		0.158	1.301	0.196
Sociability		-0.071	-0.786	0.434
Self-Acceptance		0.271	2.137	0.036
Social Presence		-0.038	-0.323	0.747
Independence		-0.047	-0.384	0.702
Achievement via Independence		0.142	1.052	0.296
Flexibility		0.018	0.176	0.861
Tolerance		0.110	0.953	0.343
Multiple R	0.666		F = 7.161	P < .001
Multiple R^2	0.443			
Adjusted Multiple R^2	0.381			

Table 16. Multiple Regression Results for Scale-Level Predictors of the Estimated Factor Scores of the Assessment Center Performance Factor Resource Allocation (N = 101)

CPI Scales	Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA	0.348	3.328	0.001
Responsibility	-0.071	-0.625	0.534
Socialization	-0.034	-0.320	0.750
Self-Control	-0.209	-2.080	0.040
Achievement via Conformance	0.362	3.548	0.001
Achievement via Independence	0.071	0.533	0.596
Flexibility	0.042	0.437	0.663
Tolerance	0.135	1.145	0.255
Multiple R 0.660		F = 8.855	P < .001
Multiple R^2 0.435			
Adjusted Multiple R^2 0.386			

Table 17. Multiple Regression Results for Scale-Level Predictors of the Estimated Factor Scores of the Assessment Center Performance Factor Interpersonal Effectiveness (N = 101)

CPI Scales	Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA	0.259	2.340	0.021
Dominance	-0.066	-0.516	0.607
Capacity for Status	0.182	1.476	0.143
Sociability	-0.064	-0.694	0.489
Self-Acceptance	0.265	2.051	0.043
Social Presence	-0.029	-0.258	0.803
Independence	-0.047	-0.379	0.705
Achievement via Independence	0.137	0.996	0.322
Flexibility	0.012	0.112	0.911
Tolerance	0.102	0.877	0.383
Multiple R	0.656	F = 6.800	P < .001
Multiple R^2	0.430		
Adjusted Multiple R^2	0.367		

Table 18. Multiple Regression Results for Scale-Level Predictors of the Estimated Factor Scores of the Assessment Center Performance Factor Decision Making (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.400	4.000	0.001
Responsibility		-0.075	-0.689	0.492
Socialization		-0.067	-0.658	0.512
Self-Control		-0.195	-2.033	0.045
Achievement via Conformance		0.331	3.391	0.001
Achievement via Independence		0.094	0.735	0.464
Flexibility		0.042	0.450	0.654
Tolerance		0.138	1.225	0.224
Multiple R	0.695		F = 10.717	P < .001
Multiple R^2	0.482			
Adjusted Multiple R^2	0.437			

The results of regressing each assessment center dimension onto the estimated factor scores for personality can be found in Tables 19- 29. All regression analyses except those for the assessment center dimensions sensitivity and decisiveness were significant. Multiple R^2 values ranged from .114 for predicting confrontation to .334 for predicting leadership. Estimated factor scores for the personality factor extraversion were significant for predicting confrontation ($p = .030$) and marginally significant for predicting initiative ($p = .083$). Estimated factor scores for the personality factor flexibility were significant for predicting the assessment center dimension analysis ($p = .014$) and marginally significant for predicting the dimensions of stress tolerance ($p = .064$), leadership ($p = .073$), and delegation ($p = .084$). None of the hypothesized relationships between assessment center dimensions and the estimated factor scores for the personality factor conscientiousness were significant. Finally, the measure of cognitive ability (i.e., Watson-Glaser) was a significant predictor of the assessment center dimensions of leadership, initiative, analysis, judgment, and planning & organizing ($p < .01$) and a marginally significant predictor of confrontation ($p = .072$). Cognitive ability was not a significant predictor of oral communication, sensitivity, stress tolerance, decisiveness, or delegation.

Table 19. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Leadership (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.260	2.397	0.018
Extraversion		0.175	1.435	0.154
Flexibility		0.229	1.815	0.073
Multiple R	0.578		F = 16.181	P < .001
Multiple R^2	0.334			
Adjusted Multiple R^2	0.313			

Table 20. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Oral Communication (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.158	1.364	0.176
Extraversion		0.185	1.419	0.159
Flexibility		0.218	1.616	0.109
Multiple R	0.490		F = 10.203	P < .001
Multiple R^2	0.240			
Adjusted Multiple R^2	0.216			

Table 21. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Initiative (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.295	2.720	0.008
Extraversion		0.214	1.754	0.083
Flexibility		0.155	1.232	0.221
Multiple R	0.578		F = 16.181	P < .001
Multiple R^2	0.334			
Adjusted Multiple R^2	0.313			

Table 22. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Sensitivity (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.031	0.239	0.812
Extraversion		-0.166	-1.126	0.263
Flexibility		0.197	1.286	0.201
Multiple R	0.149		F =0.737	P = 0.532
Multiple R^2	0.022			
Adjusted Multiple R^2	0.000			

Table 23. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Stress Tolerance (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.108	0.866	0.389
Extraversion		-0.009	-0.061	0.951
Flexibility		0.273	1.877	0.064
Multiple R	0.343		F =4.317	P = .007
Multiple R^2	0.118			
Adjusted Multiple R^2	0.091			

Table 24. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Confrontation (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.227	1.819	0.072
Extraversion		0.310	2.206	0.030
Flexibility		-0.238	-1.634	0.106
Multiple R	0.338		F = 4.180	P = .008
Multiple R^2	0.114			
Adjusted Multiple R^2	0.087			

Table 25. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Decisiveness (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.165	1.280	0.204
Extraversion		0.029	0.197	0.844
Flexibility		0.068	0.452	0.652
Multiple R	0.234		F = 1.874	P = .139
Multiple R^2	0.055			
Adjusted Multiple R^2	0.026			

Table 26. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Analysis (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.439	4.277	0.001
Conscientiousness		-0.093	-0.965	0.337
Flexibility		0.280	2.516	0.014
Multiple R	0.609		F = 19.027	P < .001
Multiple R^2	0.370			
Adjusted Multiple R^2	0.351			

Table 27. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Judgment (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.451	4.133	0.001
Conscientiousness		0.082	0.798	0.427
Flexibility		0.068	0.577	0.565
Multiple R	0.537		F = 13.073	P < .001
Multiple R^2	0.288			
Adjusted Multiple R^2	0.266			

Table 28. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Planning & Organizing (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.364	3.188	0.002
Conscientiousness		0.140	1.314	0.192
Flexibility		0.041	0.332	0.741
Multiple R	0.469		F = 9.094	P < .001
Multiple R^2	0.220			
Adjusted Multiple R^2	0.195			

Table 29. Multiple Regression Results for Factorial Predictors of the Assessment Center Dimension Delegation (N = 101)

Estimated Factor Scores		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.168	1.402	0.164
Conscientiousness		0.044	0.395	0.693
Flexibility		0.227	1.746	0.084
Multiple R	0.381		F = 5.476	P = .002
Multiple R^2	0.145			
Adjusted Multiple R^2	0.118			

The final set of regression analyses involved regressing individual assessment center dimensions onto the set of personality variables that were originally hypothesized to operationalize the relevant latent personality factors. The results of these analyses can be found in Tables 30 - 40. Seven of the eleven regression analyses involving the assessment center dimensions were significant (i.e., the regressions for analysis, judgment, delegation, planning & organizing, initiative, oral communication, and leadership). Multiple R^2 values ranged from .471 for analysis (adjusted multiple R^2 = .425) to .180 for delegation (adjusted multiple R^2 = .109).

The measure of cognitive ability was a significant predictor of the assessment center dimensions of analysis, judgment, initiative, and planning & organizing. Other significant predictors included self-control (Sc) for predicting planning & organizing; achievement via conformance (Ac) for predicting judgment, planning & organizing, analysis, and delegation; and self-acceptance (Sa) for predicting leadership. Marginally significant predictors ($p > .05$ but $< .10$) included self-control (Sc) for predicting judgment; achievement via conformance (Ac) for predicting delegation; and capacity for status (Cs) and tolerance (To) for predicting oral communication.

Table 30. Multiple Regression Results for Scale-level Predictors of the Assessment Center Performance Dimension Initiative (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.233	2.011	0.047
Dominance		0.113	0.818	0.415
Capacity for Status		0.143	1.092	0.278
Sociability		-0.152	-1.098	0.275
Self-Acceptance		0.214	1.517	0.133
Social Presence		0.095	0.692	0.491
Independence		-0.101	-0.768	0.444
Achievement via Independence		0.163	1.129	0.262
Flexibility		0.013	0.117	0.907
Tolerance		0.007	0.061	0.952
Multiple R	0.603		F = 5.148	P < .001
Multiple R^2	0.364			
Adjusted Multiple R^2	0.293			

Table 31. Multiple Regression Results for Scale-level Predictors of the Assessment Center Performance Dimension Oral Communication (N = 101)

CPI Scales	Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA	0.110	0.901	0.370
Dominance	-0.023	-0.156	0.876
Capacity for Status	0.249	1.810	0.074
Sociability	-0.024	-0.164	0.870
Self-Acceptance	0.057	0.385	0.701
Social Presence	0.104	0.722	0.472
Independence	-0.057	-0.413	0.681
Achievement via Independence	0.041	0.272	0.786
Flexibility	-0.050	-0.443	0.659
Tolerance	0.237	1.894	0.061
Multiple R	0.546	F = 3.827	P < .001
Multiple R^2	0.298		
Adjusted Multiple R^2	0.220		

Table 32. Multiple Regression Results for Scale-Level Predictors of the Assessment Center Performance Dimension Leadership (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.182	1.607	0.112
Dominance		-0.039	-0.289	0.773
Capacity for Status		0.165	1.288	0.201
Sociability		-0.190	-1.400	0.165
Self-Acceptance		0.366	2.649	0.010
Social Presence		0.060	0.443	0.659
Independence		-0.096	-0.749	0.456
Achievement via Independence		0.214	1.522	0.132
Flexibility		0.002	0.015	0.988
Tolerance		0.049	0.423	0.674
Multiple R	0.626		F = 5.811	P < .001
Multiple R^2	0.392			
Adjusted Multiple R^2	0.325			

Table 33. Multiple Regression Results for Scale-Level Predictors of the Assessment Center Performance Dimension Sensitivity (N = 101)

CPI Scales	Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA	0.034	0.246	0.086
Dominance	-0.173	-1.034	0.304
Capacity for Status	-0.096	-0.608	0.545
Sociability	-0.010	-0.060	0.952
Self-Acceptance	-0.004	-0.022	0.982
Social Presence	-0.051	-0.307	0.760
Independence	0.127	0.800	0.426
Achievement via Independence	0.143	0.825	0.411
Flexibility	-0.202	-1.544	0.126
Tolerance	0.202	1.413	0.161
Multiple R	0.278	F = 0.753	P = 0.673
Multiple R^2	0.077		
Adjusted Multiple R^2	0.000		

Table 34. Multiple Regression Results for Scale-Level Predictors of the Assessment Center Performance Dimension Confrontation (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.201	1.488	0.140
Dominance		0.059	0.367	0.714
Capacity for Status		0.084	0.553	0.581
Sociability		-0.038	-0.236	0.814
Self-Acceptance		0.230	1.393	0.167
Social Presence		-0.071	-0.445	0.657
Independence		0.064	0.420	0.675
Achievement via Independence		-0.174	-1.037	0.302
Flexibility		0.063	0.497	0.602
Tolerance		-0.048	-0.345	0.731
Multiple R	0.369		F = 1.418	P = 0.185
Multiple R^2	0.136			
Adjusted Multiple R^2	0.040			

Table 35. Multiple Regression Results for Scale-level Predictors of the Assessment Center Performance Dimension Stress Tolerance (N = 101)

CPI Scales	Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA	0.043	0.326	0.745
Dominance	-0.073	-0.461	0.646
Capacity for Status	0.196	1.300	0.197
Sociability	-0.037	-0.233	0.816
Self-Acceptance	0.158	0.970	0.335
Social Presence	-0.005	-0.032	0.974
Independence	-0.180	-1.188	0.238
Achievement via Independence	0.168	1.016	0.312
Flexibility	0.053	0.424	0.672
Tolerance	0.084	0.614	0.541
Multiple R	0.400	F = 1.714	P = 0.089
Multiple R^2	0.160		
Adjusted Multiple R^2	0.067		

Table 36. Multiple Regression Results for Scale-Level Predictors of the Assessment Center Performance Dimension Analysis (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.396	3.915	0.001
Responsibility		-0.156	-1.424	0.158
Socialization		-0.138	-1.338	0.184
Self-control		-0.157	-1.614	0.110
Achievement via Conformance		0.358	3.625	0.001
Achievement via Independence		0.127	0.984	0.328
Flexibility		0.033	0.349	0.728
Tolerance		0.122	1.067	0.289
Multiple R	0.686		F = 10.237	P < 0.001
Multiple R^2	0.471			
Adjusted Multiple R^2	0.425			

Table 37. Multiple Regression Results for Scale-Level Predictors of the Assessment Center Performance Dimension Judgment (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.414	3.670	0.001
Responsibility		0.079	0.646	0.520
Socialization		-0.043	-0.379	0.706
Self-control		-0.181	-1.675	0.097
Achievement via Conformance		0.228	2.072	0.041
Achievement via Independence		-0.076	-0.526	0.600
Flexibility		0.085	0.819	0.415
Tolerance		0.107	0.841	0.403
Multiple R	0.586		F = 6.006	P < 0.001
Multiple R^2	0.343			
Adjusted Multiple R^2	0.286			

Table 38. Multiple Regression Results for Scale-Level Predictors of the Assessment Center Performance Dimension Decisveness (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.119	0.895	0.373
Responsibility		-0.092	-0.643	0.522
Socialization		-0.015	-0.110	0.913
Self-control		-0.099	-0.776	0.440
Achievement via Conformance		0.214	1.650	0.102
Achievement via Independence		0.077	0.457	0.649
Flexibility		-0.089	-0.722	0.472
Tolerance		0.078	0.521	0.603
Multiple R	0.298		F = 1.121	P = 0.357
Multiple R^2	0.089			
Adjusted Multiple R^2	0.010			

Table 39. Multiple Regression Results for Scale-Level Predictors of the Assessment Center Performance Dimension Delegation (N = 101)

CPI Scales		Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA		0.150	1.191	0.237
Responsibility		0.005	0.033	0.974
Socialization		-0.051	-0.395	0.694
Self-control		-0.086	-0.711	0.479
Achievement via Conformance		0.222	1.801	0.075
Achievement via Independence		0.113	0.702	0.485
Flexibility		0.080	0.688	0.493
Tolerance		0.056	0.395	0.693
Multiple R	0.424		F = 2.523	P = 0.016
Multiple R^2	0.180			
Adjusted Multiple R^2	0.109			

Table 40. Multiple Regression Results for Scale-Level Predictors of the Assessment Center Performance Dimension Planning & Organizing (N = 101)

CPI Scales	Beta-weights	t-values	P(2-Tail)
Watson-Glaser CTA	0.288	2.532	0.013
Responsibility	-0.069	-0.564	0.574
Socialization	0.066	0.575	0.567
Self-control	-0.247	-2.265	0.026
Achievement via Conformance	0.403	3.632	0.001
Achievement via Independence	-0.086	-0.594	0.554
Flexibility	0.072	0.686	0.494
Tolerance	0.127	0.992	0.324
Multiple R	0.576	F = 5.701	P < 0.001
Multiple R^2	0.331		
Adjusted Multiple R^2	0.273		

Tables 41 and 42 are an attempt to summarize the regression analyses. Table 41 summarizes the four pairs of regression analyses conducted using the estimated factors scores for the assessment center performance factors as the dependent variable. In all four pairs of regressions, R^2 was higher when personality scales were used to predict the dependent measure than when estimated factors scores for personality were used as predictors. In three of four cases, adjusted R^2 was also higher when personality scales were used as predictors.

Table 42 summarizes the eleven pairs of regression analyses conducted using the assessment center dimensions as the dependent variable. In seven of the eleven pairs of regressions, R^2 was higher when personality scales were used to predict the dependent measure than when estimated factors scores for personality were used as predictors. In six of these seven cases, adjusted R^2 was also higher when personality scales were used as predictors.

Because of the multicollinearity problems associated with the use of several intercorrelated predictor measures, two indicators of predictor significance are highlighted in these tables. Those predictors listed in italics had significant bivariate correlations with the dependent measures and were significant predictors in the regression analyses. Those predictors listed in regular type also had significant bivariate relationships with the dependent measures but were not significant predictors in the regressions.

Table 41. Summary of Regression Analyses using Assessment Center Performance Factors as the Dependent Variable[1]

Assessment Center Performance Factors	Significant Personality Factors	R^2	Significant Personality Scales	R^2
Influencing Others	*Watson-Glaser CTA* Extraversion Flexibility	.402 (.384)	*Watson-Glaser CTA* *Self-Acceptance* Achievement via Independence Capacity for Status Dominance Social Presence Sociability Tolerance	.443 (.381)
Interpersonal Effectiveness	*Watson-Glaser CTA* Extraversion Flexibility	.384 (.365)	*Watson-Glaser CTA* *Self-Acceptance* Achievement via Independence Capacity for Status Dominance Social Presence Tolerance	.430 (.367)
Decision Making	*Watson-Glaser CTA* *Flexibility* Conscientiousness	.399 (.381)	*Watson-Glaser CTA* *Achievement via Conformance* Achievement via Independence Tolerance	.482 (.437)
Resource Allocation	*Watson-Glaser CTA* Flexibility Conscientiousness	.343 (.323)	*Watson-Glaser CTA* *Achievement via Conformance* Achievement via Independence Tolerance	.435 (.386)

Note: $R^2 \geq .17$ are significant at $p \leq .05$.

[1] Italicized predictors have significant bivariate correlations with the dependent measure **and** were significant predictors in the regressions. Predictors listed in regular type have significant bivariate correlations with the dependent measure **but were not** significant in the regressions.

Table 42. Summary of Regression Analyses using Assessment Center Dimensions as the Dependent Variable[1]

Assessment Center Dimensions	Significant Personality Factors	R^2	Significant Personality Scales	R^2
Leadership	*Watson-Glaser CTA* Extraversion Flexibility	.334 (.313)	Watson-Glaser CTA *Self-Acceptance* Capacity for Status Tolerance Achievement via Independence	.392 (.325)
Oral Communication	Extraversion Flexibility	.240 (.216)	Watson-Glaser CTA Capacity for Status Tolerance Achievement via Independence	.298 (.220)
Initiative	*Watson-Glaser CTA* Extraversion Flexibility	.334 (.313)	*Watson-Glaser CTA* Dominance Self-Acceptance Capacity for Status Achievement via Independence	.364 (.293)
Sensitivity		.022 (.000)		.077 (.000)
Stress Tolerance		.118 (.091)		.160 (.067)
Confrontation	*Extraversion*	.114 (.087)		.136 (.040)

Note: $R^2 \geq .17$ are significant at $p \leq .05$.

[1] Italicized predictors have significant bivariate correlations with the dependent measure **and** were significant predictors in the regressions. Predictors listed in regular type have significant bivariate correlations with the dependent measure **but were not** significant in the regressions.

Table 42. (Continued)

Assessment Center Dimensions	Significant Personality Factors	R^2	Significant Personality Scales	R^2
Analysis	*Watson-Glaser CTA* *Flexibility*	.370 (.351)	*Watson-Glaser CTA* *Achievement via Conformance* Achievement via Independence Tolerance	.471 (.425)
Judgment	*Watson-Glaser CTA* Flexibility	.288 (.266)	*Watson-Glaser CTA* *Achievement via Independence*	.343 (.286)
Planning & Organizing	Watson-Glaser CTA *Flexibility*	.220 (.195)	*Watson-Glaser CTA* *Achievement via Conformance*	.331 (.273)
Delegation	Flexibility	.145 (.118)		.180 (.109)
Decisiveness		.055 (.026)		.089 (.010)

Note: $R^2 \geq .17$ are significant at $p \leq .05$.

[1] Italicized predictors have significant bivariate correlations with the dependent measure **and** were significant predictors in the regressions. Predictors listed in regular type have significant bivariate correlations with the dependent measure **but were not** significant in the regressions.

Chapter 5

DISCUSSION

This research set out to examine the relationship between personality and job performance in the context of a managerial assessment center. Consistent with recent research regarding the relationship between personality and job performance (e.g., Ones, Schmidt, & Viswesvaran, 1994), this research proposed a factorial model of the personality-job performance relationship. The factorial model for personality was based on the factor structure of the California Psychological Inventory (CPI). There are some apparent conceptual similarities between the factors that emerge from the CPI and the five-factor model of personality. Specifically, two of the "Big-Five" factors, conscientiousness and extraversion, are conceptually similar to the two largest factors from the CPI and were so named in this study. A third Big-Five factor, openness to experience, bears some resemblance to flexibility, the third personality factor used in this study.

Job performance was operationally defined as performance in a managerial assessment center. Specifically, this research hypothesized the existence of four assessment center performance factors. This is consistent with empirical research findings that show a high intercorrelation among traditional assessment center dimensions, as well as research from the cognitive domain, which suggests that assessors tend to cognitively reduce a larger number of rating dimensions to a more

manageable number when rating assessment center performance (Schmitt, 1977). In light of validity generalization findings regarding cognitive ability (Schmidt & Hunter, 1981) and its relationship to a variety of criterion measures, a measure of cognitive ability was also included in this study. This enabled an assessment of the incremental validity of the personality factors for predicting the assessment center performance factors.

Operationally defining both personality and job performance at the same level of specificity (i.e., the factor level) was an attempt to overcome a problem that has plagued previous research in the area (i.e., computing correlations between two variables, one of which was at the micro level and the other at the macro level). Furthermore, this research proposed to examine these level-appropriate relationships simultaneously through the use of structural equation modeling. However, this research effort failed to support the viability of a factorial model of personality for predicting assessment center performance factors. Below is a discussion of the problems with the factorial approach and the efforts made to address these problems. Finally, an attempt is made to explain the findings from this research and their implications for the assumed superiority of factorial level models of personality.

The Measurement Model for Personality

Researchers who support a factorial approach to the study of personality would argue that embedded within most scale-level personality instruments can be found a common set of personality factors that capture the essence of personality (e.g., McCrae

& Costa, 1985). As part of the test of the structural relationship between personality and performance, this research examined the viability of this assumption as it relates to the California Psychological Inventory. A subset of CPI scales were selected a priori to operationalize the latent personality factors conscientiousness, extraversion, and flexibility based on their conceptual similarity to the factor definitions and the size of their loading on the factors as reported in the CPI manual (Gough, 1987). A principal components analysis confirmed the presence of three factors in the collection of scales. The principal components analysis was followed by a confirmatory factor analysis of these CPI scales. The result of this analysis demonstrated that the proposed latent factors were unsuccessful at accounting for variation among the manifestations of those factors, i.e., the individual CPI scales. Conventional fit indices (e.g., GFI, CFI) failed to reached acceptable levels (i.e. .90). The results of the confirmatory factor analysis of the CPI suggests that the five-factor model does not adequately capture the variation in response to the individual CPI personality scales.

It is important to point out, however, that this research was not a specific test of the viability of the five-factor model for predicting assessment center performance, but rather a test of the viability of a factorially based model of personality in general for making such predictions. Because the CPI is one of the most well researched and widely used personality instruments available today, its failure to support the assumption that the five-factors emerge in virtually all personality instruments raises questions about the general viability of factorial models of personality, regardless of the instrument from which those factors emerge.

The Structural Model Relating Personality to Performance

The poor fit of the measurement model for personality doomed the structural model to a poor fit as well. Initial efforts to conduct a structural equations analysis of the relationship between the personality factors and the assessment center performance factors resulted in a solution that produced out-of-range standardized path estimates, as well as path estimates whose signs were opposite to what was expected. In an attempt to salvage the model, a path analysis was conducted using the covariance matrix of the latent variables as if it were a covariance matrix for manifest variables (Lance, Cornwell, & Mulaik, 1988). The hope was that this approach might control for the extremely poor fit of the measurement model for personality. While the analysis produced results with within-range standardized path estimates and coefficients of appropriate signs, the factorial model failed in every way to account for variation among the model elements.

Supplementary Analyses

Because the factorial model of personality was a poor predictor of assessment center performance, an examination of the viability of individual personality scales for predicting assessment center performance was undertaken. This began with an analysis of the correlation matrix of all observed variables and the estimated factors scores for the assessment center performance factors. This analysis revealed some meaningful relationships between the assessment center performance factors and individual CPI scales intended to operationalize the latent personality factors, as well as between the

assessment center dimensions and those same CPI scales. This suggests that the predictive power of some of the CPI scales may have been masked by the factors of Specifically, a review of the bivariate correlations between the individual CPI scales hypothesized to define the latent personality factors and both assessment center performance factors and dimension scores shows that there are significant correlations between both performance factors and dimension scores and the CPI scales of dominance (Do), self-acceptance (Sa), capacity for status (Cs), tolerance (To), achievement via independence (Ai), and achievement via conformance (Ac). (Probability values used to assess significance were adjusted using the Bonferroni method to account for the large number of correlations considered.) Each of these scales are associated with one of the Big-Five personality factors. The value of these correlations range from .372 for the relationship between dominance (Do) and interpersonal effectiveness to .525 for the relationship between achievement via independence (Ai) and influencing others.

It should be noted, however, that the selection of scales chosen to operationally define the latent personality factors was based on conceptual and empirical evidence of their relationship to those factors and not on their expected relationship with any of the individual assessment center dimensions or hypothesized performance factors. Seven of the CPI scales were not used in the structural equations analysis because they were not relevant to the prevailing factorial model of personality. However, an examination of the correlation between these seven scales and the assessment center performance factors and the individual assessment center dimensions reveals that two

scales, intellectual efficiency (Ie) and psychological mindedness (Py), have significant correlations with all assessment center performance factors and with several individual assessment center dimensions. An individual high on Intellectual efficiency is defined by Gough (1987) as one who is efficient in the use of one's intellectual abilities. Someone high on psychological mindedness is said to be more interested in what motivates people to behave in particular ways rather than in the behaviors themselves (Gough, 1987).The average correlation for intellectual efficiency across the four performance factors is .525, while the average correlation for psychological mindedness is .512. This is noteworthy because these scales do not fit neatly into current factorial models of personality. And yet these scales may very well have been hypothesized to influence one or more assessment center dimensions or performance factors had a scale-level model been employed rather than a factorial- level model. This finding suggests that there are elements of personality outside the five-factor model that have meaningful relationships with performance.

To further examine the relationship between personality scales and assessment center performance, a series of multiple regression analyses were conducted. An attempt was made to compare the predictive validity of the personality scales as a group versus the estimated factor scores for the personality factors in predicting both assessment center performance factors and assessment center dimensions. The estimated factors scores for each assessment center performance factor were regressed onto the measure of cognitive ability and the relevant estimated factors scores for personality. Follow up regressions were performed in which the relevant personality

scales that operationally defined the personality factors were substituted for the estimated factors scores. In all four sets of regression analyses involving the assessment center performance factors influencing others, interpersonal effectiveness, decision-making, and resource allocation, the collection of personality scales and the measure of cognitive ability yielded a higher R^2 value than did the regressions involving the personality factors. When the R^2 value was adjusted for the number of predictors in the regression, the collection of personality scales was still superior in the regressions involving decision-making and resource allocation.

At the assessment center dimension level, eleven pairs of regression analyses were conducted, one pair for each assessment center dimension. When the personality factors and the measure of cognitive ability were employed as predictors, all regressions were significant except those for the dimensions of decisiveness and sensitivity. When the personality scales and the measure of cognitive ability were used as predictors, two additional regression analyses were not significant--those involving the dimensions of stress tolerance and confrontation. The regression analyses involving the assessment center dimensions of initiative, oral communication, leadership, analysis, judgment, delegation, and planning & organizing were significant using either estimated factor scores for personality or the individual personality scales as predictors. However, the R^2 value was higher in those cases where the individual personality scales were employed. Even when adjusted R^2 values are examined, the regressions involving the personality scales had larger values in all cases except those for the assessment center dimensions of delegation and initiative.

Finally, it is interesting to note that the collection of relevant personality scales were better able to predict an assessees standing on relevant estimated factors scores for the assessment center performance factors than on any of the assessment center dimensions that define those factors. Each of the personality scales in the regressions were most likely tapping different aspects of the assessment center performance factor. Thus, the R^2 values for these regressions exceeded those for the regressions involving individual assessment center dimensions where the criterion of interest was much narrower, thereby rendering some of the individual personality scales less effective.

Contributions of the Research

This research set out to contribute to the literature by examining the relationship between personality and performance using a confirmatory approach to test a specific theoretical model. The predictor side of this model was based in part on prevailing factorial conceptualizations of personality. Because the relationships hypothesized in the proposed model had not been previously explicated, some revisions to the model were anticipated. However, what was not anticipated was the need to completely discard the model in an attempt to explain the empirical findings. Rather than confirming the viability of factorial conceptualizations of personality and their relationship to job performance, this research cast doubt on the viability of such factorial models for predicting assessment center performance.

This result proved unsatisfying. Research in the areas of emergent leadership and implicit leadership theory tend to support the notion that certain personality traits are linked to perceptions of leader emergence (e.g., Hogan, Curphy, & Hogan, 1994). In addition, we also have the intuitive belief that personality has an impact on job performance. The supplementary analyses, originally outside the scope of this research, were undertaken ex post facto to determine if personality at a more microscopic level, i.e., the scale-level, might in any way support the common sense notion that personality does influence performance apart from cognitive ability. The manner in which these analyses were undertaken was guided by the originally proposed structural model.

These analyses suggest that even when individual personality scales are selected on the basis of their presumed relationship with a latent personality factor, as was the case in this study, rather than on their hypothesized relationship with a relevant criterion measure, they are collectively better able to predict the dependent measure in their observed form than as manifestations for a latent factor. These results imply that carefully selecting individual personality variables based on their presumed relationship with a dependent measure, and not on their relationship to a hypothesized latent factor, should improve the predictive validity of personality over and above what was observed in this study.

Limitations and Recommendations

This research operationalized the factorial model of personality using the California Psychological Inventory. While this paper cites evidence in support of this instrument, it should be pointed out that the CPI was not developed based on an a priori factorial model of personality. Thus, comments about the weaknesses of factorial models of personality should be viewed as tentative.

Moreover, this research did not set out to examine the viability of factor-level versus scale-level models of personality for predicting performance in an assessment center. The conclusions that have been reached regarding the potential superiority of scale-level approaches for using personality measures should therefore be viewed with caution. It is also important to note that individual personality scales may be successful at predicting assessment center performance, but assessment center performance is different from actual on-the-job performance.

While there is some evidence in this data set to support the scale-level use of personality as a predictor of assessment center performance, this conclusion does not hold for the majority of CPI scales. One might argue that the weaknesses observed in some of the personality-job performance relationships even at the scale level might be explained in terms of the distinction between strong and weak situations (Gatewood & Feild, 1995). Strong situations are ones in which situational constraints limit the scope of behavior that one can exhibit. It could be argued that in situations where the circumstances dictate a set of behaviors, the influence of personality on the choice of behaviors will be limited. To the extent that assessment centers are viewed as strong

situations, there may be a limit to the influence that personality can have on behavior in this context.

Consequently, further research should proceed in at least two directions. First, researchers should directly compare an a priori factorial model of the relationship between personality and performance with an a priori scale-level model to refine the conclusions tentatively reached in this paper. Such research should attempt to employee a personality instrument that was based on the five-factor model of personality or other factorial model (e.g., NEO-PI, Hogan Inventory of Personal Motives). In this same vein, researchers may wish to employ dominance analysis (Budescu, 1993) to compare the relative importance of latent personality factors and individual personality scales in multiple regression analyses that examine theoretically driven models of the personality-job performance relationship. Dominance analysis involves comparing the relative strength of predictors in a pairwise fashion by computing all subset regressions involving the relevant pairs. The variable in the pair that proves more useful is said to dominate the relationship. This technique would allow a direct comparison of the value of latent personality factors versus individual personality scales for predicting performance in a regression context.

Secondly, research should explore the viability of scale-level versus factorial-level models of personality for predicting job performance in a range of situations that differ on the situational strength construct. This may require developing a taxonomy of situations that defines the characteristics of situations that would cause them to assume different places along the strength continuum from strong to weak. This line of research

would enable us to determine the situations in which the use of personality may play a useful role in predicting job performance.

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APPENDICES

Variable	14	15	16	17	18	19	20	21	22	23	24	25
Assessment Center Dimensions												
14. Analysis	1.00											
15. Confrontation	.40	1.00										
16. Decisiveness	.42	.41	1.00									
17. Delegation	.49	.37	.57	1.00								
18. Initiative	.66	.48	.34	.45	1.00							
19. Judgment	.75	.48	.38	.52	.57	1.00						
20. Leadership	.68	.51	.40	.57	.69	.66	1.00					
21. Oral Communication	.54	.36	.34	.40	.59	.56	.69	1.00				
22. Planning & Organizing	.65	.35	.46	.40	.50	.59	.46	.42	1.00			
23. Sensitivity	.07	-.08	-.04	.08	.08	.18	.12	.11	.04	1.00		
24. Stress Tolerance	.36	.32	.20	.29	.40	.36	.48	.44	.21	.06	1.00	
Cognitive Ability												
25. Watson-Glaser CTA	.57	.26	.22	.32	.51	.53	.50	.40	.45	.45	.27	1.00

[1] $r \geq .348$ is significant at $p \leq .05$ using the Bonferroni adjustment.

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
Assessment Center Dimensions													
14. Analysis	.39	.49	.35	.29	.28	.29	.13	.41	-.08	.03	.31	.31	.37
15. Confrontation	.20	.10	.23	.25	.06	.20	.11	.31	-.06	.08	.14	.19	.06
16. Decisiveness	.21	.19	.22	.11	.03	.15	.09	.18	-.01	.06	.07	.06	.16
17. Delegation	.29	.34	.35	.11	.21	.18	.18	.22	.01	.08	.19	.14	.27
18. Initiative	.29	.48	.46	.40	.21	.31	.20	.46	-.00	.08	.33	.32	.34
19. Judgment	.35	.37	.40	.25	.20	.16	.25	.36	-.05	.14	.12	.24	.33
20. Leadership	.30	.50	.48	.34	.24	.29	.18	.48	-.07	.12	.33	.31	.37
21. Oral Communication	.35	.42	.48	.28	.17	.29	.17	.32	.07	.19	.31	.31	.45
22. Planning & Organizing	.42	.31	.40	.27	.17	.29	.20	.39	-.05	.18	.26	.27	.30
23. Sensitivity	.14	.10	.02	-.04	-.08	.02	.17	-.05	.06	.02	-.03	-.03	.17
24. Stress Tolerance	.15	.33	.31	.13	.18	.10	.12	.22	-.12	.02	.16	.02	.27
Cognitive Ability													
25. Watson-Glaser CTA	.35	.60	.56	.47	.22	.34	.30	.50	.02	.27	.35	.40	.47

[1]$r \geq .348$ is significant at $p \leq .05$ using the Bonferroni adjustment.

Appendix A

Variable Intercorrelations

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
Personality Variables													
1. Achievement via Conformance	1.00												
2. Achievement via Independence	.38	1.00											
3. Capacity for Status	.53	.60	1.00										
4. Dominance	.44	.45	.52	1.00									
5. Flexibility	.06	.49	.27	.05	1.00								
6. Independence	.34	.48	.57	.59	.34	1.00							
7. Responsibility	.57	.40	.47	.57	-.07	.34	1.00						
8. Self Acceptance	.29	.44	.57	.68	.20	.54	.32	1.00					
9. Self Control	.40	.13	.12	-.01	-.08	.13	.41	-.30	1.00				
10. Socialization	.45	.19	.32	.21	-.11	.20	.57	.13	.51	1.00			
11. Social Presence	.16	.47	.48	.37	.46	.62	.18	.56	-.20	.05	1.00		
12. Sociability	.41	.43	.57	.60	.17	.51	.38	.69	-.10	.23	.64	1.00	
13. Tolerance	.43	.67	.55	.30	.32	.40	.46	.26	.38	.36	.35	.33	1.00

[1] $r \geq .348$ is significant at $p \leq .05$ using the Bonferroni adjustment.

Appendix B

Observations farthest from the centroid (Mahalanobis distance)

Observation Number	Mahalanobis d^2	p1	p2
15	43.919	0.008	0.546
43	42.837	0.010	0.282
24	39.257	0.026	0.481
73	38.907	0.028	0.312
9	37.839	0.036	0.299
84	36.902	0.045	0.299
56	36.549	0.049	0.219
5	36.470	0.049	0.127
63	35.735	0.058	0.134
6	35.077	0.067	0.142
53	34.332	0.079	0.173
72	34.210	0.081	0.116
66	33.631	0.091	0.131
42	33.121	0.102	0.143
88	32.281	0.120	0.229
1	32.070	0.125	0.193
82	31.114	0.151	0.349
74	30.232	0.177	0.530
3	29.789	0.192	0.578
70	29.382	0.206	0.618
32	29.331	0.208	0.539
89	29.253	0.211	0.470
54	29.218	0.212	0.387
79	28.684	0.232	0.488
87	28.351	0.246	0.520
77	27.458	0.284	0.753
26	27.396	0.286	0.699
47	27.159	0.297	0.704
76	27.156	0.297	0.625
17	27.057	0.302	0.579
35	26.862	0.311	0.572
29	26.777	0.315	0.521
8	26.507	0.328	0.548
37	26.483	0.329	0.473

Observation Number	Mahalanobis d^2	p1	p2
50	26.441	0.331	0.408
12	26.235	0.341	0.411
61	26.148	0.346	0.366
75	25.972	0.355	0.360
58	25.905	0.358	0.311
14	25.901	0.358	0.244
99	25.897	0.358	0.186
49	25.602	0.374	0.219
55	25.378	0.385	0.232
2	25.358	0.387	0.181
16	25.231	0.393	0.165
48	25.052	0.403	0.165
20	23.721	0.478	0.635
92	23.427	0.495	0.688
86	23.110	0.513	0.747
10	23.028	0.518	0.714
39	22.988	0.521	0.660
94	22.922	0.524	0.615
85	22.736	0.535	0.624
67	22.010	0.579	0.840
100	21.467	0.611	0.929
81	21.339	0.619	0.923
30	21.268	0.623	0.905
46	21.198	0.627	0.884
40	21.032	0.637	0.885
64	20.852	0.647	0.889
65	20.753	0.653	0.873
78	20.610	0.662	0.868
45	20.520	0.667	0.847
36	20.430	0.672	0.824
13	20.391	0.674	0.780
31	20.085	0.692	0.828
93	20.070	0.693	0.775
23	20.033	0.695	0.722
18	19.880	0.704	0.715
60	19.860	0.705	0.647
41	19.079	0.748	0.874

Observation Number	Mahalanobis d^2	p1	p2
52	19.074	0.748	0.824
59	18.871	0.759	0.833
91	18.857	0.760	0.776
71	18.627	0.772	0.794
90	18.496	0.778	0.775
38	18.215	0.792	0.809
57	18.210	0.793	0.740
25	18.208	0.793	0.658
4	18.144	0.796	0.596
95	17.944	0.806	0.597
80	17.862	0.810	0.538
98	17.650	0.820	0.540
69	17.648	0.820	0.438
28	17.565	0.824	0.375
7	17.484	0.827	0.312
62	17.212	0.839	0.330
33	17.133	0.843	0.265
101	16.709	0.861	0.338
68	15.959	0.890	0.560
44	15.481	0.906	0.648
96	15.381	0.909	0.563
19	15.216	0.914	0.498
83	14.744	0.928	0.557
51	14.668	0.930	0.435
34	14.550	0.933	0.326
97	14.356	0.938	0.245
21	13.198	0.963	0.478
22	11.990	0.980	0.672
11	11.665	0.983	0.500

Appendix C

Intercorrelations Between Manifest Personality Variables and Assessment Center Performance Factors[1]

Manifest Personality Variables	Assessment Center Performance Factors			
	Decision Making	Interpersonal Effectiveness	Influencing Others	Resource Allocation
1. Achievement via Conformance	0.42	0.37	0.38	0.43
2. Achievement via Independence	0.50	0.51	0.53	0.46
3. Capacity for Status	0.46	0.53	0.52	0.47
4. Dominance	0.32	0.37	0.37	0.29
5. Flexibility	0.27	0.25	0.25	0.24
6. Independence	0.30	0.33	0.33	0.30
7. Responsibility	0.21	0.22	0.22	0.22
8. Self Acceptance	0.46	0.50	0.50	0.44
9. Self Control	-0.06	-0.05	-0.05	-0.05
10. Socialization	0.11	0.14	0.13	0.13
11. Social Presence	0.29	0.35	0.35	0.28
12. Sociability	0.32	0.34	0.35	0.29
13. Tolerance	0.41	0.42	0.42	0.39
14. Watson-Glaser CTA	0.06	0.55	0.57	0.55

[1] $r \geq .348$ is significant at $p \leq .05$ using the Bonferroni adjustment.

Appendix D

Intercorrelations Between Manifest Assessment Center Dimensions and Personality Factors[1]

Manifest Assessment Center Dimensions	Personality Factors		
	Extraversion	Flexibility	Conscientiousness
1. Analysis	0.43	0.50	0.23
2. Confrontation	0.27	0.12	0.15
3. Decisiveness	0.17	0.19	0.14
4. Delegation	0.27	0.35	0.23
5. Initiative	0.50	0.49	0.27
6. Judgment	0.35	0.39	0.30
7. Leadership	0.49	0.51	0.27
8. Oral Communication	0.43	0.45	0.30
9. Planning & Organizing	0.40	0.34	0.31
10. Sensitivity	-0.01	0.10	0.14
11. Stress Tolerance	0.25	0.33	0.13

[1] $r \geq .337$ is significant at $p \leq .05$ using the Bonferroni adjustment.

Appendix E

Intercorrelation of CPI Scales Not Included in Structural Equations Model with Assessment Center Variables[1]

Assessment Center Variables	CPI Personality Scales Not Included in Structural Equations Model[2]						
	Cm	Em	Fm	Gi	Ie	Py	Wb
Assessment Center Factors							
1. Decision Making	0.14	0.25	-0.15	-0.05	0.53	0.52	0.23
2. Interpersonal Effectiveness	0.10	0.27	-0.09	-0.03	0.53	0.51	0.24
3. Influencing Others	0.11	0.29	-0.11	-0.04	0.53	0.51	0.25
4. Resource Allocation	0.16	0.20	-0.13	-0.02	0.51	0.51	0.21
Assessment Center Dimensions							
5. Analysis	0.15	0.23	-0.19	-0.07	0.47	0.49	0.22
6. Confrontation	0.00	-0.10	-0.02	-0.04	0.27	0.23	0.05
7. Decisiveness	0.06	-0.02	-0.04	0.05	0.30	0.23	0.08
8. Delegation	0.06	0.14	-0.06	0.02	0.29	0.33	0.15
9. Initiative	0.11	0.22	-0.13	0.01	0.47	0.47	0.27
10. Judgment	0.10	0.19	-0.10	-0.06	0.44	0.40	0.15
11. Leadership	0.06	0.32	-0.09	-0.06	0.47	0.43	0.23
12. Oral Communication	0.16	0.32	-0.05	0.05	0.45	0.43	0.27

[1]$r \geq .363$ is significant at $p \leq .05$ using the Bonferroni adjustment.

[2]Cm - Communality; Em - Empathy; Fm - Femininity; Gi - Good Impression; Ie - Intellectual Efficiency; Py - Psychological Mindedness; Wb - Well Being

Assessment Center Variables	CPI Personality Scales Not Included in Structural Equations Model						
	Cm	Em	Fm	Gi	Ie	Py	Wb
13. Planning & Organizing	0.25	0.13	-0.11	0.01	0.42	0.46	0.13
14. Sensitivity	-0.14	-0.03	-0.01	0.11	0.03	0.15	0.15
15. Stress Tolerance	-0.07	0.11	0.09	-0.08	0.28	0.19	0.01
Cognitive Ability							
16. Watson-Glaser CTA	0.13	0.32	-0.22	0.06	0.59	0.48	0.21

[1]$r \geq .363$ is significant at $p \leq .05$ using the Bonferroni adjustment.

[2]Cm - Communality; Em - Empathy; Fm - Femininity; Gi - Good Impression; Ie - Intellectual Efficiency; Py - Psychological Mindedness; Wb - Well Being

VITA

David Wayne Denton was born in Brooklyn, New York on March 1, 1960. His family moved from New York to Chattanooga, Tennessee in March 1973. After graduating with honors from Hixson High School in June 1978, he attended Memphis State University and the University of Tennessee at Chattanooga, graduating from the latter magna cum laude with a Bachelor of Arts degree in History in May 1982. He accepted a position as Assistant Store Manager of the Publishers Book Outlet in Rossville, Georgia. While working full-time, he pursued a Master of Science degree in Industrial and Organizational Psychology at the University of Tennessee at Chattanooga. This degree was conferred with honors in May 1987.

The author began doctoral study in industrial and organizational psychology at The University of Tennessee in September 1987. He was awarded a Hilton A. Smith Fellowship for his first year of study. From 1989 to 1991, he served as an Assessor for the Tennessee Assessment Center. From 1991 to 1993, he was employed as an instructional technologist with Analysas Corporation in Oak Ridge, Tennessee. In 1993, he accepted the position of director of training for Books-A-Million, Inc. and moved to Birmingham, Alabama.

In July 1994, while living in Birmingham, he married his girlfriend of four years, the former Debbie Smith. He left Books-A-Million, and the business world, in August 1994 to assume the position of assistant professor of psychology at Austin Peay State University in Clarksville, Tennessee. He is the coordinator of the industrial and organizational psychology masters program at that school.

In August 1996, he received the Doctor of Philosophy degree with a major in industrial/organizational psychology. In addition to his academic pursuits, he is an avid golfer, a voracious reader, a college basketball fan, and a drummer. Dr. Denton currently resides with his wife in Clarksville, Tennessee in a turn-of-the-century home built in 1903.