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UMI

THE CONSTRUCT OF INTEGRITY:
ITEM LEVEL FACTOR ANALYSIS OF THE DIMENSIONS
UNDERLYING HONESTY TESTING
AND BIG-FIVE MEASURES OF PERSONALITY

A THESIS
SUBMITTED TO THE FACULTY OF THE GRADUATE SCHOOL
OF THE UNIVERSITY OF MINNESOTA
BY

JAMES EDWARD WANEK

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

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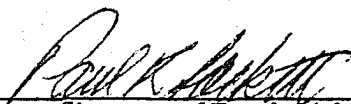This is to certify that I have examined this bound copy of a doctoral thesis by

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PAUL R. SACKETT

Name of Faculty Adviser(s)

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JULY 1995

Date

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ABSTRACT

This dissertation focuses on item-level analysis of paper and pencil psychological tests of integrity (also called honesty tests) used for the selection of employees. It continues the work on understanding and defining the construct underlying measures of integrity begun by the test-level analyses of Ones (1993) which indicated the presence of a general factor thought to be similar to the personality construct of Conscientiousness.

The data for this study consists of responses to test questions from eight integrity tests: the London House Personnel Selection Inventory, the Reid Report, the Stanton Survey, the Employee Reliability Inventory, the Personnel Reaction Blank, the Personnel Decisions, Inc. Employment Inventory, the Hogan Reliability Scale, the Inwald Personality Inventory, and three Big Five Personality measures: the Hogan Personality Inventory, the Personal Characteristics Inventory, and Goldberg's Adjective Checklist.

Factor solutions were computed separately for the overt integrity test items, the personality-based integrity test items, for the Big Five personality measure items, for a data set of all tests' items, and for integrity test items alone. Principal components analysis of the integrity test item data, followed Harris-Kaiser oblique rotation produced a 19 factor solution. Some of the major factors included Social Deviance/Conformity, Honesty Image, External Locus of Control, Theft Thoughts/Admissions, Trust/Low Self-Control, Extroversion, Social Drug Use, Punitiveness, Diligence/Planning, Home Life, Emotional Stability,

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Drinking/Deviance, and Affectivity. Several factors formed which were dominated

by specific test instruments. This unexpected result was believed to derive from

differences in standard errors due to the range of sample sizes used in computing the

correlations between items.

Correlational relationships between the 19 Factors and individual integrity

instruments indicated that the correlations between tests noted by Ones (1993) were

primarily due to their measurement of the Self-Control component of

Conscientiousness, and less with the Orderliness, Hard Work and Conformity

components of conscientiousness.

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I. Introduction

Losses due to employee theft and assorted acts of deviance cost businesses billions of dollars annually (Ash, 1991; O'Bannon, Goldinger & Appleby, 1989; OTA, 1990). When faced with such losses, employers can choose from among various options to reduce the problem, one of which is to select more honest employees. To aid in the selection of more honest employees, a class of self-report, paper and pencil tests has been developed called integrity or honesty tests. These tests are designed for use with job applicants from "normal" populations. In other words, they are not clinical measures used to detect psychoses or mental disorders, such as the MMPI. It should also be noted that while there are versions of integrity tests designed to be used with current employees, this study focuses on pre-employment instruments.

Within this class of paper and pencil tests, two distinct types of tests have emerged. They are known as overt-integrity tests (or clear purpose tests), and personality-based tests (also called veiled-purpose tests) (Sackett, Burris & Callahan, 1989; OTA, 1990). Overt tests ask subjects to respond to questions and statements which obviously deal with attitudes toward theft and admissions of prior theft. Personality-based tests, on the other hand, are derived from various personality measures and ask questions which on the surface, are not obviously linked to honesty. Both types purport to measure a wide array of deviant, counterproductive behaviors such as theft, absenteeism, turnover, and even performance, which makes it difficult to determine exactly what they measure. The APA Task Force Report (Goldberg et

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al., 1991) on honesty testing calls the domain of interest "ill-defined and heterogeneous." So many interrelated concepts and definitions are used to describe the domain of interest, that Sackett and Wanek (in progress) felt compelled to use many of the terms in the title of their review in hopes that researchers will be able to access the article from electronic data bases regardless of the "key-word" they use to conduct their search!

Here then lies the heart of the matter under investigation in this study: What are the constructs being measured by the items of these seemingly related tests of trustworthiness? Items from seven integrity tests and three personality measures will be compared and examined to determine both the common and unique factors represented by the item pool. The goal of the study is to increase the understanding of which factors are associated with each integrity test.

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II. Literature Review

This review into relevant literature is divided into three major sections. The first section provides the reader with a broad, general overview of the history of honesty/integrity testing, and introduces the reader to the measurement instruments used in this study. It is not intended to replicate or replace major reviews such as those published by Sackett and colleagues (1979, 1984, 1989, in progress). Rather, it is intended to provide a current context for this study by highlighting major developments in the use and research on integrity tests.

The second section takes a similar approach to the resurrection of interest and research on what are now called the "Big-5" personality factors. Excellent reviews by Digman (1990), Wiggins and Pincus (1992), and a special issue of the Journal of Personality, (June, 1992) are recommended for more details into this area of research.

Section three reviews previously conducted factor analyses of integrity tests, describing the factor analytic methods used, and resulting factor structures. Of special interest to this study are reports of non-theft factors which also make up the integrity construct defined by the domain of integrity test items.

Finally, the fourth section pulls together the recent research linking the construct of integrity, as measured by paper and pencil integrity tests, with the "Big-5" personality factors, especially the factor of "Conscientiousness".

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A. The Field of Integrity Testing

1. The History of Integrity Tests

Although the development of contemporary paper and pencil honesty tests for

employee screening can be traced back to the 1940's (O'Bannon, et al.; Ash, 1991),

the field of scholarly research on the psychometric properties of these tests is only

just now beginning to mature. Most of the earlier research was conducted by test

publishers outside the review of mainstream psychological testing, and often was

technically flawed (Sackett & Harris, 1984). Small sample sizes, coupled with heavy

reliance on correlations between tests and polygraph scores, correlations with other

self-report measures of theft, and differences in test scores between deviant and non-

deviant groups made up the bulk of research evidence prior to 1984. Few predictive

validity studies correlating test scores with future work-related criteria were reported.

Yet, despite the shortcomings of the evidence, Sackett and Harris noted there were

overall positive findings for the validity of the ten instruments they reviewed. They

recommended improvements in research designs including the use of control groups,

better defined criteria, and investigation into the issues of social desirability answering

and faking.

The attention to scientific rigor improved during the late 1980's and 1990's,

even though the proprietary nature of integrity tests meant that much of the research

was still conducted by publishers instead of independent researchers. Use of integrity

tests grew, partly in response to increased legal restriction over the use of polygraph

tests, following passage of the Employee Polygraph Protection Act of 1988. During

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this time, two distinct forms of integrity tests emerged: overt tests (also called clear-purpose tests) and personality-based tests (also called veiled-purpose tests) (Sackett, Burris & Callahan, 1989; OTA, 1990). Overt tests ask subjects to respond to questions and statements which obviously deal with attitudes toward theft and admissions of prior theft activities. Personality-based tests, on the other hand, are derived from various personality measures and ask questions which on the surface, are not obviously linked to honesty. Both types purport to measure a wide array of deviant, counterproductive behaviors such as theft, absenteeism, and turnover, and attitudes toward theft.

The 1989 review by Sackett and colleagues showed that much of the validity research done since the 1984 Sackett and Harris review correlated integrity test scores with external, non-self-report outcome measures. Results from large scale predictive studies showed strong correlations between test scores and a variety of outcomes of interest to organizations, including dismissal for theft, absenteeism, turnover, and correlations with supervisory ratings. There was also strong evidence that use of integrity tests did not result in adverse impact against protected classes. However, two concerns still remained which had been noted in the 1984 review. First, the preponderance of research was conducted and reported by publishers which allowed skeptics to wonder if negative results were being suppressed. Second, while the tests were useful for prediction at an organizational or group level, they were not sufficiently accurate to predict the actions of a single individual.

This potential for an individual to be erroneously classified as dishonest fueled numerous arguments and debates (see for instance Dalton & Metzger, 1993; Greenfield et al., 1989; Guastello & Rieke, 1991; G. A. Hanson, 1991; Metzger & Dalton, 1991; OTA, 1990). Critics essentially made the argument that large numbers of people were being misclassified by the tests, and therefore, unfairly denied jobs. Rejected applicants were also faced with the possible stigma of being labeled thieves.

As addressed by Goldberg, Grenier, Guion, Sechrest, and Wing (1991), these arguments are made in the abstract, rather than relative to other forms of selection. By its very nature, selection implies that there are more applicants than job openings, and any procedure less than perfect will result in some worthy people being rejected. However, use of *valid* selection instruments and procedures (e.g. those that show strong correlations with job related measures of interest, typically performance measures) will result in fewer misclassifications than random or first come, first hired procedures. This question of whether or not integrity instruments were more or less correlated with job related outcome measures than other selection devices drove much of the research during the 1980's. Goldberg's APA Task Force concluded that there was no basis to hold integrity tests to more stringent standards than those applied to other selection tests.

The labeling argument also tends to be diminished when put into an applied context. Most selection procedures include multiple interviews, forms and tests, the results of which are not reported to applicants because of employers' legal concerns. Selection is typically based on more than one test score, and applicants are not told

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specific reasons why they are not hired. If records are kept confidential, it is unlikely that candidates would assume they "failed" the honesty test, and would therefore, not feel "stigmatized". Again, the same security practices recommended for handling other confidential or sensitive employee information should apply when dealing with integrity test results.

The publisher-supported research and the independent research on integrity tests have generally focused on a single integrity instrument per study. Given this situation, it was difficult to form any comprehensive conclusions about the characteristics of integrity tests as a group. However, advances in the use meta-analytic techniques to extend validity generalization by Hunter and Schmidt in the 1980's (see for instance Hunter, Schmidt & Jackson, 1982), allowed the results of individual studies to be cumulated into a meaningful overview by Ones and colleagues.

The recent meta-analytic study by Ones, Viswesvaran and Schmidt (1993) firmly established the predictive validity of commercially available integrity tests with regard to a wide array of criteria including assorted acts of deviance, attitudes toward theft, and supervisory performance ratings. Estimated population correlation coefficients (corrected for unreliability and range restriction) between external measures of broadly defined counterproductive behavior and integrity tests, were .39 for overt tests, and .29 for personality-based tests. The corrected estimated correlation between supervisory ratings of overall job performance across all settings, and both types of integrity tests was .41. These moderate correlations across settings

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and test type add to the evidence that integrity tests are valid predictors of both overall job performance, and counterproductive behavior. Ones et al. (1993) hypothesize that a general "conscientiousness" factor linked to productive job behaviors is being measured by integrity tests. This hypothesis is explored in more detail in the upcoming sections, "Reported Factor Analyses of Integrity Tests", and "The Link Between Integrity and Conscientiousness."

Now that the evidence supporting integrity tests as valid predictors of future job-related behaviors is growing, it is important to develop an clearer understanding of the traits being measured. The focus of the current research is to advance understanding of the underlying constructs which integrity test items purport to measure.

2. Integrity Testing Instruments

There are two distinct types of integrity testing instruments included in this study: overt integrity tests, and personality-based integrity tests. O'Bannon et al. (1989) lists 43 available honesty instruments, many of which have multiple versions for specialized industries or jobs. For instance, the London House Personnel Selection Inventory comes in versions targeted at convenience store clerks, or bank tellers, to name just two. The instruments described in this section are limited to those included in the data base used for this study. They are among the most well known, widely used, and researched tests in the field, and should provide the reader with a good introduction to integrity tests. Several of the tests have become widely recognized by three letter acronyms which will be occasionally adopted throughout

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this paper. Hopefully, the savings in key strokes will not be traded in increased confusion for the reader.

The following section introduces the individual instruments. A brief history of the test development, test length, sample questions, intended target population, dimensions or constructs measured, and scoring guidelines have been provided.

a. Overt Integrity Tests

The London House Personnel Selection Inventory (PSI), Stanton Survey and Reid Report are the three overt integrity instruments included in this study. They are also referred to as "clear purpose" tests in various sources. They are designed to assess attitudes and behaviors related to honesty, theft and workplace delinquency.

(1) London House Personnel Selection Inventory (PSI). There are 12 versions of the PSI available from London House, Inc. and it may well be the most widely distributed overt integrity test (Ash, 1988). Developed primarily by Dr. William Terris in 1975, the current list of scales available include: Honesty - attitudes toward theft and likelihood of theft related behavior (this scale is included in every version); Drug Avoidance; Nonviolence; Employee/customer relations; Safety; Work values; Supervision attitudes; Tenure; Applicant employability index; Internal validity (distortion and accuracy) scales and Personal History (O'Bannon et al., 1989; Craig, 1990). Test length varies depending upon the number of scales included in a given version. The version used in this study was the PSI-7ST (1989) which includes Honesty, Drug Avoidance, Customer Relations, Safety, Work Values, Supervision,

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and Tenure scales, plus two Validity scales - one for distortion, the other for accuracy, and an Employability Index.

Development of the PSI was based on the assumption that deviant people as a group possess different attitudes about universal norms (Lasson, 1992). A dishonest individual tends to rationalize his/her own theft-related behavior as "typical" or "normal", exhibits a greater tolerance of theft behavior in others, and believes that theft by others occurs more frequently than an honest individual would believe (Ash, 1991). Lower scores for individuals are interpreted as being more like a thief, and therefore, expected to be more likely to commit theft on-the-job (for the Honesty scale). Standard scores for the entire test range from 0 to 100, with higher scores indicating better employment applicants. Scores can also be reported as "Recommend" for hire, or "Not Acceptable" (O'Bannon et al., 1989).

Test versions, written at a 6th grade level, are available for general applicant pools, as well as for targeted jobs and/or industries such as bank employees, and convenience store clerks. Items are multiple choice with 5 to 7 alternatives for each item.

(2) The Reid Report. The Reid Report from Reid Psychological Systems, first copyrighted in 1951, is based on the polygraph work of John E. Reid (Ash, 1991; O'Bannon et al., 1989). Test questions were very direct and explicit in the manner of polygraph questions such as, "How honest are you?," "How much money have you taken from employers?," "Did you ever think about stealing something from places where you have worked?" (Ash, 1991). This paper and pencil version was used to

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supplement or replace traditional polygraph exams. The earliest studies undertaken to validate the Reid Report used polygraph evaluations as the criterion. From a historical perspective, these many links to polygraphs have added to the confusion about whether integrity tests work, and if so, what they measure. Critics of the polygraph also tend to criticize paper and pencil integrity tests for many of the same reasons (O'Bannon et al., 1989).

There are three primary sections to the Reid Report: Honesty Attitudes, Social Behavior, and Personal Achievements. Also available with the most recent editions are sections to assess Substance Abuse, Service Orientation, and/or Clerical/math Skills. The Honesty Attitudes section is scored quantitatively, yielding a score which reflects punitiveness toward people committing theft, and attitudes toward theft in general (referred to as the "rawscore" in the analysis and discussion sections). The Social Behavior section asks yes/no questions regarding past theft activity. The Personal Achievements section collects biodata-type information. Scores for sections other than Honesty Attitudes are reported as "Recommended," "Qualified," or "Not Recommended". An Overall Evaluation is also reported based on the lowest score from any particular section (Lasson, 1992; O'Bannon et al., 1989). The 1989 version of the Reid Report was used for this study.

The Reid Report is usable for all applicant groups and has a 6th grade reading level.

(3) The Stanton Survey. Carl Stanton Klump, a criminologist and polygrapher with John Reid, developed and copyrighted the Stanton Survey in 1964 (O'Bannon et

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al., 1989; Willis, 1990). Like the PSI and Reid Report, it contains questions that probe into Honesty Attitudes, and Admissions of previous dishonesty. The primary assumptions underlying the Stanton Survey are (1) people who have engaged in past criminal behavior are likely to do so in the future, (2) people engaged in criminal behavior form different attitudes and behaviors than non-criminally active adults, and (3) people involved in deviant and counterproductive activities rationalize their behaviors and show a greater tolerance for deviant behavior in others (Willis, 1990).

The 1992 edition contains 82 theft and social attitude items, (including drug use), and previous behavior questions, plus basic demographic items. In addition to the yes/no, and multiple choice answer scales, in previous editions respondents were encouraged to "Explain why" to many of the questions about attitudes and previous behaviors. The essay response portions have been deleted from the newest edition. Attitude questions allow for people to show a change in perspective due to experiences, for instance, "Have your views about stealing changed in the last several years? (mark one: Yes, very much / Yes, some / No, not much / No, not at all) An example of a question about previous behavior asks, "At all the places where you have WORKED, if you added up all the MERCHANDISE you've TAKEN (stolen), how much would it add up to? (mark one: None, $1, $5, $10, $20, $50, $75, $100, $250, $500, $1000).

The Stanton Survey can be scored on-site by administrators, computer scored, mail-in scored, or scored over the telephone. Scores generated from answers are: a Numerical Base score on Attitudes toward theft, an Admissions Score, and an overall

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Stanton Score sum of the two scale scores. The Stanton Score is then assigned to a Low, Marginal, or High Risk category. Written at the sixth grade level, the Stanton Survey is intended for use with all types of applicants.

b. Personality-based Integrity Tests

Among the personality-based tests (also called "veiled purpose" tests) are the Employee Reliability Inventory (ERI), Personnel Reaction Blank (PRB), the PDI Employment Inventory (PDI-EI), the Hogan Reliability Scale (REL), and the Inwald Personality Inventory (IPI). These five instruments measure a broadly defined dimension of counterproductivity without specifically asking theft-related questions. Unlike the overt integrity tests which were developed from polygraph and security related work, the personality-based integrity tests have roots in psychological measurement. Following from that tradition, many personality-based instruments include items that were empirically selected. Empirically selected items "work" in that they are able to differentiate between groups on a trait of interest, however, they frequently lack in "face validity". That is, on the surface the items bear no relation to the trait being measured (Crocker & Algina, 1986).

(1) Employee Reliability Inventory (ERI). This instrument was created in 1986 by Dr. Gerald Borofsky, Dr. Joel Friedman and Anderson Maddocks, Jr. (O'Bannon, 1989). The ERI could be considered a bit of a hybrid integrity instrument. While some of the 81 true/false items ask explicitly about theft attitudes, it does not ask directly for theft admissions like the overt tests do. There are however, some explicit drug and alcohol use admission items.

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The ERI measures the likelihood of alcohol/substance abuse, the likelihood of poor performance resulting in termination within 30 days, the likelihood of dishonesty, and the likelihood of not showing long term job commitment. Individuals are rated on the four scales from High Risk to Low Risk. Results are presented in a graphical chart form.

The ERI was not included in Ones's earlier research due to the late arrival of the scored inventories from the publisher. Use of the ERI in this study will be limited to expanding the item pool from which the factor solution will be derived. Ideally, the final scores along with scores from the other instruments would be correlated to the factors in the final solution. Unfortunately, the ERI scores are presented graphically, not quantitatively, and time did not allow for an attempt to convert the graphed levels to numeric scores.

(2) Personnel Reaction Blank (PRB). The PRB, from Consulting Psychologists Press, was developed by Dr. Harrison G. Gough in 1954, and revised in 1988 by Dr. Gough and Dr. Richard D. Arvey to its present 90-item form. It is based on items from the Socialization scale of the California Psychological Inventory, also developed by Dr. Gough. The PRB was developed to measure a general construct originally called "wayward impulse" (Gough, 1971). O'Bannon et al. (1989), however, describe the PRB as measuring a "dependability-conscientiousness personality factor" (p.170). This use of more currently recognizable personality-related terms conveys a better understanding of the test's dimensions, than does the more archaic "wayward impulse". Indeed, assessed as part of the wayward impulse

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construct are an individual's dependability, conscientiousness, self-restraint, and social conformity (Hough, 1990).

There are two parts of the instrument. Part I, Work Preferences, lists 30 jobs and occupations rated on a Like, Indifferent, Dislike scale. Part II, Personal Reactions, rates reactions to 60 statements on a True/False scale. Examples of the statements are: "I like to be with sophisticated people," "I often feel that I made the wrong choice in my occupation," "I have very sensitive eyes," and "A person is better off not to trust anyone." These examples are among the 42 items which comprise the scoring key of the PRB. Respondents are rated as Superior, Above Average, Normal, Borderline, or Doubtful. High scores indicate an individual is "steady, reliable, appreciative, conventional in demeanor and outlook, and more willing to adapt to the needs of others" (Gough, 1971, p. 675). Also, according to Gough, the PRB is less likely to be useful as a selection device for jobs that require risk-taking, spontaneity or innovation for successful performance. Optimum cut scores for the PRB were normed from a variety of studies including normal and delinquent populations. The PRB is intended for use with non-managerial adults, ages 15 and older.

(3) Personnel Decisions, Inc. Employment Inventory (PDI-EI). The PDI-EI is designed to measure a broad construct of counterproductivity called "employee deviance" (Sackett, Burris & Callahan, 1989). It was developed in 1985 by Dr. George Paajanen to measure two scales: Performance and Tenure. The Performance scale identifies applicants who have trouble dealing with authority, tend toward rule

violations, carelessness and stealing, while the Tenure scale assesses the probability of an applicant staying on the job at least three months (Lasson, 1992; O'Bannon et al., 1989; Sackett et al., 1989). 97 true/false, and multiple-choice items yield "Recommended Rejection," "Caution," or "Recommended Hire" categories for the Performance scale, and "Low," "Moderate," or "High" probability of remaining at least three months for the Tenure scale. The 1985 edition was used in this study.

There are computer, mail-in, or phone-in scoring options for the PDI-EI. It is written at the sixth grade level, and unlike some other instruments, the target population is rather narrowly defined as, "Any hourly job with access to valuable company property, merchandise or information that requires dependable job performance" (O'Bannon et al., p. 154).

(4) Hogan Reliability Scale . The Reliability Scale is derived from the 310 item Hogan Personality Inventory (HPI), developed by Dr. Robert Hogan in 1981. It needs to be made explicit here, that the HPI is doing double duty in this study. The HPI itself yields seven personality factors, and is described more fully in the section on Big-5 personality measures. The Reliability Scale is not one of those seven main HPI factors. Rather, items and subscales on the HPI were analyzed and recombined to create measures of successful job performance by Dr. Joyce Hogan and Dr. Robert Hogan in 1986. These new job-related measures form the individual units in the Hogan Personnel Selection Series (Hogan & Hogan, 1989; Lifton & Nannis, 1990). Measuring a broad construct labeled "organizational delinquency", the 69 item Hogan Reliability Scale assesses thrill seeking, conscientiousness, social insensitivity,

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hostility toward authority, and confused vocational identity (Sackett et al., 1989).

Like the PRB, the Reliability Scale is closely linked to and in part, derived from, the

Socialization scale of the California Psychological Inventory (Woolley & Hakstian,

1992).

The Reliability Scale is available along with five other scales reflecting aspects

of occupational performance. The other scales are: Service Orientation, Stress

Tolerance, Clerical Potential, Sales Potential, and Managerial Potential. The

true/false statements, like those on the PRB, do not on the surface appear to be

honesty related. The HPI and HPSS have options for mail-in, on-site computer and

automated modem scoring. The 1990 edition was used in this study.

(5) Inwald Personality Inventory-Risk (IPI). The following information on the

IPI comes from a review by Fekken (1990). The IPI was designed to screen out

psychologically unfit training applicants for jobs as police officers, security guards,

and corrections officers. Developed by Dr. Robin Inwald for Hilson Research, Inc.,

the IPI has 26 distinct scales organized in three clinical groupings. The first

grouping, "Acting Out" Behavior Measures is subdivided into six Specific "External"

Behavior scales, and five Attitude and Temperament scales. This grouping includes

the subscales most relevant to on the job behaviors seen in other instruments, such as

alcohol and drug abuse behaviors, job difficulties, trouble with the law and society,

absence abuse, attitudes toward substance abuse, and antisocial attitudes. The second

grouping is labeled "Internalized" Conflict Measures and contains seven scales

assessing mental dysfunction, such as anxiety, obsessive personality and depression.

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The final grouping is "Interpersonal" Conflict Measures which contains six scales assessing the quality of interpersonal interactions, including interactions with the respondent's family, with their mate, sexual concerns, and other interpersonal difficulties.

The 310 IPI test items seek true/false responses to statements. Answers are scored using Scan-Tron answer sheets. A personality profile is reported comparing an individual's scores on the 26 scales to a normative group. Also a written evaluation of 3 to 4 pages long is given, which ends with an overall rating of probable job success for the candidate. A numerical "Critical Score" is given as an overall integrity score. The 1980 edition of the IPI was used for this study.

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B. The Five-Factor Model of Personality

1. Development of the Big-5 Framework

Reviews by Digman (1990), Wiggins and Pincus (1992), Ones (1993), and Hogan and Ones (1994) relate the long, checkered process leading to the identification and increased acceptance of the personality dimensions referred to as the Big-5 personality factors: Extroversion/Introversion (also called surgency), Emotional Stability (neuroticism), Agreeableness (likability), Conscientiousness (conformity, dependability), and Openness to Experience (intellect, culture).

At the onset, it should be explained that the Big-5 model is less a distinct personality theory, than a structure or framework to aid in interpretation and understanding of personality dimensions. Nor is the five-factor model of personality a recent discovery. Some researchers were suggesting the existence of a five-factor structure in the 1930's (McCrae, 1992). According to Digman (1990), Fiske (1949) re-examined Cattell's complex 16 primary factors and 8 subfactors structure of personality from the 1940's, and was unable to find more than five factors. Tupes and Christal (1961) re-analyzed the Cattell and Fiske data, finding support for five factors: Surgency, Emotional Stability, Agreeableness, Dependability and Culture. This work, however, went largely unnoticed until Norman (1963) replicated the five factors and suggested that the trait dimensions be used to develop a taxonomy of personality attributes (Digman, 1990). Furthermore, according to Digman, it was Norman's (1967) continued research which gave rise to the term "Big-Five" for the five personality factors.

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Although a considerable research base had accumulated over twenty years ago, trait theories of personality fell out of favor as proponents of situational behaviorism gained prominence (Digman, 1990). Until the work of Goldberg (1981), and Digman and Takemoto-Chock (1981), the five-factor model received little scholarly attention. McCrae and John (1992) discuss how the five-factor model of personality dimensions has been shown to have discriminant and convergent validity across instruments, observers and individuals. It represents a broad structure of personality traits in a common language which can help standardized future personality research.

Although there is growing agreement that there are five factors, naming and interpreting them is still a point of contention among researchers (Barrick & Mount, 1991; McCrae & John, 1992). Initially, there were two approaches to naming the variables; the lexical approach and the questionnaire approach. The observation that major personality traits are expressed in everyday language gave rise to the "lexical approach" for naming factors. The other method for naming the factors was based on analysis of questionnaires.

Goldberg (1990, 1993) describes the lexical approach to studying personality, which grows from the hypothesis "that the most important individual differences in human transactions will come to be encoded as single terms in some or all of the world's languages." (p.1216) The robustness of the five-factor model has been demonstrated by Goldberg (1990) and McCrae and Costa (1987) across self-ratings and peer ratings.

Following the questionnaire method, H. J. Eysenck identified what became known as the"Big Two", Extroversion and Neuroticism (McCrae & John, 1992). The search for additional personality dimensions not explained by the Big-Two eventually led to a merging between the lexical and questionnaire approach to give us the contemporary Five-Factor Model (McCrae & John, 1992). Table 1 shows an adaptation of Digman's summary of the names given to the Big-Five dimensions by researchers since Fiske's 1949 study. The terms assigned to the factors by the different researchers gives an idea of the conceptual features of each factor.

Insert Table 1 about here

The connection between the Big-Five model and this study's investigation into the properties of integrity tests, follows from a lexical perspective. Many of the same words used to describe personality traits, such as conscientiousness, self-control, agreeableness, sociability, stability, and impulse constraint, are used by integrity test developers to describe the trait dimensions their tests measure. By using an assortment of Big-Five measures along with an assortment of integrity tests, this study defines the factor space they have in common. At a test level, Ones (1993), (described more fully in the section on Factor Analyses of Integrity tests), has already shown that integrity tests share a higher order factor she called Conscientiousness, which is itself defined by three of the Big-Five: conscientiousness, agreeableness and emotional stability. This study continues the research she started, but takes the

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Table 1. <u>The Five Robust Dimensions of Personality from Fiske (1949) to Goldberg (1992).</u> (Adapted from Digman 1990, p. 423)

Author	I - Extroversion	II - Agreeableness	III - Conscientiousness	IV - Emotional Control	V - Openness to Experience
Fiske (1949)	social adaptability	conformity	will to achieve[a]	emotional control	inquiring intellect
Cattell (1957)	exvia	cortertia	superego strength	anxiety	intelligence
Tupes & Christal (1961)	surgency	agreeableness	dependability	emotionality	culture
Norman (1963)	surgency	agreeableness	conscientiousness	emotional	culture
Borgatta (1964)	assertiveness	likeability	task interest	emotionality	intelligence
Eysenck (1970)	extraversion	-------psychoticism-------		neuroticism	---
Guilford (1975)	social activity	paranoid disposition	thinking introversion	emotional stability	---
Costa & McCrae (1985)	extraversion	agreeableness	conscientiousness	neuroticism	openness
Tellegen (1985)	positive emotionality	---	constraint	negative emotionality	---
Hogan (1986)	sociability & ambition	likeability	prudence	adjustment	intellectance
Lorr (1986)	interpersonal involvement	level of socialization	self-control	emotional stability	independent
Digman (1988)	extraversion	friendly compliance	will to achieve	neuroticism	intellect
Peabody & Goldberg (1989)	power	love	work	affect	intellect
Goldberg (1990)	surgency	agreeableness	conscientiousness	emotional stability	intellect
Barrick & Mount (1991)	extraversion	agreeableness	conscientiousness	emotional stability	openness to experience
Goldberg (1992)	introversion -extroversion	pleasantness or agreeableness	conscientiousness or dependability	emotional stability	intellect or sophistication

[a]Not in the original analysis but noted in a re-analysis by Digman & Takemoto-Chock (1981)

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investigation to the item level.

2. Big-5 Personality Measures

There are three personality measures based on the Big-5 lexicon used in this study. They are: the Hogan Personality Inventory (HPI), the Personal Characteristics Inventory (PCI), and Goldberg's Adjective Checklist. Unlike some of the integrity instruments which have been around for forty years, the Big-5 instruments were all recently developed. The oldest of the Big-5 instruments used in this study is the Hogan Personality Inventory from 1986 (Hogan, 1986).

a. Hogan Personality Inventory (HPI). Overall the HPI is designed to predict organizational and occupational performance (Hogan & Hogan, 1993). It measures seven personality dimensions along with an eighth scale to measure "validity" e.g. random or careless response patterns. Although they bear different labels, the HPI dimensions are essentially the "Big-5". The biggest difference is that the HPI Extroversion scale of is broken out into two separate factors called "Sociability" and "Ambition" (Hogan, 1986). Each factor scale is made up of between five and nine Homogeneous Item Composites (HIC) clusters, with each cluster containing three to seven items (Lifton & Nannis, 1990). While the items making up a particular HIC cluster are highly intercorrelated, HICs from one scale are only minimally correlated with those from another scale.

The label on the HPI that is the least recognizable as one of the Big-5 is "Prudence", the HPI Conscientiousness scale. The Prudence scale is made up of 31 items, which decompose into two subscales called Social Appropriateness and

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Constraint (Hogan & Hogan, 1993). As discussed earlier in the section on personality-based integrity tests, empirical regrouping of the independent HIC's led to the creation of six new, distinct scales linked to occupational performance, one of which is the Reliability Scale.

The 310 true/false items on the HPI are written at the fourth grade level and are targeted for college student and adult populations.

b. Personal Characteristics Inventory (PCI). The PCI was developed by Dr. Murray Barrick and Dr. Michael Mount in 1991 to assess the prototypical characteristics of the Big-5 (Barrick & Mount, 1993). The original inventory contained 232 items to which respondents indicated their degree of agreement on a 3-point scale. The 1991 edition used in this study contains 200 items, of which 161 are scored. 37 items measure Extraversion, 17 measure Agreeableness, 55 measure Conscientiousness, 29 measure Emotional Stability, and 23 measure Openness to Experience (Barrick & Mount, 1993).

c. Goldberg's Adjective Checklist. The 100 item Adjective Checklist evolved from several studies done by Dr. Goldberg in 1990. He examined 1,431 trait adjectives for evidence of a common language clustering of personality characteristics, refining the instrument until he achieved its final five factor, 100 item form (Goldberg, 1992). Respondents rate the one word items on a nine point scale based on how accurately (9) to inaccurately (1) the term describes them. Each of the five personality dimensions are identified by 20 terms marking the positive and negative aspects of that dimension. For instance, on the positive pole, Conscientiousness is

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identified by organized, systematic, thorough, careful, steady, prompt, efficient, practical, and neat, while the negative pole is described by disorganized, careless, unsystematic, inefficient, undependable, impractical, negligent, inconsistent, haphazard, and sloppy.

C. Reported Factor Analyses of Integrity Tests

The focus of this study is to identify the domain defined by the items contained in an assortment of popular, commercially available integrity tests. One of the factor analytic techniques known as principle components analysis will be the method used to explore the domain of interest. Previous factor analytic studies have been conducted on integrity tests, some of which used principle components analysis, while others used common factor, confirmatory factor analyses. In addition to employing different methods for defining the factor space, studies have varied between investigations carried out at the test level, and investigations done at the item level. Sackett et al. (1989) noted that the only factor analyses of integrity tests up to that point had been conducted on overt tests. Since their review, three other studies have been found which include personality-based integrity measures.

1. Factor Analyses at the Test Level

This section presents two factor analyses done at the test level with multiple integrity test instruments, and five single instrument studies done at the item level. Studies at the test level will be discussed first, with extensive coverage of Ones (1993), which is the origin of the data for this study. She found evidence that intercorrelations among and between overt-integrity tests and personality-based

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integrity tests result substantially from the presence of a single, general factor she called Conscientiousness.

Data on the instruments included in this study (the three overt-integrity tests, four personality-based integrity tests, and three Big-5 instruments) were collected by Ones (see the Data section for more detail). She investigated: (1) Whether overt-integrity tests were intercorrelated, (2) Whether personality-based integrity tests were intercorrelated, (3) Whether overt and personality-based tests were intercorrelated, and (4) whether the integrity tests were correlated with other personality measures, as assessed by Big-5 instruments. Questions (1), (2), and (3) will be addressed here, while question (4) will be addressed in the following section linking integrity testing and conscientiousness.

The integrity test intercorrelations obtained by Ones are reported in Table 2.

Insert Table 2 about here

Using an orthogonal confirmatory factor analysis model on the matrix of intercorrelations (corrected for test unreliability), Ones found the factor loadings on a single common factor shown in Figure 1 (adapted from Ones' Figure 7). The factor loadings of individual tests on the common factor were: PSI - .87, Stanton Survey - .86, Reid Report - .69, PDI-EI - .66, Hogan Reliability - .82, PRB - .77, and .83 for the IPI.

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Table 2

Correlations between Overt and Personality-Based Integrity Tests (r /r)

	PSI Honesty	Reid Report	Stanton Survey	PRB	PDI-EI	Hogan PI Reliability	IPI Risk
	(ρ /r)	(ρ /r)	(ρ /r)	(ρ /r)	(ρ /r)	(ρ /r)	(ρ /r)
PSI	1.0						
Reid Report	.71 / .59	1.0					
Stanton Survey	.95 / .79	.89 / .74	1.0				
PRB	.71 / .55	.26 / .20	.48 / .37	1.0			
PDI-EI	.62 / .48	.36 / .28	.37 / .21	.56 / .40	1.0		
Hogan Reliability	.57 / .44	.48 / .37	.68 / .52	.79 / .57	.65 / .47	1.0	
IPI-Risk	.51 / .39	.52 / .40	.68 / .52	.79 / .57	.74 / .53	.74 / .53	1.0

ρ = "true score" correlations (corrected for unreliability)
r = observed correlations

Note. Correlational data for these tables comes from Deniz S. Ones's 1993 dissertation, The Construct Validity of Integrity Tests, pp. 137-139.

As is known from factor analysis theory, the variance among items is broken down into the communality, i.e., that which is common (the sum of the squares of common-factor coefficients, which are the loadings for an orthogonal solution), and that which is unique (Harman, 1976). The uniqueness is made up of two types of error - specificity, and measurement error. Since the intercorrelation matrix was corrected for test unreliability, that is, measurement error, the difference between the communality and 1.0 in the orthogonal solution, is the amount of co-variance between tests not due the common factor. Specificity, on the other hand, are those test specific factors that are uncorrelated with other tests, which define the remainder of the test domain.

Improvement to the orthogonal solution was obtained by specifying a correlated relationship between an overt test group factor, and a personality-based test group factor. The oblique solution shown in Figure 2 (adapted from Ones' Figure 8). The resulting model showed that overt tests loaded onto a subfactor, which correlated .66 with a personality-based test subfactor. Both subfactors in turn loaded .81 on a higher level, broad integrity factor which Ones called Conscientiousness.

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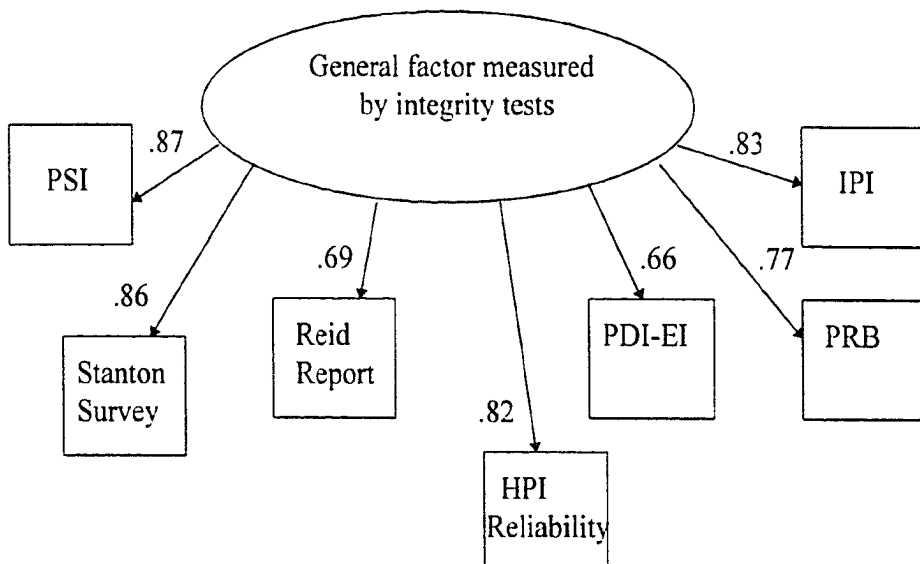
Figure 1. Factor loadings of overt and personality-based integrity tests on a general integrity factor of. (From Ones 1993. p. 61)
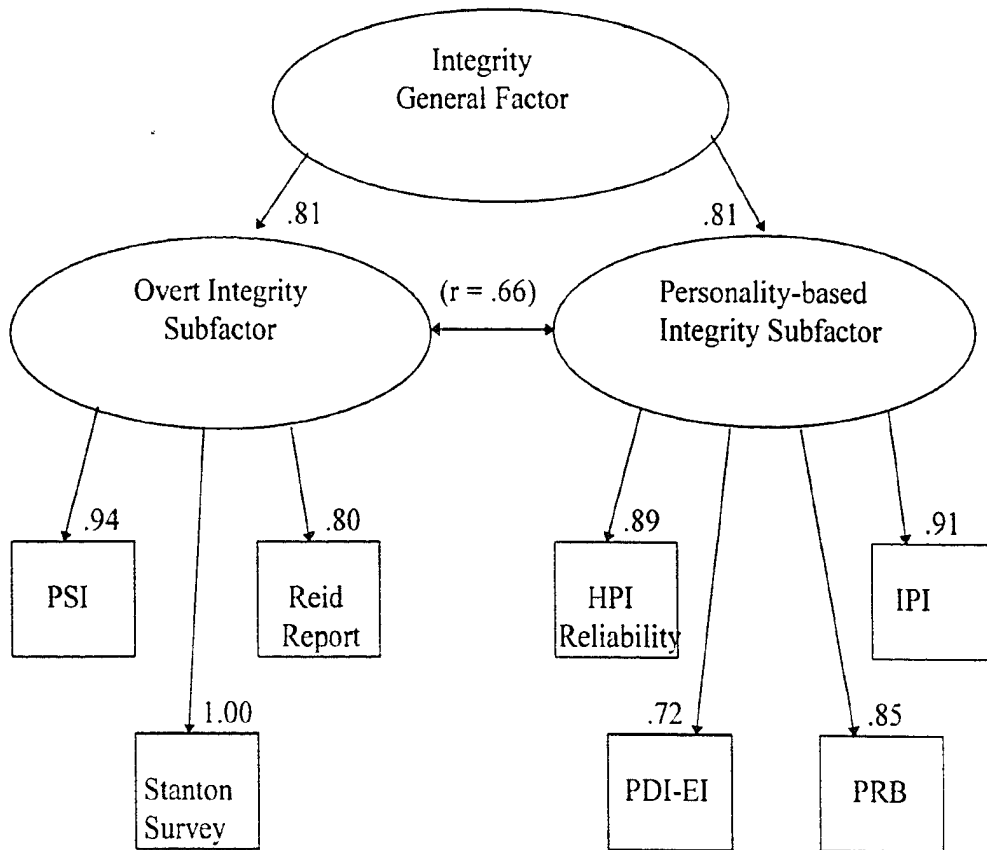
Figure 2. Hierarchical factor structure of integrity tests showing group factors and higher-order general factor. (From Ones 1993, p. 62)

(As an aside, I need to address the issue of labeling used in this report. In her original work, Ones described the test subfactors as "Conscientiousness as measured by overt (or personality-based) integrity tests", and the higher-order integrity factor as "Conscientiousness". Additionally, there are the Big-5 measures of Conscientiousness and the underlying factor of Conscientiousness. In order to reduce confusion and impart descriptive clarity, I have re-labelled the subfactors as "Overt-Integrity Subfactor", "Personality-based Integrity Subfactor", and the broad, higher-order factor as "Integrity General Factor". The term "Conscientiousness" (upper-case) is reserved for discussing the Big-5 scale with that name, or the underlying construct tapped by the Big-5 scale.)

Loadings of the overt tests on the Overt-Integrity Subfactor were: PSI - .94, Stanton - 1.0, Reid Report - .80. Loadings of the personality-based tests on their Subfactor were: PDI-EI - .72, Hogan Reliability - .89, PRB - .85 and .91 for the IPI. Note that interpretation of loadings from oblique solutions is not as straightforward as that from orthogonal solutions. For example, the Stanton Survey loads 1.0 on the Overt-Integrity Subfactor. This does not mean that the co-variance between the Stanton Survey and the other integrity tests is perfectly explained by its relationship to the underlying Overt-Integrity Subfactor, as would be the interpretation in the orthogonal case (Kim & Mueller, 1978a). Instead, the loading describes how much of the co-variance among the tests on the Subfactor is explained by the direct correlations between the tests, plus the indirect correlations between the two Subfactors, plus the indirect correlations between the Subfactors and each of the tests.

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As in the orthogonal solution, even though much of the common variance is explained by the subfactors and higher-order factor, some unexplained co-variance remains.

Ones' discovery of the presence of a large general factor explains much of the intercorrelations between tests, but it does not address test specific factors which are uncorrelated with other tests, and contribute to the total variance between tests. As shown in Figure 1, a general integrity factor explains much of the overlap between tests, but not all. The purpose of this study is to investigate those test specific differences. Some hints to the nature of those test specific factors can be found in the single instrument, item-level studies described later in this section.

In the other multiple integrity instrument, test level factor analysis study, Woolley and Hakstian (1992) included the PRB, PDI-EI, Hogan Reliability Index, Reid Report, and selected scales from three personality measures; the California Psychological Inventory (from which the PRB and Hogan Reliability Index are derived), the NEO Personality Inventory, and the 16PF. They used maximum likelihood common-factor analysis followed by Harris-Kaiser oblique rotation to achieve a four factor solution. The pattern matrix is reproduced in Table 3, showing loadings greater than .30. The factors are named: I - Conventional Commitment, II - Intolerance of Dishonesty, III - Socialized Control, IV- Active conscientiousness.

Insert Table 3 about here

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Table 3.
Factor Analysis of multiple integrity tests and personality scales. (From Woolley & Hakstian, 1992, p. 485)
Results of Factor Analysis of the Integrity Tests and Selected Personality Scales (Decimal points and loadings < .30 omitted)

Oblique Primary Factor Pattern Matrix

Test or Scale	I - Conventional Commitment	II - Itolerance of Dishonesty	III - Socialized Control	IV - Active Conscientiousness	h^2
PRB			76		61
PDI-EI - Performance	47		48		51
PDI-EI - Tenure	96				99
Hogan Emp. Reliability Index			75		69
Reid Report - Honesty		94			99
Reid Report - Punitiveness		81			61
CPI - Socialization			82		67
CPI - Responsibility			62		50
CPI - Self Control			70		69
CPI Tolerance			67		43
16PF (C) - Ego Strength			38	34	28
16PF (G) - Conscientiousness				62	42
16PF (Q_3) -Self Controlled				59	46
NEO-PI Conscientiousness				79	63

Primary Factor Intercorrelations

Factor	I - (CC)	II - (ID)	III - (SC)	IV - (AC)
I - (CC)	-			
II - (ID)	16	-		
III - (SC)	31	35	-	
IV - (AC)	20	22	27	-

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(Note: It was not mentioned why an oblique solution was sought. Typically, it is done to improve upon an orthogonal solution, or because theory suggests that the underlying factors are correlated. Although Woolley and Hakstian describe the correlations between the factors as "substantial" (i.e., .35 between Factor II and III, but ranged from .16 to .35), conventional interpretation would describe correlations in this range as small to moderate). Factor I, Conventional Commitment, loads heavily on the PDI-EI Performance and Tenure scales and reflects traits of dependability, conventionality, and commitment. Factor II, Intolerance of Dishonesty, was defined by the Reid Report Honesty Attitudes and Punitiveness scales. Socialized Control, Factor III, loaded on the PRB, PDI-EI Performance scale, the CPI-Socialization, Responsibility, Self Control and Tolerance scales, and the 16PF-C scale-Ego Strength. Finally, Factor IV, Active Conscientiousness, loaded on the personality variables: NEO-PI Conscientiousness scale, 16PF Super-Ego/Conscientiousness (G), Ego Strength (C), and Self Control (Q3).

Woolley and Hakstian conclude that the three correlated personality-based integrity tests all measure a general, higher-order construct they call Socialized Control. They also note that their results gives empirical support for the distinction drawn by Sackett et al., (1989) between overt-integrity tests and personality-based tests.

2. Factor Analyses at the Item Level

The other investigations into the factor structure of integrity tests have been done on single instruments at the item level. Common themes emerge which suggest

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potential factors that might be replicated in the proposed study. Sackett et al. (1989) and Ash (1991) reviewed several of the same studies on overt-integrity tests. Each of those studies concentrated on one of the overt instruments included in the data base for this study - PSI, Stanton Survey, or Reid Report. The review by Ash (1991) provides a helpful summary table of four studies (actually five since W.G. Harris 1987 is a replication), reproduced here as Table 4. Principal components analysis followed by some form of rotation (which is the exploratory method adopted in this study) was used in all but one of the studies.

Insert Table 4 about here

Jones and Terris (1984) factor analyzed the entire 96 question PSI which included Honesty, Violence and Drug Abuse scales. They reported finding thirty factors, thirteen of which had eigenvalues greater than one. Six of the factors were theft-related and are listed in Table 4. The remaining seven non-theft related factors were not reported, however, O'Bannon et al. (1989) and the publisher's promotional literature do list other scales available on the PSI. As reported earlier, those scales are: Drug Avoidance, Nonviolence, Employee/Customer Relations, Safety, Work Values, Supervision Attitudes, and Tenure.

The other four factor analytic studies included only honesty scales instead of entire instruments. W. G. Harris (1987) replicated an earlier study by Hay (1981) on the Stanton Survey using both the honesty attitudes and admissions sections. After

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Table 4.
Factor structures of overt honesty tests: A general Comparison. (Based on Ash, 1991, p. 14)

	1. Stanton Survey (W. G. Harris, 1987)	2. PSI (Jones & Terris, 1984)	3. PSI (M.M. Harris & Sackett, 1987)	4. Reid Report (Cunningham & Ash, 1988)
Honesty/ Theft Factors	General Theft	Temptation & Rumination	Theft Temptation & Thoughts about Theft	Self-projection of Honesty
	Opportunism	Theft Rationalization	----	Self-punitiveness
	Employee Theft	Personal Theft Admission	Actual or Expected Dishonest Behaviors of Individual	---
	Leniency	Theft Punitiveness	---	Punitiveness
	Perceived Pervasiveness of Dishonesty	Projection of Theft to Others	Norms about Dishonest Behaviors of Others	Projection of Dishonesty to Others
	Association with Dishonest Individuals	Inter-thief Loyalty	---	---
Non-theft Factors	---	---	Self-report Personality Variables	---

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conducting a principal components factor analysis and equamax rotation, both studies concluded that six major factors were present: General Theft, Opportunism, Employee Theft, Leniency, Perceived Pervasiveness of Dishonesty, and Association with Dishonest Individuals (Ash, 1991).

The PSI was also investigated by M.M. Harris and Sackett (1987) in a principal axis factor analysis with varimax rotation. They found four factors with eigenvalues greater than one. Factor 1, Temptation and Thoughts about Theft, accounted for 58% of the common variance. The second factor accounted for 16% of the variance, and reflected Actual or Expected Dishonest Activities by the Individual. Third, items related to Norms about Other People's Dishonest Behavior accounted for 11% of the common variance. Finally, the fourth factor which is not included in Ash's original table, reflected self-report personality variables, such as Impulsiveness and Reliability, and accounted for 11% of the common variance.

The fourth study reviewed by Ash was Cunningham and Ash (1988). They found four interpretable factors after conducting a principal components analysis with varimax rotation on the Reid Report, even though the instrument was conceptually constructed on two scales, Punitiveness and Projection of Honesty/Dishonesty. The four factors, in order of loadings are: Punitiveness Toward Others, Punitiveness Toward Self & Relations, Projection of Honesty for Self, Projection of Dishonesty to Others.

Kochkin (1987) had also conducted an unspecified factor analysis method and rotation on the correlations between the Reid Report and the 16PF, a

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multidimensional personality measure developed by Eysenck. Although four factors had non-zero loadings for the Reid Report, only two were above the .30 threshold rule of thumb and interpreted by Kochkin. Factor I loaded .42 on the Projective portion of the Reid Report. High Reid Scores (from low projection) occupied the same factor space as positive Ego Strength, and negative loadings on tension and apprehensiveness (also called guilt). Factor II, loading .37, defined the Reid Punitiveness items in the same space as the 16PF dimensions of Super-ego (labeled conscientiousness) and Self-Control.

Paajanen, Hansen, and McLellan (1993) conducted a principal components analysis followed by varimax rotation of the PDI-EI. This was the only personality-based, single instrument factor analysis found in the literature search. They reported a five factor solution which accounted for 99.8% of the common variance among items on the PDI-EI, but only 15.7% of the total variance of the 69 items. This small amount of total variance accounted for was not unexpected since the PDI-EI is factorially complex and contains items derived from 25 different constructs. The five factors found were: I - Irresponsibility, (low work commitment, denial of responsibility, cynicism, and suspiciousness), II - Sensation Seeking (excitement, risk taking, thrill seeking, like of new experiences), III - Unstable Upbringing (home relationship problems, trouble with authority, being in a difficult living situation), IV - Frankness (social desirability, claiming unlikely virtues, denying common faults or unpopular attitudes, exaggerating one's own strengths), and V - Conforming Work Motivation (achievement motivation, impulse control, rule following). The amount of

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common variance accounted for by each factor was: Irresponsibility (24%), Sensation Seeking (21%), Unstable Upbringing (20.6%), Frankness (18.6%), Conforming Work Motivation (15.7%).

The remaining 84.3% of the total variance was explained by unique factors identified by Paajanen et al. as Well-Behaved, Unlikely Virtues, Alcohol Use, Rebelliousness, and Caution.

As concluded by Sackett et al. (1989), Ash (1991), and Woolley and Hakstian (1992), the factor structure of integrity appears to be complex, and multidimensional. At the test level, Ones found evidence of a general higher-order integrity factor, and two subfactors; one each for personality-based integrity tests, and overt-integrity tests. Woolley and Hakstian also defined separate general factors for the personality-based tests, and the overt test used. Their general factor for the three personality-based integrity tests was called Socialized Control. The single overt instrument loaded on its own factor called Intolerance of Dishonesty. It can be surmised from the test level, aggregated data, that there is a core "Integrity" component to these tests, as well as a component unique to overt tests, and a component unique to personality-based tests. By analyzing across tests at the item level, this study will decompose this structure further to show what lower-subfactors are defined by the domain of test items, and to what extent each test correlates with each of those lower-subfactors.

From the item level studies (see Table 4), certain themes recurred which suggested potential factors for this study to find. (Note, at this point discussion will focus on the factors expected from the Honesty scales of the instruments, rather than

the entire instrument which can include a variety of "add-on" scales. Of course, in some cases, such as with the PRB, an Honesty scale cannot be separated out for analysis from the entire test.) Normative beliefs or Projection of theft by others is one such factor. The other expected factors include: Thoughts about Theft/Temptation; Rationalization of Theft; Personal Admissions of Theft/Counterproductive Activities; Punitiveness/Leniency toward Thieves; Association with Delinquents. From Paajanen et al., factors of Irresponsibility, Sensation Seeking/Risk Taking, Family Problems, Rationalization of Self, Conforming Work Motivation, can be expected to form from the PDI-EI. In addition to these substantial, Integrity common factors, several item-level studies suggested "left-overs" which don't belong in the "Integrity" space. Among these factors are Drug Avoidance, Violence, Employee/Customer Relations, Safety, Work Values, Supervision Attitudes, Tenure, Alcohol Use, Rebelliousness, and Caution. When the factor space of interest included entire integrity tests, not just Honesty scales, it was expected that all of the aforementioned factors, plus a variety of others, would be identified.

D. The Link Between Integrity and Conscientiousness

Attempts to understand the underlying personality dimensions tapped by integrity tests have been hampered by the lack of a common framework or unifying theory to focus investigations. As reported by Sackett et al., (1989), studies have been conducted which showed a variety of factor structures for different integrity tests (see previous section). Likewise, attempts to correlate integrity tests with other

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measures of personality have frequently resulted in lists of associations between integrity scores and uniquely-named personality scales, with only a slight sense of the relationships between tests. The past ten years has seen a resurgence of interest in, and growing acceptance of, the Big-5 lexicon as a model of personality (see for instance McCrae & Costa, 1987). Increased acceptance comes, in part, from research suggesting the usefulness of the Big-5 model as an organization tool for traits measured by questionnaires, which began to appear a decade ago (Digman, 1990).

This model provides a unifying framework needed to gain a clearer picture of the structure of personality in general, and the place of integrity in the realm of personality. Integrity test publishers use many terms to describe the constructs assessed by their instruments which often have the look of synonyms, but are still different enough to preclude direct comparison between tests. The structure imposed by the Big-5 model allows investigators to assess the degree to which various integrity instruments tap certain trait dimensions. For example, as stated by Hogan and Ones (1994), a number of reviews have concluded "that when personality research is organized in terms of the Big-Five factors, personality is consistently related to job performance criteria." (p.3). Without a common framework, such sweeping conclusions would have been all but impossible to make.

1. Who Made the Integrity-Big-5 Connection?

Given the simultaneous growth in the fields of integrity testing and the Big-5 personality model during the past decade, one might ask who first suggested the link between integrity and the dimension of conscientiousness. The answer to that

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question unfortunately, is not readily apparent. Several of the personality-based integrity tests assess conscientiousness (most notably the PRB which Gough (1971) describes as assessing "dependability, conscientiousness, and social conformity," p. 669). However, these tests were derived from instruments based on non-Big-5 theories of personality, e.g. CPI.

If one were to restate the question and ask who first linked contemporary integrity tests to conscientiousness as defined within the Big-5 framework, the answer still eludes a definitive answer. I have found no author who singles out a particular study or researcher as the source of the Big-5 Conscientiousness and integrity testing comparison. It appears as though several researchers independently began to investigate the relationships at about the same time. The earliest references are to a 1991 manuscript, subsequently published by Murphy and Lee (1994b), (cited in Murphy, 1993), and an MA thesis by Ross Woolley (assumed by this author to be circa 1990-91), which provided the data for Woolley and Hakstian (1992, 1993). Also in this same time frame is an unpublished study by Nolan (1991) which correlates an overt-integrity instrument with the Big-5. It was reported by Ones (1993), however, neither of the instruments used were identified.

2. Empirical Studies

The earliest published study is the Woolley and Hakstian (1992) comparison of the PRB, ERI, PDI-EI, and Reid Report with the NEO-Personality Inventory, developed by Costa and McCrae (1985). Contrary to their hypothesis, they found only marginally significant correlations between Conscientiousness and the PDI-EI

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Tenure scale, ERI, and Reid Report Honesty scale at the .05 level, and non-significant correlations with the other integrity instruments. Agreeableness correlated the most strongly of the Big-Five with all test scales, with the exception of a non-significant relationship with the Reid Report Punitiveness scale for females. Stronger relationships were also found between the integrity tests and selected scales from the CPI and 16PF, than with the NEO-PI. Woolley and Hakstian conclude that people who are more interpersonally agreeable - good natured, straightforward and trusting - tend to score higher on integrity measures. Conscientiousness did not appear to be a large component of contemporary integrity tests according to their study results.

Ones (1993) related three overt and four personality-based integrity instruments with three Big-5 personality instruments in the most broadly conceived study on the integrity-conscientiousness link to date. Her findings suggest that integrity tests measure a broad, higher-level Integrity General Factor, which is in part made up of the more narrowly focused personality measures of conscientiousness, agreeableness and emotional stability assessed by "Big-5" personality instruments. Her evidence of a higher-order factor helps explain conflicting results from smaller studies by other researchers, such as Murphy and Lee (1993, 1994a), who found a relationship between integrity tests and conscientiousness, but concluded that integrity tests were a more narrowly focused part of a Conscientiousness factor, as measured with a Big-5 instrument.

As introduced earlier, one of Ones' research questions was whether the overt and personality-based integrity tests were correlated with the Big-5 personality

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measures. In order to investigate these relationships, she formed linear composites of

the overt and personality-based tests to more clearly define what was meant by

"integrity" within each type of test, and also formed a "shared integrity" composite

from all seven integrity instruments. In a similar manner, she constructed composites

of the Big-5 factors from the corresponding scales on the three Big-5 personality

instruments included in this study. The HPI, PCI and Goldberg's Adjective

Checklist, each contributed to the creation of these five composites: (1)

Extroversion/Introversion, (2) Emotional Stability, (3) Agreeableness, (4)

Conscientiousness, and (5) Openness to Experience. The overt-, personality-based-,

and seven-test integrity composites were then correlated with the Big-5 composites.

Observed and true score correlations (corrected for instrument unreliability) are

summarized in Table 5.

Insert Table 5 about here

Of the Big-5 composites, Conscientiousness correlated the strongest (rho=.91)

with the seven-test integrity composite. This finding supports the hypothesis of Ones

and others, who have suggested that integrity tests primarily tap into the construct of

Conscientiousness. The explanation would seem to be "that individuals who are

dependable, responsible and who follow rules are also high on integrity tests." (Ones,

1993, p. 64). Two other personality variables appear to be linked to high scores on

integrity tests. Agreeableness had a true score correlation of .61 with the seven-test

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Table 5.

Correlations between Integrity Composites and Big-5 Composites

Big-5 Composites	Composite of Both Types of Integrity Tests	Overt Composite	Personality-Based Composite
	pr / r	pr / r	pr / r
Conscientiousness	.91 / .85	.68 / .58	.86 / .72
Agreeableness	.61 / .53	.47 / .40	.58 / .49
Emotional Stability	.50 / .46	.31 / .28	.51 / .45
Extroversion	.31 / .25	.19 / .15	.37 / .29
Openness to Experience	.08 / .06	.08 / .06	.03 / .02

ρ = "true score" correlations (corrected for unreliability)
r = observed correlations

Note. Correlational data for these tables comes from Deniz S. Ones' 1993 dissertation, The Construct Validity of Integrity Tests, pp. 140-142.

integrity composite, while Emotional Stability correlated .51. Extroversion also showed a positive, though weak, correlation of .31 with the seven-test composite. The only Big-5 factor not correlated with the broad integrity composite was Openness to Experience, which only correlated .08. This lack of a relationship makes sense and supports the statement made by Gough (1971) regarding the PRB, which was mentioned earlier. Namely, that the PRB, and by extension, integrity tests in general, are less useful as selection devices for jobs that require risk-taking, spontaneity, or innovation for successful performance.

Correlations between the overt-composite and the Big-5 composite scales, again showed the strongest relationship to be with Conscientiousness (rho=.68). Agreeableness and Emotional Stability were, again the next most strongly correlated at rho=.47 and rho=.31, respectively. Extroversion showed a weaker relationship with the overt-composite (rho=.19), than with the broader, seven-test composite. At rho=.08, Openness to Experience was not related to overt integrity test scores.

The personality-based integrity test composite and the Big-5 scale composites showed the same general pattern of relationships as did the previous two analyses, with slightly different correlation coefficients. True score correlations for Conscientiousness, Agreeableness, and Emotional Stability were .86, .58, and .51, respectively. Extroversion correlated rho=.37 with the personality-based-composite, and Openness to Experience was essentially uncorrelated at rho=.03.

The overall similarity in patterns of relationship between the overt-integrity test composite, the personality-based integrity test composite, and the complete seven

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integrity test composite, with the Big-5 scale composites, adds support to the conclusion that both types of integrity tests tap into the same general construct.

Given the strong relationship with the Conscientiousness scale, Ones next examined whether the construct of Integrity tapped by integrity tests, and the construct of Conscientiousness, were essentially the same. Sample size weighted, scale-level averaged intercorrelations from the three Big-5 personality instruments are presented in Table 6.

Insert Table 6 about here

As can be seen from the matrix, the five personality dimensions show substantial correlations in some cases. Ones hypothesized that if the construct tapped into by integrity tests, and the construct of Conscientiousness were the same, the pattern of correlations between the composite of Conscientiousness with the other four personality composites should be similar to the pattern obtained between the integrity seven-test composite and Conscientiousness. The correlations between the composite of Conscientiousness and the other four personality composites are presented in Table 7.

Insert Table 7 about here

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Table 6.
Scale-level average intercorrelations between the Big-Five Dimensions of Personality.
(Sample size weighted averages, corrected for unreliability.)

	Emotional Stability	Extroversion	Openness to Experience	Agreeableness	Conscientiousness
	ρ / r	ρ / r	ρ / r	ρ / r	ρ / r
Emotional Stability	.86 / .65				
Extroversion	.30 / .23	.67 / .51			
Openness to Experience	.26 / .20	.39 / .30	.54 / .41		
Agreeableness	.49 / .37	.36 / .27	.24 / .18	.62 / .47	
Conscientiousness	.37 / .28	.22 / .17	.20 / .15	.41 / .31	.71 / .54

Note: The vaules presented in each cell are true score (ρ)/ and observed score (r) correlations. The diagonal contains correlations between different personality scales tapping the same dimension of the Big-Five. The values were obtained by combining the correlations between the corresponding scales of the three personality inventories used for data collection.
(From Ones, 1993, Table 15, p. 143).

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Table 7.

Correlations between a composite of Conscientiousness and composites of the remaining Big-Five dimensions.

	Conscientiousness
	ρ / r
Emotional Stability	.47 / .43
Extroversion	.32 / .25
Openness to Experience	.32 / .24
Agreeableness	.62 / .53
Conscientiousness	---

ρ/r = corrected "true score correlation / observed correlation.

Note. A composite was formed for each of the Big-Five dimensions by combining the appropriate scales from the Personal Characteristics Inventory, Hogan Personality Inventory and Goldberg's Adjective Checklist. The pattern of relationships between Conscientiousness and the other Big-Five dimensions was compared with the patterns obversed between the Big-Five composites and integrity test composites to investigate the degree of overlap between the constructs of integrity and conscientiousness.
(From Ones, 1993, Tables 12, 13, 14, pp. 140-142.)

The pattern observed by Ones was indeed similar to that obtained from the integrity/Big-5 composite correlations, with one major exception. In both cases, the integrity composite and the Conscientiousness composite correlated about the same with Agreeableness, Emotional Stability, and Extroversion. However, all of the integrity composites had shown a near zero correlation with Openness to Experience, yet the Conscientiousness composite had a true score correlation of .31. These findings were thought to indicate that while the constructs of Integrity and Conscientiousness show a great deal of overlap, they are not identical.

The meta-analysis performed by Ones, which included twice as many instruments, and thousands of data points, showed substantially similar relationships to those obtained from the original data. Composites of overt integrity tests and personality-based integrity tests in the meta-analysis had a true score correlation of .64, while the composites in the original data had correlated .61. Likewise, the overt-, personality-based-, and all-integrity test composites correlated highest with conscientiousness, agreeableness, and emotional stability, in that order. Table 8 presents the meta-analysis correlations achieved between the three integrity composites, and the Big-5 linear composites. (Also included are the correlations with the Big-5 composites. They are discussed later in this section.)

Insert Table 8 about here

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Table 8.

True Score Correlations Between Three Composites of Integrity Test Scores and Composites of the Big-Five Personality Dimensions: Results of Ones (1993) Meta-Analysis. (From Table 20, p. 148)

Meta-Analysis Correlation Results Between Composites

	Seven-Test Composite	Overt-Composite	Personality-based Composite	Conscientiousness Composite
Emotional Stability	.59	.50	.54	.48
Extroversion	-.18	.07	-.20	.00
Openness to Experience	.26	.19	.24	-.13
Agreeableness	.78	.66	.69	.54
Conscientiousness	.87	.81	.75	--

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Pattern differences from the original data appeared in the meta-analysis correlations with Extroversion and Openness to Experience. The meta-analysis overt-composite correlated only .07 with Extroversion, while the personality-based composite correlated (-.20), and the all-test composite correlated (-.18). (Recall that in the original data, correlations between the overt-, personality-based-, and seven-test composites and Extroversion had been .19, .37 and .31, respectively.) The meta-analysis results can be taken to mean that outgoing people are slightly less honest, instead of slightly more honest as would be concluded from the original data.

Also, instead of near zero correlations between the various integrity test composites and Openness to Experience in the original data, the meta-analysis showed Openness correlated .19, .24, and .26 with the overt-, personality-based-, and all-test integrity composites, respectively.

Ones offers two possible explanations for the differences between the original data and meta-analysis results. First, the original data may contain more sampling error since the sample size is smaller and limited in occupational scope. Second, the thirty-six personality instruments used in the meta-analysis probably define some of the constructs differently than do the three Big-5 instruments used in the original data collection. In the creation of the composites, shared things are retained, and test specific factors are treated as error and removed. It could be that the broader range of instruments contained shared factors not present, or present in sufficient strength, in the original data instruments.

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As with the original data, Ones tested whether the combined integrity test composite and the Conscientiousness composite showed the same pattern of relationships with the other Big-5 factors. The pattern of correlations were essentially the same as those from the original data. Integrity tests and Conscientiousness correlated highest with Agreeableness, Emotional Stability, with only minor or near zero correlations with Extroversion, and Openness to Experience. The conclusion from these results, once again, is that integrity tests and Conscientiousness both tap into the same general construct with substantial overlap, but they are not identical.

Additionally, correlations from the meta-analysis were used in a confirmatory factor analysis to verify that overt-integrity tests, personality-based integrity tests, and conscientiousness scales tapped in to the same general construct. The factor loadings on the general factor for the overt-integrity tests was .87, .80 for the personality-based integrity tests, and .98 for the Conscientiousness scales, indicating that a strong general factor explained the intercorrelations among the three types of tests.

Given the overlap between integrity test scores and measures of conscientiousness, Ones (1993) wondered if the predictive validity of integrity tests with supervisors' ratings of performance (.46, Ones, Viswesvaran, & Schmidt, 1993) was due to the conscientiousness dimension, which had also been shown to predict job performance (.23, Barrick and Mount, 1991). Using the correlations from her meta-analyses, and the .42 true score correlation between integrity and conscientiousness, Ones partialed conscientiousness from the integrity-performance correlation. It reduced from .46 to .41, indicating that conscientiousness measured by the Big-5

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scales only explains part of the integrity test-job performance relationship. When she subsequently partialed integrity test scores out from the conscientiousness-job performance true score correlation, it reduced from .23 to .05. This indicated that the measures of conscientiousness from the Big-5 instruments are part of the broader construct measured by integrity tests.

Murphy (1993) suggested that integrity was a lower level factor in the construct of conscientiousness. Yet the analysis of Ones (1993) finds the reverse - conscientiousness, along with agreeableness, and emotional stability are lower level factors of the integrity construct. Hogan and Ones (1994) explain these differences on the basis of how the measures of conscientiousness and integrity were developed. The Big-5 measures in use are factor analytically derived from a rationally selected lexicon of trait words. This process leads to clearly defined constructs. Many integrity tests, on the other hand, were empirically derived to differentiate people on a broad array of criteria. The assortment of items that differentiated between groups on the basis of complex behaviors will itself be complex, and most likely broader than the more focused measures of the Big-5.

Understanding of the importance of the conscientiousness dimension and how it ties into integrity comes from Hogan and Ones (1994). They point out that since the 1930's, all major personality inventories contained some kind of broadly defined scale of conscientiousness, regardless of the main intent of the instrument. From correlations between the NEO Conscientiousness scale (a Big-5 instrument) and a variety of personality instruments, Hogan and Ones note four themes underlying

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measures of conscientiousness: (1) a Control Component, which identifies consientiousness with "a lack of impulsiveness and spontaneity, and a disposition toward cautiousness and criticality" (p.10). (2) An Orderliness Component, which includes tidiness, and compulsiveness. (3) A Hard Work and Perseverance Component which describes working hard as the "right thing to do", rather than working hard out of ambitiousness to get ahead. Finally, (4) A Conformity Component that reflects "tendencies toward rule compliance, obedience and conventional integrity" (p.11). The conformity component resembles the CPI Socialization scale dimensions, from which the PRB is derived.

Based on several theories of personality, Hogan and Ones suggest that through dealing with authority figures and social interaction, people create personal identities which help them gain social acceptance and social status. Reactions to us by others in social situations leads to reputations, which are expressed in trait words related to our status and identities. These trait words then, come back to form the content base of the Big-5.

Identities are reinforced through social acceptance. Hogan and Ones contend that "Over time, a person who is described by others as conscientious develops the identity of a 'person of integrity'" (p.25). The traits associated with the identity of integrity are: Conscientiousness, "the reputation for being dependable, responsible, and careful" (p.25). Agreeableness, in that the person is kind and trusting, as well as calm and content, reflecting Emotional Stability. By adulthood, the identity and the traits associated with it become part of the unconscious. When a person responds to a

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test item, which can be considered a form of social interaction, they respond in a manner consistent with their identity.

As noted by Hogan and Ones, measures of integrity and conscientiousness hold great potential for assisting employers to predict important work-related outcomes. Those outcomes range from the low end of the continuum which describe counterproductive behaviors, to the high end of productive behaviors.

E. Summary

There are several conclusions that can be drawn at this point. One, overt-integrity tests are highly intercorrelated, and personality-based integrity tests are highly intercorrelated. Two, overt-integrity tests and personality-based integrity tests show strong correlations between the types of test, but not as strong as within each type. Three, much of the correlation between overt- and personality-based integrity tests is thought to be due to a common underlying General Integrity Factor. However, the General Integrity Factor alone does not explain all of the variance between test scores. Likewise, the strong correlations between integrity tests and Big-5 personality scales, especially Conscientiousness, Agreeableness and Emotional Stability, are thought to be due to a general underlying construct, which is similar but not identical to the General Integrity Factor. In neither case, does the common factor explain all of the variance between test scores. The tests are correlated, but not perfectly. Why not? How do they differ?

The major outcome of this study will be to identify the ways in which the individual tests measure similar factors, and in what ways they differ. To accomplish this goal, inter-item correlations will be computed, and factors identified from a principal components solution. It is conceivable that some factors will be defined by items from overt-, personality-based integrity tests, and some Big-5 scales, while another factor may be defined by only overt-integrity items, and yet, another by just Big-5 items. Each factor can be then be expressed as a composite of the items which define it, and related back to the individual instruments. Conceptually, this would

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result in a correlation matrix of ten-instruments by however many factors. From this matrix of correlations between factor composites and test scores on individual tests, it will be possible to state how well a given instrument measures a given factor, relative to the other instruments. For example, it should be possible to say whether the PSI is more or less, strongly correlated with a "Punitiveness" factor, than is the Reid Report, or PRB.

From the literature review of item-level factor analyses on integrity tests, it is possible to conjecture what some of the resulting factors might be. For example, some form of the following factors will most likely be evident: Normative beliefs or Projection of theft by others; Thoughts about Theft/Temptation; Rationalization of Theft; Personal Admissions of Theft/Counterproductive Activities; Punitiveness/Leniency toward Thieves; Association with Delinquents; Irresponsibility; Sensation Seeking/Risk Taking; Family Problems; Rationalization of Self; and Conforming Work Motivation. In addition, there are potential "leftover" non-theft, factors embedded in some tests, such as Drug Avoidance, Violence, Employee/Customer Relations, Safety, Work Values, Supervision Attitudes, Tenure, Alcohol Use, Rebelliousness, and Caution. Tests without separate Honesty scales may well be expected to show associations with these, and other non-theft delinquency scales.

Also expected are factors reflecting the themes identified as part of Conscientiousness: (1) Self Control - a lack of impulsiveness, spontaneity, and a disposition toward cautiousness and criticality. (2) Orderliness - tidiness,

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compulsiveness. (3) Hard Work and Perseverance - working hard as the "right thing to do". (4) Conformity - rule compliance, obedience and conventional integrity.

A casual glance suggests that some of the integrity factors and conscientiousness factors cover opposite poles of the same factor such as Sensation Seeking/Risk Taking on one end, and a lack of impulsiveness and spontaneity, and a disposition toward cautiousness and criticality, at the other. In other instances, they might define the same part of the same factor, such as Work Motivation, and Hard Work and Perseverance. The exploratory nature of this study precludes further speculation into the results expected, however, the reader should now have a clearer understanding of the direction this study is taking.

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III. Methods

A. The Data

The data used in this study were collected by Dr. Deniz S. Ones between September 1991 and January 1993, and used in her 1993 Ph.D. dissertation at the University of Iowa, Department of Business Management. It needs to be stated that her dissertation included two large data sets. One data set contained original integrity test data which she collected, and is being re-analyzed in this study. The other data set consisted of data from previously conducted studies which she then used in a meta-analytic review. The meta-analytic data is not part of the current study's data base.

Ones reported results from a sample size of 1,365 individuals who completed a variety of integrity and personality instruments, and for whom total scores could be computed. The ten instruments they completed have been described in previous sections. The sample consisted of college students from a large Midwestern University receiving extra credit for participation, and skilled manufacturing job applicants at the Midwestern plants of a Fortune 500 company. It is important to note (for reasons described later in this section) that all individuals did not complete all instruments. Between 300 and 500 individuals completed any given test, and between 66 and 302 individuals took any pair of tests. Table 9 shows the sample sizes reported by Ones (from her Table 32) for the integrity and personality instruments, and the sample sizes used for this investigation. There are several reasons why sample sizes between the studies, and between the item-level and score-levels may

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differ. First, incomplete tests which could not be scored for use in the Ones study, were able to be included in the item pool for this study. Second, most test scores were located on diskettes from Ones's 1993 study, while test booklets and answer sheets were used to enter much of the item-level data. Over the course of time, some booklets may have been misplaced, or conversely, some late arriving tests were not scored for the Ones study, but were available for this data set. Finally, the ERI items were able to help define the factor space for this study, however, the tests were scored by the publisher on a graphical scale which could not be rendered into a numeric score for use in this investigation.

Insert Table 9 about here

(Measures of intelligence were also collected but are not pertinent to this study, so they are not reported here.)

Additional information on demographic variables was collected by Ones. Of those students who completed the tests, 43% were female, and 40% male, 17% left the answer blank. 26% of the student sample were freshmen, 9% sophomores, 49% juniors, and .7% graduate students, and 9% did not indicate their status. The racial composition of the sample was 68% white, 17% African-American, 7% Hispanic, 6% Asian and 2% other. 82% of the sample were originally from Midwestern states.

Table 9
Test and Scale Score Sample Sizes

Test	PSI	Stanton	Reid	ERI	PDI-EI	HPI/Rel	PRB	IPI	PCI	Goldberg	Scale Score Sample Sizes
PSI	532										511
Stanton	84	330									319
Reid	139	162	508								509
ERI	184	127	279	562							~
PDI-EI	157	100	123	118	381						384
HPI/Rel	219	118	95	76	160	401					403
PRB	85	160	87	123	70	83	456				456
IPI	106	91	145	96	200	189	71	443			443
PCI	126	82	102	93	69	94	182	170	482		482
Goldberg	164	93	163	159	104	83	137	238	200	512	512

Overt Tests: PSI = London House Personnel Selection Inventory; Stanton = Stanton Survey; Reid = Reid Report.

Personality-Based Tests: ERI = Employee Reliability Inventory; PDI-EI = Personnel Decisions, Inc. Employment Inventory; HPI/Rel = Hogan Personality Inventory (Big-5) & Hogan Reliability Index; PRB = Personnel Reaction Blank; IPI = Inwald Personality Inventory.

Big -5 Measures: PCI = Barrick & Mount's Personal Characteristics Inventory; Goldberg = Goldberg's Adjective Checklist.

B. The Instruments

The instruments were introduced in greater detail earlier in this paper. The following names of the instruments for each test type is presented here as a quick summary.

The three overt-integrity instruments used in the study are: The London House Personnel Selection Inventory (PSI), the Reid Report, and the Stanton Survey.

There are five personality-based integrity tests included: the Employee Reliability Inventory (ERI) (items only), the Personnel Reaction Blank (PRB), Personnel Decisions, Inc.'s Employment Inventory (PDI-EI), the Hogan Reliability Scale (REL) (scale score only), and the Inwald Personality Inventory (IPI).

Measures of the Big-5 personality factors are assessed by: the Hogan Personality Inventory (HPI), the Personal Characteristics Inventory (PCI), and Goldberg's Adjective Checklist.

C. Hypotheses and Research Questions

(1) How many factors are needed to define the domain covered by overt integrity test items?

(2) How many factors are needed to define the domain covered by personality-based integrity test items?

(3) How many factors do items from overt tests and personality-based tests jointly define, and what are they? As stated earlier, it is expected that some form of the following factors will be evident: Normative beliefs or Projection of theft by others; Thoughts about Theft/Temptation; Rationalization of Theft; Personal

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Admissions of Theft/Counterproductive Activities; Punitiveness/Leniency toward

Thieves; Association with Delinquents; Irresponsibility; Sensation Seeking/Risk

Taking; Family Problems; Rationalization of Self; and Conforming Work Motivation.

In addition, there are potential "leftover" factors such as Drug Avoidance, Violence,

Employee/Customer Relations, Safety, Work Values, Supervision Attitudes, Tenure,

Alcohol Use, Rebelliousness, and Caution, if entire tests, rather than just Honesty

scales, are analyzed.

(4) What are the dimensions defined by the broad domain covered by the item

pool from all three types of instruments?

(5) How do the factors identified relate back to specific tests? The relationship

between tests and factors is examined in two ways. First, to what extent does any

particular test contain items which tap a given factor? Second, what is the

correlational structure between tests and factors? The less than perfect correlation

between the various instruments assembled for this study suggests that, even within

the same test type (overt, personality-based, Big-5), some tests contain items not

contained in others which relate to unique factors.

D. Procedure

1. Correlation Matrix

The item correlation matrix created as the first step in the factor analysis process is extremely large. Data used for this study came from 1428 respondents, on 1489 items contained in the 10 instruments.

All respondents were not surveyed on all instruments, so the data matrix contained a large number of "0" entries. Pairwise deletion of those missing values was designated so that the resulting correlations were based on the actual pairs of observed data. As reported in Table 9, the sample sizes reported by Ones were between 300 and 500 people completing any particular test, and between 66 and 302 people completing any pair of tests.

One cautionary note must be made regarding interpretation of the correlations resulting from this data. Statistically, there is an increased risk that chance relationships between variables will look significant when the number of subjects is not considerably greater than the number of items (Kachigan, 1982). There are cells in this data set for which the number of items exceeds the number of subjects on a given pair of instruments. For instance, 66 individuals completed both the Reid Report (84 items) and the Personal Characteristics Inventory (137 items). However, the items on each instrument are known to be correlated within each scale and represent only a limited number of scales (3 in the Reid Report and 5 in the PCI). Therefore the concern over chance correlations between unrelated items seems greatly reduced.

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A greater source of concern is the argument that dichotomous or limited category variables are inappropriate for use in factor analysis. Kim and Mueller (1978b) discuss the problem of factor analytic results being distorted by nonrandom measurement error associated with limited categories. They conclude that there is less distortion the greater the number of categories, and that the use of correlations between dichotomous variables can be justified when used to find the general clustering of variables, if the underlying continuous variables are believed to be only moderately ($< .70$) correlated.

From a practical stand point, given the long history of using factor analysis on hundreds of psychological tests with limited category or dichotomous responses, this argument would appear to be less than crucial.

2. Principal Components Analysis

Although it is part of the family of techniques generally called "factor analysis", principal components is primarily an empirical data reduction process. Unlike other factor analytic methods, principal components does not require assumptions about the common and unique parts of the variance present in the data (Dillon & Goldstein, 1984). Instead, the dimensions or components of the data are defined by their contributions to the sum of the total variance. This is the feature that makes principal components a valuable exploratory tool, in that each additional component accounts for the maximum incremental explanation of total variance. Decision rules, such as eigenvalues greater than one, and scree plots are used to determine the number of components present in the data and retained as principal

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components or "factors". Eigenvalues correspond to the equivalent number of items the factor represents, so an eigenvalue of "1" summarizes as much variance as any one variable (Kachigan, 1982).

Ones (1993) found that two correlated factors explained her general integrity factor model better than did a single integrity factor. Given this expectation of correlated factors, rotation of the retained components, by two methods, was done within the total variable space to help interpret the dimensions they represent. The process of rotation redistributes the variance explained by the number of components among the factors, instead of the first extracted factor accounting for the most variance, which sharpens the distinctions between the factors. As explained by Nunnally (1978), each resulting rotated factor is a linear combination of the original factors, with the rotated set explaining exactly the same amount of variance as the original set. One of the goals of rotation is the achievement of "simple structure" which basically states that items should be heavily represented or "loaded" on as few factors as possible, and near zero on all others, and as few items as possible should be associated with each factor (Harman, 1976). The resulting scores or "loadings" represent the correlations between the component factors and the items.

The first rotation was orthogonal, that is, based on the assumption that the factors are independent of each other. Two important properties of orthogonal rotation are that, (1) the sum of squared loadings for any factor column is the same in the rotated solution, as in the original solution, and (2) the sum of products of loadings in any two rows is the same for the rotated and original solutions (Nunnally,

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1978). What this means to the researcher is that the rotated factor solution is statistically "just as good" as the unrotated one. This enables the researcher to more easily define and interpret the factors as they relate to the variables and to each other.

The other method of rotation, oblique rotation, allows for correlated factors to share some of the same space. Although oblique rotation often results in similar conclusions regarding the factor solution as orthogonal rotation, there are some important differences. Oblique rotation loses some of the statistical properties of orthogonal, such as the sum of the squared factor loadings no longer describes the amount of variance explained by a factor (Dillon & Goldstein, 1984; Nunnally, 1978). The primary reason for doing oblique rotation is that sometimes, allowing factors to be correlated cleans up the solution by making high loadings higher, low loadings lower, and eliminating some of the mid-range loadings.

3. Confirmatory Factor Analysis

The original intent of this study was to use Maximum Likelihood Factor Analysis to confirm the rotated models. MLFA determines a solution based on the probability of the observed data having come from the hypothesized population with an assumed multivariate normal distribution (Harman, 1976). The choice of MLFA as a confirmatory method in this study was based on two considerations. First, according to Dillon and Goldstein (1984), MLFA yields more accurate factor loading estimates when dealing with extremely large sample sizes (those near 1,500) than other methods. With a sample size of 1,428 the differences in the accuracy of loading estimates may be important. Second, MLFA allows for a chi-square test for

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statistical significance of the number of factors in the model. The use of a statistical test would have been helpful in deciding which of the rotated solutions was better. A significant chi-square value means that the residual matrix still contains a significant amount of variance and more factors are needed to reproduce the correlations between the original variables.

Unfortunately, the nature of this data set, with the number of variables exceeding the number of observations, and the uneven sample sizes, prevented MLFA methods from working so that avenue of investigation had to be abandoned.

4. Relating Factors to Individual Tests

The last step which often accompanies factor analyses of psychological instruments, is the computation of factor scores, which allow the investigator to say how much of a person's observed score is due to an underlying factor. As noted in the discussion about the item correlation matrix, every individual did not complete all tests or items. Without responses by every individual on every item, it is not possible to estimate what a person's value is on a particular identified factor. However, the goal of this study is to estimate the degree of association between a test's honesty scale score and the individual factors in the final solution. This calculation is made possible by constructing a composite of the factor items, and correlating that composite with the test scale score. The formula used for those calculations is described in the analysis section.

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IV. ANALYSES AND RESULTS

A. The Data and System Requirements

1. The Data   Data sets were created for seven integrity tests and three Big-5 personality instruments from answer sheets, booklets, and diskette information originally gathered by Ones (1993). Individual test data sets needed to be uniformly formatted and coded for missing information to ensure a successful merge into one large raw data set. This was accomplished by manually entering raw data, or reading existing files into SPSS 4.0 (DOS) and using the "write" procedure to output files as ASCII files. (Use of a personal computer package at this step allowed for more flexibility in the researcher's schedule than logging onto the mainframe from a computer lab.) A combined total of 1826 booklets and bubble-sheets for the PSI-7ST, Reid Report, Stanton Survey, and PRB tests had to be manually entered. (234,886 total answers). Most of the ERI, and HPI items on NCS forms were machine scanned and saved as ASCII at the University of Minnesota Office of Measurement Services. (An additional group of tests was manually entered to reach the total sample size reported.) The IPI, PDI-EI, Goldberg's Adjective Checklist, and PCI item-level data were available on diskettes from the Ones study. Data from both the Goldberg instrument and the PCI were in multiple files from different administrations which were merged and then written as ASCII files. The IPI raw data file was too large to open in SPSS 4.0 (DOS), or SPSS Windows, so this file was cleaned up and formatted on the IBM mainframe computer.

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The data sets were read into SAS 6.08 (CMS) for manipulation and analysis on the Carlson School of Management IBM mainframe computer. Descriptive statistics including means, standard deviations, and frequency distributions were run on the individual test data to assess the quality of the data. (Note: Individual test factor solutions were computed for the PSI, Stanton Survey and PRB to familiarize the researcher with the SAS system and output.) Table 9 shows the final sample sizes for each of the ten tests making up this data base.

2. System Requirements

From the onset of this investigation there were concerns expressed over whether computer resources available to the researcher had the capacity to perform the required analyses. Even before concerns about storage and memory capacity, however, was the concern about whether the computer program would even factor a matrix built from unequal sample sizes, and where observations were not greater than the number of variables. The answer to this question was found by taking a known, existing data set and contriving a situation where the variables exceeded the sample size. Although an error message was received about observations not exceeding the number of variables, a factor solution was produced which could be interpreted consistent with the nature of the data used. This result supported moving forward with this study.

The question about storage and memory requirements however, was not answerable in advance, so a procedure of building, merging and computing until system parameters hit their maximum was employed. The very first of many "unable

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to allocate sufficient memory" error messages occurred when attempting to open the file containing IPI data on the personal computer. Transferring data sets to first one, then another mainframe as system limits were reached, followed. The good news is that time on the Cray Supercomputer did not have to be purchased. The bad news is that two mainframe systems were eventually used, and that access to greater resources could not be procured until lower system limits were tried and found to be inadequate.

On the IBM mainframe, the first such error message came when computing the correlation matrix for just the 206 Reid Report items. Successful results at this point were obtained by running in batch mode instead of interactive. Numerous requests for additional hard disk storage space, and permission to access greater, and greater amounts of RAM allowed analysis of the three grouped test-type data sets, described in the analyses section.

For each group of test-type data, a correlation matrix was created followed by an initial principal components solution, selection of several factor models, and analysis of factor solutions produced by orthogonal and oblique rotations of those models. Visual inspection of descriptive statistics from the raw data sets raised the concern that the lack of variability on some items, (resulting from nearly all subjects answering the item in the same way), might prevent computation of correlations for the factor input matrix. It was decided, however, to include all items in building the correlation matrix for each group, and to attempt an initial factor solution to gauge the impact of the problem. Every initial correlation matrix computed for this study

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resulted in "system missing values" (paired items for which a correlation could not be computed.) Visual inspection of the correlation matrix cells, and a printout of the n's used to compute means of the matrix items showed missing values for many of the items suspected of lacking in variance. Consequently, a decision rule was adopted that if a correlation could not be computed for a given pair of variables, the variable with the least variance was deleted and correlations recomputed. Further information on the items deleted is provided in the sections describing the analyses where the problems occurred.

The IBM system's 16m of memory was accessed to the maximum available, but proved insufficient to analyze the complete merged item-level data set (1428 observations and 1489 variables), which occupied 7.4m of hard disk space. Consequently, the complete data set was transferred on March 24, 1995 to a Sun Systems work-station (UNIX System V, Release 4.0) with 65m of RAM. However, even then the initial attempts at creating the matrix in SAS 6.09 were unsuccessful due to insufficient memory on the Unix, which has a system default of 32m of RAM. A SAS command option allows for RAM to be increased, but it was not successful at 40m, 50m or 64m. U of MN computer consultants then contacted system consultants at SAS to determine whether the system could handle the data set. The SAS consultants were unable to provide a precise estimate of the amount of RAM needed to process the matrix beyond a minimum of 39m. They did, however, suggest trying a programming option phrase which gained access to all the memory available on the system when added to a program command. (It should be mentioned that this option

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excludes any other users from the system, and is not a good way to make friends and influence people! Luckily, the system was new and only available to a few researchers, instead of to the larger campus community, so only minor inconveniences occurred.)

Accessing the entire 65m of memory, the initial correlation matrix of the complete data set ran in one hour, five minutes - real time, and 20:00 minutes - CPU time.

This "victory" was short-lived however, when the first principal components solution failed to run due to system missing values. System missing values stem from inability to compute a correlation between two low-variance items, and are represented as "." where a value should be in the matrix. This problem was familiar to the researcher from each of the previously run grouped test-type analyses. Unlike the previous occurrences where matrices were visually scanned for system missing items represented by '.', this matrix was too large to be efficiently scanned. (The matrix occupied over 22m of disk storage, and would have printed out over 900 pages.) Instead, means of the variables were computed, and variables with divergent "N's" were investigated. As in the test-type analyses, the low variance items were dropped from the data set. Twenty Reid Report items (mostly admissions of specific crimes), three ERI items, and one HPI item were eventually dropped. It took three inspections and clean-ups before a final data set of 1442 variables was produced on March 30, 1995. The 1442 by 1442 correlation matrix occupied over 19.1m of hard disk space.

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The PROC CORR procedure in SAS 6.08 was implemented to create a Pearson-Product Moment Correlation output matrix for each of the test-type data sets. Although PROC FACTOR, the program used to produce the factor solutions, can analyze raw data, a two step process was necessary due to the uneven sample sizes employed to create the data set. PROC FACTOR utilizes a "listwise" default which deletes an entire case if data is missing on any variable, while PROC CORR utilizes a "pairwise" deletion protocol which uses all available pairs of non-missing data on variables. Using the pairwise approach was the only way the data on hand could be used to fill the correlation matrix cells. PROC FACTOR was then used to derive an initial principal components solution with eigenvalues and a scree plot, followed by orthogonal and oblique rotations using the "promax" option. Promax produces both a varimax orthogonal rotation, and a procrustes oblique rotation in one command. The resulting oblique procrustes rotations produced small inter-factor correlations for all three test-type analyses, indicating minimal differences from the orthogonal solutions. (More on the reason for that result later.) Given the apparent low inter-factor correlations, the orthogonal solutions were initially adopted for presentation and interpretation of the grouped test-type factor models.

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B. Analyses by Test Type

The analyses which follow look at the factor structures underlying the three types of tests under investigation in this study: overt, personality-based, and Big-5. Item-level data from individual tests were merged with others of the same type. The Overt Tests included data from the PSI-7ST, the Reid Report, and the Stanton Survey. The Personality-Based Tests included the PDI-Employment Inventory, the Personnel Reaction Blank, the Inwald Personality Inventory, and ERI. The Big-5 Tests consisted of Goldberg's Adjective Checklist, the Personal Characteristics Inventory, and the Hogan Personality Inventory.

One of the challenges of this study centered on how to best summarize and present the results. A more conventional study would simply present the factor pattern matrix with the items listed down the side, the factors across the top, and the loadings down the columns. The copyrighted nature of the items in this data set made listing them down the side illegal, besides which, the sheer number of items made listing them all impractical. Additionally, the relationship of individual items to factors is not the primary concern of this study, but rather the relationship between the factors and the various tests. The goal then, for presentation purposes, was to provide an understanding of the relative contribution each test made to a given factor, and to indicate the kind of items loading on a factor which led to the label of its underlying construct. In order to meet this presentation goal, the frequencies of items from each test loading at an absolute value of .30 or more, were calculated, and listed by test within each factor according to the range of their loadings. The amount of the

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total communality estimate explained by each factor is given (variance explained), and also reported is the amount of that variance each test explains. The contribution of each test to the variance explained is the sum of the squared loadings of all items which loaded at .30 or more. (Note: The variance explained values are "raw" values, not percentages or proportions of the total communality estimate.) Finally, prototypical examples of the highest positive and negatively loading items are given. It should be noted, however, that the examples of the highest loading items by themselves, do not necessarily define the factor adequately. A more complete description of the items defining a factor can be found in the analysis section.

1. Overt Integrity Test Analysis

The Overt Tests data set included 403 variables with a sample size of 933. A correlation matrix was computed but the initial principal components solution was unsuccessful due to missing correlations for pairs of observations. After a number of iterations and inspections of the matrix, twenty-one Reid Report items reporting the commission of, or conviction for specific crimes were deleted. Nearly all subjects reported they had neither committed nor been convicted for the specified behavior, resulting in near zero variance. No items had to be excluded from the PSI-7ST or Stanton Survey. (Perhaps a broader sample with few college students would not suffer from the same high endorsement rate of this sample.) After deletion of non-varying items, the matrix contained pairwise correlations on a total of 382 variables from the three overt integrity tests.

The initial principal components solution was programmed to extract as many factors as there were eigenvalues greater than 1.0. One-hundred twenty seven (127) factors were extracted using that criterion (see Appendix A). Inspection of the 127 varimax rotated factors revealed that items broke out into test specific clusters with common themes. Logically, it was apparent that many clusters were measuring the same characteristics, but the eigenvalue greater than 1.0 decision rule allowed for too much dispersion in the solution. These results eventually led to the adoption of another decision rule, namely that inspection of scree plots and eigenvalue printouts, would both be used to the determine the number of "interpretable" factors before rotation. Visual inspection of the scree plot showed a break around 10 factors. There were also relatively "big" drops from the ninth to tenth eigenvalues, and from the twenty-first to twenty-second. Since the PSI-7ST reports scores for ten scales, it was decided to run a ten factor solution as a beginning point. Twenty-one factor and nine factor solutions were also run, however they did not improve on interpretability over the ten factor solution. Consequently, the ten factor orthogonal solution was adopted and is presented here.

Table 10 summarizes the results of a 10-Factor solution from the Overt Tests.

Insert Table 10 about here

As in the initial 127 factor solution, many factors appear to be test specific, or dominated by a particular test. Seven of the ten factors in this model are dominated

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Table 10 Overt Tests - 10 Factor Orthogonal Solution
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 1 Thoughts & Temptations to Steal $ or Goods			Factor 2 Reid Drug Use Attitudes at & away from work			Factor 3 Thoughts & Temptations to Steal / fights			Factor 4 Honesty Image / Social Desirability			Factor 5 Ext. Locus of Control / Low Self-Control		
test / loading range	PSI	Stant	Reid	PSI	Stant	Reid	PSI	Stant	Reid	PSI	Stant	Reid	PSI	Stant	Reid
.90-.99						6									
.80-.89						5									
.70-.79						6									
.60-.69			2			3	2						1		
.50-.59			9			1	8			2	3		5		
.40-.49		1	15				4			8	3		12		
.30-.39	1	11	11			2	6	1	2	5	4		12		
(.30-.39)	7	2	1				6	1	2	9	7		6	1	2
(.40-.49)	1		1				4			1	6				
(.50-.59)			1				3			1	1				
(.60-.69)							1								
# items	9	14	40	-	-	23	34	2	4	26	24	-	36	1	2
Test contribution to Variance Explained as shown	1.068	1.734	8.16	-	-	13.49	7.38	.226	.425	4.15	4.12	-	6.46	.096	.239
Variance Explained by Factor	17.096			16.84			14.09			13.49			11.39		

Factor 1 - Thoughts & Temptations to Steal Money or Goods
- Have you ever thought about stealing money or merchandise from where you've worked?
- Were you ever tempted to take something (money or goods) from where you worked, but didn't?
- Have you ever seen other employees stealing from the company you worked for?
- (-) What is the total amount of money or merchandise you've taken from all previous employers?

Factor 2 - Reid Report Drug Use Attitudes & Use
- What percent of your friends do you think drink beer?
- ....use cocaine at work? Away from work?
- ....use marijuana at work? Away from work?

Factor 3 - Thoughts and Temptations to Steal / Deviance or Fights
- Have you been able to figure out a way a person could take something from work, but didn't?
- How often have you let friends and relatives use your employee discount?
- (-) How often have you bought stolen merchandise?
- (-) How often are you forced into a fist fight?

Factor 4 - Honesty Image / Social Desirability
- How honest are you really?
- If you were sent too much merchandise with an order would you return the extra?
- (-) Do you sometimes feel like swearing?
- (-) Is it OK to bend the rules in order to get things done?

Factor 5 - External Locus of Control / Low Self-Control
- How often do you worry about getting sick?
- Do you get annoyed when given orders?
- Who you know, and luck, is more important to success than hard work.
- Low pay makes people steal.

Table 10 (continued) Overt Tests- 10 Factor Orthogonal Solution
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 6 Admissions of Commissions / Convictions of Crimes			Factor 7 Perception of Pervasiveness of Workplace Theft			Factor 8 Attitudes towar Drug / Alcohol Use			Factor 9 Punitiveness			Factor 10 Supervision Attitudes / Resentment toward Test Questions		
test / loading range	PSI	Stant	Reid	PSI	Stant	Reid	PSI	Stant	Reid	PSI	Stant	Reid	PSI	Stant.	Reid
.90-.99															
.80-.89															
.70-.79															
.60-.69			1				2								
.50-.59			6		3		2		1		1	3			
.40-.49		3	7	4	8	1	2		4		1	6			
.30-.39			8	4	11	1	1	1	2		1	2	7		2
(.30-.39)		2	4		1		3		5	2	1				5
(.40-.49)		2	2		2				3			3			
(.50-.59)			1		1				1		1	1			
(.60-.69)									1						
# items	-	7	29	8	26	2	10	1	17	2	5	15	7	-	7
Test contributi-on to Variance Explained as show	-	1.10	5.46	1.23	4.47	.34	2.38	.12	3.15	.199	1.0	3.12	.82	-	.75
Variance Explained by Factor	11.29			11.256			10.18			8.3			6.48		

Factor 6 - Admissions of Various Crime Commissions / Convictions
- Were you ever convicted for selling drugs?
- Have you ever shoplifted ?
- (-) How much money do you spend on drugs?

Factor 7 - Pervasiveness of Workplace Theft
- Do you believe most people steal a little?
- Do you think most employees would steal if they were sure they wouldn't get caught?
- Do most young people steal from where they work?
- (-) What dollar value in merchandise have most employees taken from where they work?

Factor 8 - Attitudes toward Drug & Alcohol Use
- How acceptable is someone who shares marijuana with their friends?
- How would you describe your own use of drugs?
- How often do you drink hard liquor when not at work?
- (-) What percent of your friends use marijuana or tobacco?

Factor 9 - Punitiveness
- How much money would an employee have to steal before you as the manager would fire them?
- Should an employee be fired for helping another employee steal something small?
- (-) Is a person who borrows money from work without permission, but pays it back before anyone notices, honest?

Factor 10 - Supervision Attitudes / Resentment to Reid Questions
- Do most supervisors treat workers fairly?
- How much did you resent or accept answering the questions in the previous section?
- Is the company to blame if employees steal from it?
- (-) What percent of your friends use tranquilizers or opiates?

by one test. For example, Factor 1 clearly measured Thoughts and Attitudes toward Theft and Admissions with 40 items with loadings greater than .30 coming from the Reid Report, 14 from the Stanton Survey, and 9 from the PSI-7ST. Factor 2, on the other hand, measures Drug Use Attitudes, with all 23 loadings greater than .30 coming from the Reid Report. Factor 3 measures Thoughts and Attitudes toward Theft as did Factor 1, but heavier loadings come from the PSI. It also includes some broader delinquency questions reporting fights and association with thieves. Factor 3 contained 34 PSI items, 4 Reid Report items, and 2 Stanton Survey items.

Factor 4 is made up of items pertaining to the Image of Honesty an individual projects, and also some items which may be included in tests to detect social desirability answering. For example, asking for a self-proclamation of honesty level, or whether a person would return extra merchandise or change seem to be linked to the image a person tries to portray. On the other hand, asking questions about whether a person sometimes feels like swearing, or enjoys listening to gossip may be intended to flag individuals who are "faking good". Items loading on Factor 4 are fairly evenly split between the PSI and Stanton Survey.

Most items loading on Factor 5 come from the PSI. It is a rather complex factor, containing items about job safety, tenure, and dispositional traits on the positive pole, and perceptions and values on the negative pole. Taking a broader view of the factor, there appears to be a central theme that responsibility for events in the respondent's life rests outside the individual. This mind set is referred to as "External Locus of Control" in psychology. Sample items include a belief that luck

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plays an important part in avoiding accidents, or in being successful, or that success is due to who you know, not what you know. Additionally, there are items which align with low-self control, such as losing one's temper, getting annoyed with job related orders, and thinking about hitting someone. The negatively loaded items include beliefs about the honesty of police officers, whether taking paper and pens from work is stealing, thoughts about whether this job is permanent, if a person could live comfortably on the salary they will be making, and if they believe they can accomplish their goals.

Factor 6 is clearly about Admissions of Committing and/or being Convicted for Specific Crimes, with most items coming from the Reid Report. The crimes range from shoplifting, drug sales, selling stolen merchandise to fraud, burglary and robbery. Also included on the negative pole are admissions of dollars spent on illicit drugs and gambling.

Perceptions about what the norms are for Theft activity make up Factor 7. In addition to questions about how many workers steal from their employers, and how many people cheat on their income tax, some questions are directed at the extent to which employers take advantage of their workers. The subject of this factor is very clear and interpretable.

Factor 8 is another Drug Use factor with items contributed from the PSI and Reid Report. The positive end of the factor contains items about a person's use of and attitude toward friends who use socially acceptable drugs and alcohol (including

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marijuana) away from work, while the negatively loaded items inquire about how many friends use a variety of hard drugs.

Factor 9 is Punitiveness, measuring which transgressions and up to what amount people are willing to forgive. Should a person caught taking money or merchandise from work be given a second chance? If yes, how much stolen would be too much to forgive? All three tests contribute to the factor, with most items coming from the Reid Report.

Finally, Factor 10 has several themes. Foremost are attitudes toward supervisors and fairness perceptions, including acceptance or resentment of the questions asked within each section of the Reid Report. At the negative end are two questions about friends' drug use, and a question about the extent to which all employees have cheated their companies out of something.

The Overt Tests 10-Factor solution contains at least two unexpected findings. First, superficially similar theft thoughts and admissions questions from the three instruments failed to merge into a single theft factor. Secondly, and related to the first, is that so many of the factors were dominated by a single instrument. In fact, the Reid, Stanton and PSI each dominated a theft-focused factor of their own. Reid Report items actually loaded heavily on two theft-related factors, two drug-related factors, and on the Punitiveness factor. The PSI loaded on a theft-related factor with some violence-related items, a drug-related factor, an external locus of control factor, and an honesty image factor jointly defined with the Stanton Survey. The single

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Stanton dominated factor was the perception of theft pervasiveness, sometimes referred to as the projection of (dis)honesty to others.

Finally, although relatively identifiable factors formed, they were nonetheless, rather complex and "messy". The factors often contained items that would at least on the surface, seem to fit better in other factors. Perhaps this empirically derived solution picked up on, or amplified anomalies in the data set. More will said about this in the discussion section.

2. Personality-based Integrity Test Analysis

Test items from the IPI, PDI-EI, PRB, and ERI were merged to form the Personality-based data set of 1262 observations on 578 variables. Inspection of the correlation matrix for system missing values resulted in two items from the PDI-EI and one from the ERI being dropped due to low variance, leaving 575 variables in the Personality-based Tests data set. This time, with more observations and more variables, there were 195 factors meeting the eigenvalue greater than 1.0 criterion. Following the procedure adopted during the Overt Tests analysis, visual inspection of the scree plot combined with relatively big differences between eigenvalues indicated that 11 factor and 21 factor solutions were potential models (see Appendix B). Orthogonal and oblique rotations were run on both models using the promax command. The 11 factor orthogonal solution proved to be the more interpretable model, and consequently, is presented in Table 11.

Insert Table 11 about here

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Table 11   Personality-based Tests - 11 Factor Orthogonal Solution
Frequency of Loadings (>.30) by test on each Factor

Factor name	Factor 1 Emotional Stability / Anxiety				Factor 2 Deviance / Dependability / Sociability				Factor 3 Drinking, Delinquency, Thrill-Seeking				Factor 4 Success/ Achievement Orientation			
test / loading range	IPI	PDI-EI	PRB	ERI	IPI	PDI-EI	PRB	ERI	IPI	PDI-EI	PRB	ERI	IPI	PDI-EI	PRB	ERI
.80-.89																
.70-.79																
.60-.69									1							
.50-.59	4				5				1				1			
.40-.49	22	3	3	5	23	3			7	3	1		3	2		
.30-.39	49	4	1	10	29	2		2	15	2	2	6	7	7	1	1
-(.30-.39)	3				14	2		1	3	3	1	2	2	3	3	1
-(.40-.49)					7				2	1	1			1	5	
-(.50-.59)					2				1						2	
-(.60-.69)										1					1	
# items	78	7	4	15	80	7	-	3	30	10	5	8	13	13	12	2
Test contribution to Variance Explained as shown	11.36	1.03	.66	2.11	12.99	1.13	-	.34	4.70	1.80	.73	.92	1.89	1.69	2.29	.20
Variance Explained by Factor	24.86				24.12				16.51				13.40			

Factor 1 - Emotional Stability / Anxiety
• Sometimes I feel uneasy for no reason.
• I have a problem with my temper.
• People will try to take advantage of you if they get a chance.
• My friends say that I'm moody
• (-) Overall, I feel happy with my life.

Factor 2 - Deviance / Undependability / Sociability
• I have trouble holding a job.
• I gone through a drug rehabilitation program.
• Somebody is always trying to get me into trouble.
• (-) There is nothing I like better than a good home-cooked meal.
• (-) I enjoy making other people happy.

Factor 3 - Drinking, Delinquency, Thrill Seeking
• I've been known to drink a six pack of beer.
• I've shoplifted small things on impulse.
• I would enjoy sky diving or driving a race car.
• (-) I've never been one for heavy drinking.
• (-) I don't think I know anyone who has stolen.

Factor 4 - Success / Achievement Orientation
• I succeed and do better at the things I try than most people.
• I typically do more than is required for school or work projects.
• (-) I often act without thinking.
• (-) I regret things that I do more than other people.

Table 11 (continued)   Personality-based Tests - 11 Factor Orthogonal Solution
Frequency of Loadings (>.30) by test on each Factor

Factor Name / test / loading range	Factor 5 Home Life				Factor 6 PRB Jobs (disliked???)				Factor 7 Sociability				Factor 8 Extroversion / Risk Taking			
	IPI	PDI-EI	PRB	ERI	IPI	PDI-EI	PRB	ERI	IPI	PDI-EI	PRB	ERI	IPI	PDI-EI	PRB	ERI
.80-.89																
.70-.79			1													
.60-.69			1				3									
.50-.59		2	1				4				1					
.40-.49	1						10		5				3			3
.30-.39	6	1	3	1	2		5		10		2		1	5		2
-(.30-.39)	6		5				1			1	4		1	4		3
-(.40-.49)			3								1					
-(.50-.59)																
-(.60-.69)																
# items	13	3	14	1	2	1	22	-	15	1	8	-	5	9	-	8
Test contribution to Variance Explained as shown	1.47	.71	2.87	.10	.245	.137	5.19	-	2.28	.10	1.09	-	.91	1.11	-	1.13
Variance Explained by Factor	11.89				10.96				10.74				10.41			

Factor 5 - Home Life
- My home life was mostly happy.
- I come from a close knit family.
- (-) I don't think my parents understood me.
- (-) My parents often didn't approve of my friends.

Factor 6 - Listing of PRB Jobs (not liked by college students?)
- Firefighter
- Bartender
- Mail Carrier
- (-) I'm busy doing lots of things at this time in my life.

Factor 7 - Sociability
- I like being around other people.
- Spending time with my family is precious to me.
- (-) I get irritated by people to tend to make lots of mistakes.

Factor 8 - Extroversion / Risk Taking
- I find it easy to talk to strangers.
- I like to create excitement in situations that I'm in.
- I really like to take chances.
- (-) I tend to be more sensible than adventurous.

Table 11 (continued)
Personality-based Tests - 11 Factor Orthogonal Solution
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 9 Reflection				Factor 10 Disheartened				Factor 11 Conforming to Authority			
test / loading range	IPI	PDI-EI	PRB	ERI	IPI	PDI-EI	PRB	ERI	IPI	PDI-EI	PRB	ERI
.80-.89												
.70-.79												
.60-.69				1								
.50-.59				1			1					
.40-.49							4				3	
.30-.39		2	1	3			12			1	4	
-(.30-.39)		1		5	2	2			1	2	1	
-(.40-.49)				2						1		
-(.50-.59)				1								
-(.60-.69)												
# items	-	3	1	13	2	2	17	-	1	4	9	-
Test contribution to Variance Explained	-	.30	.14	2.35	.21	.27	2.41	-	.09	.55	1.15	-
Variance Explained by Factor	9.35				9.22				8.81			

Factor 9 - Reflection

- I do my best to be fair with others.
- My life has turned out OK.
- (-) I wouldn't drink so much, if my life were better.
- (-) Newspapers are a waste of time to read.

Factor 10 - Disheartened

- Life seems to have dumped on me.
- Other people seem more happy than me.
- You are better off not trusting anyone.
- (-) How many times have you been praised by a boss or teacher?

Factor 11 - Conforming to Authority

- I tended to play hooky from school quite a bit.
- I often didn't do what my parents wanted me to.
- (-) I was never fired from a job.
- (-) What were your grades like in school?

The IPI contributes 310 items to the data set and dominates four of the factors. About half of the IPI items load on the first two factors, Factor 1 - Emotional Stability, and Factor 2 - Deviance. Factor 1 was virtually identical in both the 11 factor and 21 factor solutions. It represents primarily the emotional instability and insecurity pole of the factor, with only three items on the negative pole expressing happiness with life and confidence.

Factor 2 is more complex than Factor 1. Items loading on the positive pole of this factor express an external locus of control - someone is out to get me, my mother has made my life harder; deviance such as past drug experimentation and dependency, having a large number of unpaid parking tickets, and use of sick leave. Also included are a number of questions most likely used to detect random answering patterns or response sets such as never having used the phone or watched TV, or never having hurting anyone's feelings. Items on the negative pole reflect sociability, agreeableness, and social conformity such as being considered a good friend, liking to entertain friends, enjoying a home cooked meal, wanting to own your own home, or expecting children to respect their parents.

Factor 3, Drinking, Delinquency and Thrill Seeking, covers the full spectrum from heavy drinking and marijuana use on the positive pole, to no drinking or marijuana use on the negative pole. Also, part of this factor which seems to measure low-self control, are admissions of shoplifting, gambling, getting into trouble, and thrill-seeking activities like sky-diving. In addition to little or no drinking items on the negative pole, are honesty items like giving back extra change, not cheating on

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exams, not knowing any thieves, and dependability items like not being a thrill-seeker, or being a stay at home type of person.

Dependability, planning, and achievement mark the positive end of Factor 4, Success/Achievement Orientation. The items reflect a person's tendency to planning ahead, taking on responsibility, succeeding at what they do, and demanding a lot of themselves. The negative pole is marked by items about making decisions on the spur of the moment, regretting prior decisions, having low self confidence, and not believing in hard work.

Factor 5, Home Life, covers a person's family background, running from a happy, pleasant home life and close knit family members on the positive end, to having parents disapprove of friends, not having a peaceful household, and wanting to run away at the negative end. Embedded among the positive pole items are the stock market broker and life insurance sales jobs from the PRB.

More PRB jobs make up the majority of items in Factor 6. Many of the jobs could be termed "blue collar" type jobs, however, teacher is included in the list. Non-PRB items loading on this factor include a desire for revenge when people harm you among the positive pole items, and the only negative pole item which states that a person is busy with many things at this point in life.

Factor 7 expresses Sociability as defined by liking friends and family, being easy going, and liking jobs with lots of public contact such as flight attendant, hotel clerk, and nurse. On the negative end are questions about misbehaving in school, and getting irritated at people who make mistakes.

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Extroversion/Introversion and Risk Taking are measured in Factor 8. Ease in talking to strangers and before crowds, and liking to stir up excitement and shock people, and take risks are on the positive pole of the factor. At the other end are items admitting that one is more sensible than adventurous, and frightened by speaking in front of large groups.

Factor 9 is a bit difficult to pin down, but seems to indicate a Reflectiveness or Openness to life. Items on the positive end include trying to be fair with others, believing that smoking is bad for you, a belief that life has turned out OK, enjoyment of the outdoors, and admission of having been jealous. The negative end shows a certain amount of ignorance, or closed mindedness with items such as reading the paper is a waste of time, my personality doesn't change when I get high, I wouldn't need to get high if my life were better, a dislike of high school, and a dislike of TV shows about complex subjects.

Depression or a disheartened outlook seem to be the theme of Factor 10. Items include a belief that life has handed a person a raw deal, it's easy for other people to win arguments with me, other people seem happier than me, and a frequent feeling of having made the wrong occupational choice. Included among those questions are file clerk, and accountant jobs. Negatively loaded items include whether personal interests are more important than job duties, the amount of praise a person received from teachers and bosses, if a person has trouble knowing when to stop a joke, and if they have had more than one driving ticket.

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Factor 11 reflects an individual's willingness to Conform to Authority. Giving teachers trouble, playing hooky, and disobeying parents mark the positive pole, while getting good grades, having high attendance at school, and never being fired from a job mark the negative pole.

In summary, as with the Overt Tests, there is a tendency for individual tests to dominate specific factors. In the case of the Personality-based Tests, 8 of the 11 factors are dominated by one test. The IPI clearly dominates the factors of Emotional Stability, Deviance/Dependability, Drinking/Thrill Seeking, and Sociability, while the PRB dominates the factors of Home Life, Disheartened, Conforming to Authority and PRB Blue Collar Jobs. The ERI dominates only the Reflection factor, while the PDI-EI dominates none. This is not to say that the PDI-EI does not measure any of the factors. It jointly defines the Success/Achievement factor with the IPI and PRB, and also the Extroversion factor with the ERI. Many of its items load on factors dominated by the IPI such as Emotional Stability, Deviance, and Drinking/Thrill Seeking so they don't stand out at first glance. The ERI on the other hand, only contributes to defining the Reflection, Emotional Stability, and Extroversion factors in a meaningful way.

Not surprisingly, the personality-based tests define major personality characteristics which can be used as measures of broadly defined deviance tendencies. Only Factor 3, Drinking, Deviance and Thrill-Seeking, contains theft specific questions similar to those found in overt tests. And as with the Overt Tests solution,

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more will be said in the discussion about the tendency for single tests to dominate certain factors.

3. Big-5 Personality Test Analysis

Three personality instruments measuring what have come to be known as the "Big-5" personality dimensions were merged into a single data base. The instruments involved were the 100 item Goldberg's Adjective Checklist, the 206 item Hogan Personality Inventory, and the 200 item version of the Personal Characteristics Inventory. 163 factors were indicated by the eigenvalues greater than 1.0 criterion, which, again, was deemed too many for practical purposes. Visual inspection of the scree plot showed a break at five factors, however it was rather high up in the vertical portion of the plot line. Following the decision rules previously applied to the overt and personality-based test-type analyses, 8 and 16 factor solutions appeared to be more appropriate (see Appendix C). However, given the assertion that these instruments were measures of five personality constructs, a five factor solution was also run.

The results of the five factor model were unexpected. Only four of the Big-5 factors formed in the orthogonal solution - Factor 1 Emotional Stability, Factor 2 Extroversion/Introversion, Factor 3 Conscientiousness, and Factor 5 Agreeableness. Intellect/openness to experience did not form an identifiable factor. The Factor 4 which did form is a composite of characteristics perhaps best described as "Goldberg's Integrity". Items loading on the factor came from all five personality dimensions. There were 19 Conscientiousness items, 15 Agreeableness items, 15

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Intellect items, 8 Surgency (extroversion/introversion) and 4 from Emotional Stability. The highest positive loading items (all above .50) were considerate, efficient, bright, cooperative, pleasant, active, helpful, conscientious, kind, generous, practical, and thorough. Items loading above .50 on the negative side were undependable, unkind, unintelligent, unintellectual, uncooperative, inefficient, shallow, and uncharitable. Given the failure of the 5 factor model to form the Big-5, and the break up of the 16 factor model into test specific clusters, the 8 factor solution was adopted to explain the data.

Table 12 explains the 8 factor model in the same manner as the preceding test-type summaries. Drawing heavily from both the HPI and PCI, Factor 1 is a measure of Emotional Stability. Feelings of depression, worry, anxiety, and unhappiness are reflected in the items at the positive pole, while seldom being grouchy, confidence and happiness mark the negative end.

Insert Table 12 about here

Factor 2 is Extroversion/Introversion with representative questions coming from all three instruments. At the positive pole are questions about enjoying parties, and assuming leadership positions, and introversion terms from Goldberg's Adjective Checklist such as shy, quiet, timid and introverted. (This pairing makes sense because a score of "1" on the questions means true, while a score of "1" on the Goldberg items means extremely inaccurate.) Negative pole items include statements

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Table 12
Big-5 Tests - 8 Factor Orthogonal Solution
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 1 Emotional Stability			Factor 2 Extroversion / Introversion			Factor 3 Agreeableness			Factor 4 Goldberg's Integrity		
test / loading range	Goldbg	HPI	PCI	Goldbg	HPI	PCI	Goldbg	HPI	PCI	Goldbg	HPI	PC
.90-.99												
.80-.89												
.70-.79												
.60-.69		1	1	2		1		1		5		
.50-.59		11	3	2	1	4		5	3	12		
.40-.49	1	15	10	3	5	1	1	9	6	13	1	
.30-.39		17	19	4	9	8	6	6	6	9	7	
-(.30-.39)	3	9	8	3	5	6	8	3	7	13		
-(.40-.49)	5	2	2	1	3	4		1	1	6		
-(.50-.59)			1	1	1	2		1		4		
-(.60-.69)												
# of items	9	55	44	16	24	26	15	26	23	62	8	-
Test contribution to Variance Explained	1.44	9.63	7.08	3.33	3.87	4.76	1.85	4.96	3.81	12.81	1.05	-
Variance Explained by Factor	26.28			19.33			18.87			18.63		

Factor 1 - Emotional Stability
- I get depressed often.
- There are times when I wish I were someone else.
- I tend to worry a lot of the time.
- (-) I seldom get cross when I am ill.
- (-) I tend to be a happy person.

Factor 2 - Extroversion / Introversion
- I enjoy talking to people at parties.
- Timid
- I prefer to be the leader of a group.
- (-) My friends would say I'm shy.
- (-) I find it difficult to meet new people.

Factor 3 - Agreeableness
- I like to help out other people.
- It bothers me to hurt someone's feelings.
- I'd rather be happy than famous.
- (-) I don't like being required to follow directions.
- (-) I frequently lose my temper.

Factor 4 - Goldberg's Integrity
- Considerate   Bright   Efficient
- Conscientious   Careful   Pleasant
- I often get away with things.
- (-) Undependable   (-) Unintelligent
- (-) Unkind   (-) Inefficient

Table 12 (continued)
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Big-5 Tests - 8 Factor Orthogonal Solution
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 5 Dependability / Conscientiousness			Factor 6 Intellectance			Factor 7 Emotional Immaturity			Factor 8 Achievement		
test / loading range	Goldbg	HPI	PCI	Goldbg	HPI	PCI	Goldbg	HPI	PCI	Goldbg	HPI	PC
.90-.99												
.80-.89												
.70-.79												
.60-.69											1	
.50-.59			2		3	3	3				1	
.40-.49		2	11		6	6	12		1		2	
.30-.39		6	14	2	13	4	16	7		2	10	2
-(.30-.39)		3	10	4	2				1		10	1
-(.40-.49)		1	7	3		2					1	
-(.50-.59)				1	1	1					1	
-(.60-.69)												
# of items	-	12	44	10	25	16	31	7	2	2	26	3
Test contribution to Variance Explained	-	1.56	7.17	1.45	3.95	3.07	5.15	.78	.30	.22	3.88	.31
Variance Explained by Factor	17.63			15.28			13.25			12.35		

Factor 5 - Dependability / Conscientiousness
- I'm often a little late getting someplace.
- I take things as they come instead of planning ahead.
- I get careless when I'm running out of time.
- (-) I always strive to do my best.
- (-) I have a lot of self-discipline.

Factor 6 - Intellectance
- I like working with theoretical concepts.
- Sometimes I take things apart to see how they work.
- People say that I am creative and imaginative.
- (-) I dislike working with abstract concepts.
- (-) I strongly dislike opera.

Factor 7 - Emotional Immaturity
- Rude   Impractical   Moody
- Nervous   Inconsistent   Careless
- I find the hustle and bustle of the city exciting.
- (-) I was disciplined by the principle more than once.
- (-) I think acting spontaneously is best.

Factor 8 - Achievement
- My future seems hopeless.
- I don't care about anything anymore.
- I never told a lie on purpose.
- (-) I tend to expect success.
- (-) I believe if something is worth doing, it is worth doing well.

that meeting new people is difficult, and not liking to speak up in groups, and

Goldberg terms of talkative and extraverted. (High scores with these items means

false for the statements, and extremely accurate for the adjectives.)

Factor 3, Agreeableness, includes items from all three instruments but the

higher loading items come from the HPI and PCI. Helping people out, making

people feel better, and trying hard to get along with people mark the positive end of

the factor. At the other end, are a refusal to go out of your way to help others,

dislike of following directions, often losing one's temper, getting poor grades, and not

enjoying the company of other people.

Factor 4 is the nearly the identical "Goldberg Integrity" factor which formed

in the five factor solution. The same items mark both ends with only slight changes

in their order. There are low-positive-loading items included in this factor from the

HPI which deal with getting away with things, being rebellious in school, and a belief

that success depends on a person's appearance.

Factor 5 is Dependability/Conscientiousness as measured by the PCI and to a

lesser degree, the HPI. The positive loading items actually are the negative spectrum

of the factor including items like always being late, never planning ahead, believing

that rules are made to be broken, and acting carelessly or irresponsibly. (This makes

sense because a higher score from the HPI means "false", and it means "disagree" on

the PCI). Negatively loaded items include always doing one's best, being a

disciplined person, being thorough in any work done, and making careful decisions.

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Various aspects of Intellect are captured in Factor 6. Enjoyment of mental exercises, interest in science, curiosity about how things work, and enjoyment of riddles, classical music, and poetry are some of the items marking the positive end of the factor. Not being very inventive, a dislike of working with abstract ideas, and a tendency to take an unimaginative approach problem solving mark the negative end. Also included are some Goldberg adjectives which would be inaccurate descriptions of the respondent including philosophical, creative, imaginative, artistic, and introspective.

Factor 7, Emotional Immaturity/Low Self-Control, is made up of primarily Goldberg adjectives from emotional stability, conscientiousness, and intellect. The adjectives appear to describe an adolescent sort of immaturity and impulsiveness including impractical, rude, moody, nervous, irritable, selfish, insecure, jealous and self-pitying. The one negatively loaded item is that acting spontaneously is best.

Finally, an Ambition or Achievement orientation appears to be the nature of Factor 8, with most items coming from the HPI. The formation of this factor is entirely unexpected. Recall from the literature review that the HPI breaks Extroversion into two components: Sociability, and Ambition. The HPI sociability items contributed to defining Factor 2, Extroversion, and the remaining items clustered here. Items at the positive pole express a sense of failure such as the future seems hopeless, nothing matters to me, nothing good ever happens to me, I am a slow learner, and I am not competitive. At the other end are "can do" items such as most of the time I expect to succeed, any worth doing is worth doing well, I like

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challenges, and perhaps most predictive about success in life - I always felt my parents loved me.

It appears that the extent to which factors link with a dominate test, is slightly less pronounced among the Big-5 instruments, than with either of the preceding test groups. Extroversion, Agreeableness, Intellectance, and to a lesser degree, Emotional Stability, show more of the melding across instruments that was expected to result from the factor solutions of this investigation. Of some interest is the manner in which conscientiousness-, integrity-, diligence-, and perseverance-type items loaded on different factors. Goldberg's Integrity factor reflects some of the same work-ethic, dependability items found in the PCI-defined Dependability factor, yet it also hints at a spiritedness, higher energy requirement; more action oriented and less rigid than the dependability factor. Other discipline-, diligence-type items from Goldberg loaded with emotional stability items in the Emotional Immaturity/Low Self-Control factor. It is interesting to see how the willingness to work hard and steady, as embodied by these three factors, is somewhat separate from the desire to succeed. The HPI Ambition factor, as a separate factor, is consistent with the design of that instrument, as another part of extroversion. Openness to experience, a high degree of intelligence, and high standards of work quality items loading on the factor, do tend to reflect an "otherly" orientation.

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C. Analyses of Merged Data Sets

1. Determination of the Final Factor Model

Before proceeding with this section, two method notes need to be made. First, a switch from the Promax procrustes oblique rotation method to the Harris-Kaiser Case II orthoblique method was adopted in the analysis of the complete data set. As mentioned in the grouped test-type analyses, the procrustes rotations showed minimal factor inter-correlations, leading the researcher to accept the orthogonal solutions as "best". The procrustes rotation from the promax command, is built off of the preceding varimax solution. Varimax rotation is widely used because it works to closely approach Thurstone's "simple structure" (Harman, 1976). However, a major property of the varimax rotation, is that it is hostile to the formation of general factors, and is therefore, inappropriate to use if one or more general factors are hypothesized. On the other hand, the default Harris-Kaiser orthoblique rotation builds off of a quartimax solution, which allows general factors to form. Given prior research on this data set (Ones, 1993) an expectation of several general factors seemed reasonable, so the Harris-Kaiser rotation was tried to see how its inter-factor relationships differed from those of the procrustes rotation. Inter-factor correlations in the .20-.40 range formed showing stronger relationships between factors than those produced by the promax (procrustes) method. Based on the observed relationships between factors which logically should be related, it was decided to continue future rotations with the Harris-Kaiser method, and if time allowed, to re-analyze the grouped test-type solutions using that method also.

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Another note on methodological choices needs to be made. The earlier proposal of the research project had indicated that final factor analyses would be made using maximum likelihood estimation, which provides chi-squared statistics and other test measures to determine the best fitting solution for the data. ML methods were attempted, however, the nature of the data set precluded their successful use. One of the anomalies of this data is that the number of observations (individuals) does not exceed the number of items. This feature prevented ML estimation from being performed at all to confirm the factor solution accepted as "best". Consequently, subjective judgements on the "best" fit, and interpretability were used as selection criteria for the final factor model.

Although the system related problems had been overcome, a "final" factor solution was not readily apparent. The minimum eigenvalue=1.0 decision rule for selecting factors had to be abandoned, once again, when 479 factors met that criterion. Likewise, visual inspection of the scree plot alone (Appendix D) suggested somewhere between 11 and 60 factors. Matching the major breaks in the scree plot with the difference between adjacent eigenvalues (see Appendix D) led to the running of 11, 22, and 25 factor solutions. Varimax orthogonal rotations and Harris-Kaiser Case II orthoblique rotations were made. Items loading greater than .30 were retained to define the factors. However, going forward with the complete 1442 item correlation matrix as intended, provided results not well suited to answering the main questions of this investigation about integrity tests.

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The factor results on the 1442 item matrix were not as expected. The three Big-5 scales and the IPI tended to break off into various personality dimensions, while the integrity tests defined test specific factors of similar constructs (e.g. Reid thoughts and admissions of theft, PSI thoughts and admissions). What did not come through in any of the models and rotations was a clear indication of what made up "integrity", which is the focus of this study. The decision was made to remove the "noise" introduced by the large number of personality items, and to concentrate on just the items from defined integrity tests. A new data set of 934 integrity test items was created which included the PSI, Reid Report, Stanton Survey, ERI, IPI, PDI-EI, and PRB. Although the HPI reports an integrity scale called "Reliability", the specific HPI items which contribute to that scale are not publicly known, so the HPI could not be represented as an integrity test for defining the factor space.

The principal components analysis of the integrity data set yielded the scree plot and eigenvalues found in Appendix E. Once again, too many factors were defined by eigenvalues greater than one (327) to be useful as a decision tool in determining the number of relevant factors. As with the other data sets, the differences between eigenvalues as marked by breaks in the scree plot, was used to suggest potential solutions. Varimax and Harris-Kaiser Case II orthoblique rotations were run with 9, 15, 19, and 21 factors.

To summarize the results, the 9 and 15 factor solutions seemed too compressed to tell the story of the constructs underlying the integrity test domain. On the other end, the two additional factors in the 21 factor solution were not readily

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interpretable and did not contribute any explanatory power beyond that included in the 19 factor solution. Given the its greater interpretability, relative to the larger and smaller models, the 19 factor model was adopted as the focus for this investigation.

2. Results of the 19 Factor Model

Table 13 shows the factors and variance explained from the varimax rotation of the 19-factor model. However, the pattern of loadings with the different tests is not shown. The factors resulting from the orthogonal rotation were quite complex and not as clear to interpret as those resulting from the Harris-Kaiser orthoblique rotation. Consequently, the following report on the 19-factor integrity test solution will concentrate on presenting the results from the orthoblique rotation.

Insert Table 13 about here

Adoption of an oblique solution requires presentation of the inter-factor relationships, as well as the factor-defining factor to item relationships described previously. This section is organized with the descriptions of factors presented first, followed by the inter-factor correlations.

The pattern of oblique loadings by test on each factor, and prototypical items defining the upper and lower poles of each factor are presented in Table 14. As with the grouped data, copyrights preclude reporting of the exact test items associated with each factor. Unlike the summaries presented for the grouped data, variance explained is not a useful comparative value with the oblique solution, thus only the number of

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Table 13
19 Factor Solution - Orthogonal (varimax) Rotation Results

Factor Name	Variance Explained by Each Factor	% of Common Variance Explained
Factor 1	27.926	8.7
Factor 2	27.456	8.6
Factor 3	26.676	8.3
Factor 4	21.029	6.58
Factor 5	19.357	6.05
Factor 6	19.099	5.97
Factor 7	18.96	5.93
Factor 8	17.437	5.45
Factor 9	15.807	4.94
Factor 10	15.722	4.92
Factor 11	15.627	4.89
Factor 12	13.108	4.1
Factor 13	12.30	3.85
Factor 14	12.018	3.76
Factor 15	11.998	3.75
Factor 16	11.459	3.58
Factor 17	11.329	3.54
Factor 18	11.268	3.52
Factor 19	11.12	3.48
Total Communality Estimates	319.698	

items and range of loadings are presented. One additional piece of information included in the individual factor descriptions is coefficient alpha for that factor. This estimate of internal consistency is used in a later section to estimate the correlation between the factor composite and the honesty scale scores. (More information about the composite correlations, and coefficients alpha can be found in Table 17 and upcoming discussions.)

Insert Table 14 about here

Factor 1 is largely defined by IPI items which define a construct that might be termed Social Conformity on its positive pole, and Social Deviance on its negative pole. This factor also correlates -.34 with Factor 17, Emotional Stability, which is also heavily represented by IPI items. The heavily loaded items on the positive end deal with a desire to help or please others, enjoyment of social activities, and conventional desires such as home ownership. On the negative pole, several questions reflect deviance behaviors such as prior drug use, and having children out of wedlock. Additionally, some items reflect a disregard of others'opinions, school misbehavior, and breaking rules. The standardized coefficient alpha for Factor 1 is .91.

The Image of Honesty a person presents of him or herself is captured in Factor 2 by items from the PSI and Stanton Survey. The positive pole defines whether a person always tells the truth, is too honest to steal, and always completes

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Table 14
Oblique 19 Factor Solution - Integrity Test Items Only (934)
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 1 Social Deviance / Conformity							Factor 2 Honesty Image							Factor 3 Random Answer Items / No Theme						
Test Name	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB
loading range																					
.80-.89																					
.70-.79					1																
.60-.69					7					2											
.50-.59					4			1		2										1	
.40-.49					6			3		1				1							
.30-.39			1		10	1		4		2			1			1	1		1		
-(.30-.39)		1	2		7		2			7				2					2	2	
-(.40-.49)					2			2		5											
-(.50-.59)																					
-(.60-.69)																					
# of items	~	1	3	~	41	1	2	10	~	19	~	~	1	3	~	1	1	~	3	3	~

Factor 1 - Social Deviance / Conformity

People say that I am a good friend.

Children should respect their parents.

(-)It doesn't bother me what others think or say about me.

(-) I once had a chemical dependency problem.

Factor 2 - Honesty Image

I always finish what I start.

If you were sent an extra item with an order, would you send it back?

(-)Is it OK to "use" a sick day when you are not sick?

(-) Do you ever feel like swearing?

Factor 3 - Random Answer Items

Work that used be done by hand, is now done by computers.

Did you ever borrow something from work without anyone knowing it?

(-) I have never used a telephone.

(-) Travel is slower now than at the turn of the century.

Table 14 (continued)
Oblique 19 Factor Solution - Integrity Test Items Only (934)
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 4 External Locus of Control / Lie Scale							Factor 5 Theft-Thought, Admissions (Reid)							Factor 6 Trust / Low Self -Control						
Test Name	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB
loading range																					
.80-.89																					
.70-.79																					
.60-.69									6						1						1
.50-.59			1						7						6						
.40-.49			1	1	2	2			13			2			10						2
.30-.39			1	6	11	2			19			1			12				3	1	4
-(.30-.39)			2	1		1			4			2	2	3					5		2
-(.40-.49)			3		1	1			2					1							
-(.50-.59)									1												
-(.60-.69)			1						1												
# items	-	-	9	8	14	6	-	-	53	-	-	5	2	4	29	-	-	-	8	1	9

Factor 4 - Ext. Locus of Control / Lie Scale

Everything I do is interesting.

I take it easy whether at work or at play.

(-) Sometimes it is necessary to stretch the rules at work.

(-) Have you ever told a lie?

Factor 5 - Theft

Have you ever taken company property from a job site?

Did you ever think about taking money from where you worked, but didn't go through with it?

(-) Are you too honest to steal?

(-) What is the total dollar value of merchandise you've taken from work in recent years?

Factor 6- Trust/Low Self-Control

Have you thought about hitting someone because they deserved it?

Is it better to not trust anyone?

(-) People sometimes say I drink too much.

(-) I tried cocaine more than one time.

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Table 14 (continued)
Oblique 19 Factor Solution - Integrity Test Items Only (934)
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 7 Extroversion /Adjustment							Factor 8 Social Drug Use							Factor 9 Deviance/Association w/Drugs						
Test Name loading range	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB
.80-.89																					
.70-.79																					
.60-.69									2												
.50-.59					1			1				2							1		
.40-.49	1				1	2		2	5		1	1							1		
.30-.39	1		1	2	8	1	1	3	2			1		1			1		4		
-(.30-.39)	1								3	1		1	1								
-(.40-.49)									1			2				1					
-(.50-.59)						1			1							2					
-(.60-.69)									1							1					
# of items	3	~	1	3	11	1	1	6	15	1	1	7	1	1	~	4	1	~	6	~	~

Factor 7 - Extroversion/Adjustment

It is not hard for me to converse with strangers.

I tend to be cheerful and excited about life.

(-) How frequently do you feel dissatisfied with yourself?

(-) How confident are you about yourself?

Factor 8 - Social Drug Use

When not at work, how often do you use tobacco?

I've smoked marijuana at parties.

(-) How many of your friends drink liquor?

(-) How many of your friends smoke marijuana?

Factor 9 - Deviance/Drug Assoc.

At one point, I had over $100 in unpaid parking tickets.

I've quit at least 5 jobs in the past 10 years.

(-) How many of your friends use speed?

(-) How many of your friends use sedatives?

Table 14 (continued)
Oblique 19 Factor Solution - Integrity Test Items Only (934)
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 10 PRB Blue Collar Jobs							Factor 11 Hard Drug Use							Factor 12 Punitiveness/Autocracy						
Test Name loading range	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB
.80-.89									2												
.70-.79							1		8												
.60-.69							2		2												
.50-.59							4-		2												
.40-.49							4									3					
.30-.39	1						5		5						1	1	1		1	1	
-(.30-.39)									3	1				2		4	3		3		
-(.40-.49)									3					1		2					
-(.50-.59)																					
-(.60-.69)																					
# of items	1	~	~	~	~	~	16	~	25	1	~	~	~	3	1	10	4	~	4	1	~

Factor 10 - PRB Blue Collar Jobs

Postal carrier

Dishwasher

Ranch Hand

Police Officer

Factor 11 - Hard Drug Use

How often do you take LSD before work or while at work?

How often do you take designer drugs when not at work?

(-) How much money do you spend per week on non-prescription drugs?

(-) How much money do you spend per week on gambling?

Factor 12 - Punitiveness/Autocracy

Should a person keep their job if they pay back the money they took?

Should a person who has taken merchandise from work be given a second chance?

(-) People fear making me angry.

(-) What dollar value would a worker have to steal before you would fire them?

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Table 14 (continued)
Oblique 19 Factor Solution - Integrity Test Items Only (934)
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 13 Drinking / 'Fast Crowd' Jobs							Factor 14 Diligence / Planning							Factor 15 Theft Thoughts, Admissions, Violence (PSI)						
Test Name loading range	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB
.80-.89																					
.70-.79																					
.60-.69							4								3						
.50-.59							3					1			8						
.40-.49					4	1	3			1		1	1		5						
.30-.39					4	1	5					3	7		10		1		1		
-(.30-.39)					3	1	2	2		1		1	1	2	4	1					
-(.40-.49)							1								1						
-(.50-.59)														1	4						
-(.60-.69)																					
# of items	-	-	-	-	11	3	18	2	-	2	-	6	9	3	35	1	1	-	1	-	-

Factor 13 - Drinking/Fast Crowd Jobs

Night Club Performer

I hang out with sophisticated people.

(-) I have never been a heavy drinker.

(-) I am not a thrill seeker.

Factor 14 - Diligence/Planning

People say that I'm a workaholic.

I normally plan carefully ahead.

(-) My parents didn't like a lot of my friends.

(-) I often act without stopping to think about what I am doing.

Factor 15 - Theft thoughts/Admissions

Have you thought about taking money from someone by force?

Have you ever purchased or received stolen merchandise?

(-) What is the dollar value of merchandise you've taken from work in recent years?

(-) What is the dollar value of money you've taken from work in recent years?

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Table 14 (continued)
Oblique 19 Factor Solution - Integrity Test Items Only (934)
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 16 Home Life							Factor 17 Emotional Stability							Factor 18 Theft (Stanton)						
Test Nam loading range	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB	PSI	REID	Stanton	ERI	IPI	PDI	PRB
.80-.89																	3				
.70-.79																					
.60-.69																					
.50-.59							2					3					1				
.40-.49					1	2	1			1		14									
.30-.39			1	2	1	1	2				5	26		1		2	4		3	1	
-(.30-.39)			1		2	1			1		1	1					5	3		3	
-(.40-.49)							3		1	1											
-(.50-.59)							1														
-(.60-.69)																					
# of items	~	~	2	2	4	4	9	~	2	2	6	44	~	1	~	2	13	3	3	4	~

Factor 16 - Home Life

My life at home was always happy.

The members of my family have always been close to each other.

(-) Life at my house was not peaceful and quiet.

(-) I don't think my parents understood me.

Factor 17 - Emotional Stability

I have a feeling that someone is out to get me.

Sometimes I tingle all over and want to jump out of my skin.

I've thought about taking my own life.

(-) How many times have you been in fist fights or shoving matches?

Factor 18 - Theft thoughts/Admissions

What dollar value in merchandise have most most workers taken?

How would your friends describe your honesty?

(-) How many young people steal from their first few employers?

(-) Why do you think employees steal from work?

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Table 14
Oblique 19 Factor Solution - Integrity Test Items Only (934)
Frequency of Loadings (>.30) by test on each Factor

Factor Name	Factor 19 Affectivity / Locus of Control						
Test Name	PSI	REID	Stanton	ERI	IPI	PDI	PRB
loading range							
.80-.89							
.70-.79							1
.60-.69							2
.50-.59	1				1		5
.40-.49	2				2		3
.30-.39	11				6		7
-(.30-.39)					8		
-(.40-.49)					1		
-(.50-.59)							
-(.60-.69)	1						
# of items	15	~	~	~	18	~	18

Factor 19 - Affectivity

Life often dumps on me.

With the way things are going, it is hard to hope.

Luck is more important to success than hard work.

(-) I feel good about myself.

(-) I seldom am laid up in bed with a cold.

the things they start (which might be part of a lie scale). The negative end contains more questions which may be part of a lie scale, such as if someone has ever felt like swearing. Also included, though, are self-reports of ever being tempted to steal, consideration of keeping a found bag of money, and attitudes toward using sick days for purposes other than illness. The standardized coefficient alpha for Factor 2 is .863.

There is no apparent theme to Factor 3, other than empirical association between three questions used to determine random answering patterns. With only eight items, all but one of which load just above .30, Factor 3 also has the lowest internal reliability with a standardized coefficient alpha of .485. The highest loading item, at .54, is true/false that computers now do much of the work formerly done by hand. The middle items deal with drinking to relax, borrowing things from work, giving a criminal record to someone caught stealing, having been deliberately poisoned, and not knowing anyone who smokes marijuana.

Factor 4 is well represented across four of the tests. It defines some lie scale items, and a person's perception of what is termed in psychology, an External Locus of Control. The central theme of many of the middle items is an "it's not me, or my fault" mind set. For example, success is largely due to being in the right place at the right time, and it is natural to cover up mistakes. Other items on the positive end include people are born dishonest, a person can talk their way out of anything, they are unable to break bad habits, and a belief that smiling covers evil thoughts. Items from the IPI tend to measure a certain social ineptness, such as trouble getting along

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with the opposite sex, and with co-workers, not knowing when to stop a joke, and needing to have a few drinks to relax. Lie scale items from the Stanton Survey weight the negative pole with questions about whether the respondent has ever told a lie, hurt someone's feelings, talked behind someone's back, or stretched the rules to get a job done. Standardized coefficient alpha is .847 for Factor 4.

Thinking about taking merchandise or money from work, being tempted to take merchandise or money from work, and admitting to taking merchandise or money from work are the items with the highest positive loadings on Factor 5. This General Theft factor is mostly defined by items from the Reid Report. The negative end is anchored by reports of total dollar values of merchandise and money taken from employers in recent years. Also on the negative pole are questions about moving vehicle violations, are you too honest to steal, a punitiveness toward someone caught stealing in a scenario case. Less clear as to how they fit, are questions about fear of the dark, praise received from teachers, and a belief that you have not wasted years of your life. Factor 5 has the highest standardized coefficient alpha of the factors at .933.

Factor 6 represents Low Self Control/Rule Abidance, with tendencies toward violence on the positive pole, and substance abuse on the negative end. Thoughts about hitting someone, threatening someone with force, defending self, losing control of their temper ignoring rules, and doing things their own way are some of the top loading items. Also included are beliefs that it is better to not trust anyone, feeling restless, believing that others talk behind your back, and being unable to avoid

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accidents at work. Drinking too much, and trying cocaine on more than one occasion anchor the negative pole (higher scores being "false"). Sandwiched between them is like of a management trainee job, followed by descriptions of being easy going, and generally cheerful. The factor exhibits high internal consistency with a standardized coefficient alpha of .90.

Extroversion and Life Adjustment define Factor 7. Items cover being comfortable beginning a conversation with a stranger, being proud of personal accomplishments, satisfied with life in general, and having a cheerful, energetic disposition. Ratings of being less dissatisfied with themselves and having more self confidence anchor the negative end of the factor. The standardized coefficient alpha for Factor 7 is .815.

Factor 8 covers what could be considered Socially Acceptable Drug Use away from work. Although it is mostly comprised of items measuring attitudes toward, and frequency of use of tobacco, wine, beer, and liquor, it also includes marijuana. This social acceptance of a controlled substance is not unusual in the college population contributing most of the responses to this data set. (As an aside, lenient attitudes toward marijuana use were already the norm among younger applicants taking integrity tests eleven years ago when this researcher was administering the PSI and Stanton instruments in business settings. Such attitudes did not preclude hiring decisions if other scale scores were acceptable.) The negative pole items included perceptions of the percent of respondents' friends who use various drugs including

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marijuana, hallucinogens, tobacco, wine, beer and liquor. Standardized coefficient alpha for Factor 8 is .903.

Behaviors best described as irresponsibility/Deviance combined with Association with Drug Users define Factor 9. The positive end includes reports of having had over $100 in unpaid parking tickets, being divorced, quitting 5 jobs in the past 10 years, being irritated by noise, and not having flown in a plane. At the negative spectrum are items about the percent of the respondent's friend who use hard drugs such as, sedatives, amphetamines, tranquilizers and opiates. Purely speculative, but perhaps the deviant behaviors and association with drug users point to a current drug addiction problem. Although this factor contains only 11 items with loadings above .30, it exhibits acceptable internal consistency with a standardized alpha coefficient of .75.

Factor 10 represents a factor which formed in virtually ever factor solution run in both combined data sets, and in the personality-based integrity test group data. It consists almost entirely of what might be described as Blue Collar Jobs listed on the PRB. Since higher scores are associated with "dislike" of such a job, the positive factor loadings are interpreted as dislike of such jobs. Given the college population making up most of the observations in the data set, this factor makes some sense. The one non-PRB item from the PSI asks the respondent about what percent of people have never used marijuana. Factor 10 has a standardized coefficient alpha of .787.

Unlike Factor 8 which measures socially accepted drug use, Factor 11 defined by mostly Reid Report items, measures illegal Hard Drug Use both at work and away

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from work. The factor shows the heaviest item loadings of any factor in the solution, with 10 items loading .70 or above. Personal use of hallucinogens, amphetamines, cocaine/crack, steroids, designer drugs, inhalants and tranquilizers, while at work or away are among the top positive end items. Highest scores on these items are for reports of never using them. The items at the negative end include reports of the weekly dollar totals spent on substances, and gambling, convictions for driving while intoxicated, and the percent of friends the respondent believes use inhalants (from Reid Report items) but also includes some less obvious PRB questions. Those questions elicit true/false responses to whether a person feels happy most of the time, whether they value their independence, and whether they think about the impression they make on others. Coefficient alpha for Factor 11 is the second highest in the model at .93.

Although 50% of the items in Factor 12 come from the Reid Report, the remainder cut across several instruments. Defined as Punitiveness/Autocracy, the Reid items at both poles ask about whether respondents as managers would give employees a second chance or fire them given a variety of circumstances. Items from the Stanton Survey query about whether a person who steals for need should be judged the same as someone who steals routinely, and whether they as a manager could trust someone who has stolen. IPI items lean toward being a measure of authoritarianism or autocracy and include items such as: Others are afraid to make me angry, I'm willing to defend my beliefs even if they are unpopular, and there are few

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people who can intimidate me. Standardized coefficient alpha for the 20 items in Factor 12 is .814.

Factor 13 is about heavy Drinking and an affinity for jobs associated with drinking. The positive end is defined by the dislike of a variety of jobs from the PRB include night club entertainer, private detective, pro-athlete, bartender, bodyguard, TV announcer, and stock market broker. Additionally, items from the IPI measure a person's enjoyment of downing a 6-pack of beer, boasts of being a big drinker, liking to stay out late, and arrests for drinking or drug related offenses. At the negative end, PRB and IPI items ask whether a person is not a heavy drinker, the PDI-EI measures agreement with the statement that the person is not a thrill seeker. The internal consistency reliability for this factor as measured by standardized coefficient alpha is .863.

It was difficult naming Factor 14. The first impulse was to call it "conscientiousness", however, previous research on integrity and personality measures over the years have tended to use the same term for an ever growing construct. It is hoped that calling the factor Diligence and Planning, is descriptive without adding to the already extensive list of synonyms used for "conscientiousness". Five of the seven instruments contribute items to this factor, with most coming from the PDI-EI and IPI personality-based devices. Being a workaholic, being careful, cautious, serious, sensible, responsible, planning ahead, stay at home type of person, describes the positive pole of the factor. The negative end has items about parents' dislike of friends, acting on the spur of the moment, and feeling that strangers are better than

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you from the PRB. Taking a sick day when not ill, and whether this job is considered permanent or not are negative end items from the IPI and PSI, respectively. Although the standardized coefficient alpha of .781 is the third lowest in the model, it is still an acceptable level of internal consistency.

Factor 15 would best be described as a PSI General Theft factor. Taking money by force, thinking about taking money and/or merchandise from work, actually taking money and/or merchandise from work, and reporting the dollar value of money and/merchandise taken from work are representative of the majority of questions in this factor. However, there is a sub-group of low loading (.30's) items which deal with an individual's effort to get along in school, with others and with their supervisor. The negative pole items are the dollar value reports of money or merchandise taken. There is high internal consistency in this factor, with a standardized coefficient alpha of .919.

Factor 16 consists of items from five of the seven integrity instruments describing the quality of the respondents' home life and upbringing. The items at the positive end state that a person's home life was usually happy and pleasant, family members got along well together, and they seldom thought they'd want to run away. Conversely, the negative pole is marked by items stating that a person's home life was less peaceful than others', they had frequent disagreements with their parents, their parents didn't understand them, and they often thought about running away from home. Internal consistency reliability of the factor as measured by standardized coefficient alpha is .829.

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Emotional Stability, Factor 17, consistently formed as a large factor in all of the factor solutions. It is strongly defined by items from the IPI, skewed toward the positive pole of the factor. The heaviest loading items include true/false statements such as: I have a feeling someone is out to get me; Life is unfair; Sometimes I tingle all over and want to jump out of my skin; I have received at least 6 weeks disability; I feel low half the time; and I have considered suicide. On the negative end, a Reid Report item asks for the number of times a person has been in a fist fight or shoving match recently. Less clear are a Stanton item which asks whether a person would go back to the store to return extra change, and an ERI item stating that hard work is good for you. Overall, the factor high internal consistency with a standardized coefficient alpha of. 90.

Factor 18 is the third overt test General Theft factor, this time defined mostly by Stanton Survey items. The highest loading items on the positive end are three questions asking for respondents to indicate the dollar value of money and merchandise most people have taken from work, and the dollar value of money most people have taken in their lives. Unlike the other tests which ask for self reports of how much <u>you</u> have taken, the Stanton questions seem aimed at a person's perception of the prevalence of theft with the phrase "most people", perhaps under the assumption that you are like "most people". Also aimed at a person's view of the norm on the negative end, are questions about the percent of young people who steal in their first few jobs, and whether most workers would steal if they could get away

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with it, and reasons why some employees might steal. The standardized coefficient alpha for Factor 18 is .805.

Finally, Factor 19 appears to be a combination of Affectivity and Locus of Control measured by about the same number of items each from the PSI, IPI and PRB. Like Factor 4, it includes statements about success being due to luck or who you know instead of hard work, however, there appears to be more of a slant toward a doomsday, fate perspective. For example, agreement with statements that there is little a person can do to avoid falls or accidents, or that they have little chance for advancement. Along with these items are depression/negative affectivity statements that life always hands them a raw deal, there is much in their life they regret, they are a burden to others, and it is hard to keep up hope given their life. At the negative end of the factor are items expressive of strength and self confidence such as I have never been involved in serious crime, I tend to feel good about myself, and I seldom catch a bad cold. The fifty-one items with loadings above .30 have a standardized coefficient alpha of .915.

The summary findings of the 19-factor solution from the merged integrity data set are in one sense, more than just a restatement of the individual overt and personality-based data set solutions, and yet, less than envisioned. Less than envisioned because only one factor, Social Drug Use, had loadings from items across all instruments. Just over half of the factors exhibit a dominance by one test, a situation familiar from the test-type analyses. Still, even though many factors showed dominance by one or another test, minor loadings with items from both overt and

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personality-based tests nearly always helped define a factor. More often than not, these minor loadings help to define the factor, rather than merely representing statistical noise. For instance, Factor 1 is heavily defined by IPI Social Conformity / Deviance items, but the few items from other tests also deal with deviance behaviors. Also noteworthy, this conformity/deviance factor with 41 IPI items, is much cleaner and interpretable than personality-based Factor 2 Deviance/Dependability/Sociability, with 80 IPI items.

In fact, although the link is not as dramatic or large as perhaps expected, the relatedness between overt and personality-based integrity tests does seem clearer from this factor solution. Factor 4 - External Locus of Control, Factor 6 - Trust/Low Self-Control, Factor 7 - Extroversion, Factor 12 - Punitiveness/Autocracy, Factor 14 - Diligence/Planning, Factor 18 - Stanton Theft, and Factor 19 - Affectivity/Locus of Control all include items with substantive representation from both overt and personality-based tests.

Table 15 shows the inter-factor correlations of the 19 factor solution, with correlations above an absolute value of .25 in bold. Medium-sized correlations above .30 are reported here. While the oblique, correlated factors solution produced more identifiable factors, visual inspection of the inter-factor correlations alone, doesn't add much to the picture of factor relationships formed from the factor solution. What can be seen is that the three Theft factors correlate with each other, and in varying degrees with Low Self-Control, Emotional Stability, Drinking/Fast Crowd, and with External Locus of Control.

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Medium size correlations are evident among the following factors: Factor 1,

Social Conformity with Factor 17, Emotional Stability; Factor 2, Honesty Image with

Factor 5, Theft Thoughts and Admissions (based on Reid Report items), and with

Factor 6, Low Self-Control. Factor 4, External Locus of Control, correlated .44 with

Factor 17, Emotional Stability, and -.31 with Factor 18, Theft Thoughts and

Admissions, (based on Stanton Survey items). Factor 5, Theft Thoughts and

Admissions (Reid) correlated with the PSI and Stanton Theft factors, 15, and 18,

respectively, as well as with Factor 8, Social Drug Use, and Factor 13, Drinking and

Association with a "Fast Crowd". Factor 6, Low-Self Control correlated above .30

with Factor 13, Drinking and Association with a "Fast Crowd", and with the PSI

Theft Factor 15. Finally, Factor 17, Emotional Stability, correlated -.39 with Factor

18, Theft Thoughts and Admissions (based on Stanton Survey items).

While both the factor solution and inter-factor correlations tell us something

about the relationships between tests and factors, the answers are somewhat weak and

fuzzy. It is hoped that more useful information can be garnered from correlations

between test honesty scale scores, and composites created from the items loading on

the individual factors. The following section discusses the mechanics and findings of

that line of investigation.

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Table 15 -19 Factor Solution - Inter-factor Correlations (Harris-Kaiser Oblique Rotation)

	F 1	F 2	F 3	F 4	F 5	F 6	F 7	F 8	F 9	F 10	F 11	F 12	F 13	F 14	F 15	F 16	F 17	F 18	F 19
Factor 1 Social Conformity	1 0																		
Factor 2 Honesty Image	- 01	1 0																	
Factor 3 Random Answer Items /No Theme	16	- 20	1 0																
Factor 4 External Locus of Control / Lie Scale	- 22	- 12	- 01	1 0															
Factor 5 Theft (Reid)	- 20	-.37	08	19	1 0														
Factor 6 Trust/ Low Self-Control	- 07	-.30	12	.27	.26	1 0													
Factor 7 Extroversion	- 02	0 0	01	04	08	03	1 0												
Factor 8 Social Drug Use	- 13	- 18	02	04	.32	06	11	1 0											
Factor 9 Deviance / Drug Assn	-.25	- 13	- 03	19	23	15	11	17	1.0										
Factor 10 PRB Blue Collar Jobs	0 0	08	0 0	- 06	- 02	- 08	03	- 04	- 05	1 0									
Factor 11 Hard Drug Use	-.12	01	- 07	08	19	03	08	23	13	- 02	1 0								
Factor 12 Punitiveness	05	- 21	08	05	12	12	- 07	- 03	01	- 03	- 07	1 0							
Factor 13 Drinking/Fast Crowd	-.06	- 24	07	17	.30	.30	14	.25	13	- 02	14	03	1 0						
Factor 14 Diligence/Planning	11	13	- 03	0 0	- 16	0 0	02	- 19	-.11	- 01	- 07	01	- 12	1 0					
Factor 15 Theft (PSI)	14	.25	- 03	-.11	-.31	-.34	- 06	- 20	- 17	07	- 13	- 12	-.27	14	1 0				
Factor 16 Home Life	08	10	- 03	- 16	- 02	- 15	17	03	-.03	0 0	02	- 05	- 04	01	02	1 0			
Factor 17 Emotional Stability	-.34	- 17	- 05	.44	.25	.27	04	05	.28	- 07	10	05	18	- 06	-.15	- 21	1 0		
Factor 18 Theft (Stanton)	23	18	03	-.31	-.31	- 23	- 07	- 10	-.24	04	-.13	- 08	- 18	05	18	05	-.39	1 0	
Factor 19 Affectivity / Locus of Control	- 16	- 15	- 01	21	08	24	- 12	- 01	13	- 10	02	13	09	- 05	-.25	- 21	.28	- 19	1 0

3. Correlations between Factor Composites and Integrity Test Scores

The primary goal of this study is to estimate the degree of association between a test's honesty scale score (if one is computed), or total score, and the factor of interest. This calculation is made possible by using a constructed composite of the factor. Estimation of the degree of association between the factors and the various test scale scores was accomplished by using the formula for correlations between composites and outside variables (see Ghiselli, Campbell and Zedeck, 1981; Nunnally, 1978). The equation is as follows:

$$r_{oc} = \frac{\bar{r}_{oi}}{\sqrt{1/k + (\frac{k-1}{k}) \bar{r}_{ii}}}$$

Correlation between a composite score and an outside variable (Ghiselli, Campbell & Zedeck, 1981, p. 164)

where: r_{oc} = correlation between an outside variable and a composite

$\bar{r}_{oi}$ = mean correlation of the outside variable and the items of the composite

k = number of items in the composite

$\bar{r}_{ii}$ = mean of the composite item intercorrelations

The equation looks rather straightforward and simple to compute, but then, looks can be deceiving. It took just over a week of intense computing to assemble all of the pieces and obtain the final correlations. Each r_{oc} (correlation between a factor composite and test score) required computing $\bar{r}_{ii}$, and $\bar{r}_{oi}$. Then each of the nineteen observed correlations, r_{oc}, had to be corrected for unreliability. Since the associations

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of interest in this research are at the construct level, it was appropriate to correct the observed correlations for unreliability of the composite scores and test scores, if estimates of both values were available, or at least corrections for the composite unreliability. (In a few noted cases, it was only possible to correct for the composite unreliability.) Coefficients alpha were calculated for each of the factor composites as part of this study, while estimates of internal consistency reliability for the test scores were obtained from test manuals or other published sources. One of the more difficult computing tasks was obtaining the estimate of $\bar{r}_{ii}$, the mean inter-item correlation for each composite. There is no option in SAS that provides this figure, and no easy, direct method to compute it when dealing with a large number of variables. The procedure required to get at such a figure is briefly outlined here as a guide for others who may find themselves faced with such a task in the future.

First, the items defining the factors (all 610 items with loadings greater than an absolute value of .30) were entered as variables for their respective factors, in separate correlation programs. The SAS procedure, PROC CORR, with the ALPHA option was then run. This produced a square item by item correlation matrix, and the coefficient alpha for each factor composite, which was needed later. Also part of the program were commands (thanks to assistance from campus computing consultants) which dropped the lower half of the square matrix, added up the items and divided them by "n" to provide the single, mean inter-item correlation for each of the nineteen factors.

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Second, $\bar{r}_{oi}$ was calculated by running PROC CORR on the test scale scores, WITH the composite items for each factor. The WITH statement created a column of correlations with items for each of the test scale scores, and then another line of command calculated the mean correlation between the test score and composite items.

Finally, the data from the above two procedures were entered into an Excel spreadsheet where r_{oc}, the observed correlation between the test scores and factors were computed, and corrected for unreliability. (These observed and corrected correlations are shown in Table 17, and discussed shortly.)

Table 16 shows the internal consistency reliability estimates used in calculating the corrections. It also lists the method employed to derive them, if not standardized alpha coefficients. With the exception of Factor 3, all of the factors showed acceptable levels of internal consistency above .75. The test scores were mostly in the .90's, with the exception of the three personality-based tests which had reliability estimates in the low .70's.

Insert Table 16 about here

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a. Associations Within Factors Across Tests

Table 17 shows the observed and corrected correlations between the nineteen factors and the PSI-7ST Honesty Scale, Reid Report Raw Score, Stanton Survey Numeric Base Score, HPI Reliability Score, IPI Critical Score, PDI-EI Performance Score, PRB Score, and the Big-5 dimensions of Goldberg's Adjective Checklist.

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Table 16

INTERNAL CONSISTENCY RELIABILITY FOR FACTOR COMPOSITES AND TEST SCALE SCORES- STANDARDIZED COEFFICIENT ALPHA (unless otherwise indicated)

Factor 1 Social Conformity	.91		**PSI - Honesty Scale**	.95[a]
Factor 2 Honesty Image	.863		**Reid Report** Raw Score	.90
Factor 3 No Theme/ Random Answer Items	.485		**Stanton Survey** Numeric Base	.91
Factor 4 External Locus of Control / LieScale	.847		**IPI** - Critical Score	na[b]
Factor 5 General Theft (Reid)	.933		**HPI** - Reliability Scale	.75
Factor 6 Trust/ Low-Self Control	.90		**PDI-EI** Performance Scal	.74
Factor 7 Extroversion	.815		**PRB** Score	.73[c]
Factor 8 Social Drug Use	.903		**ERI** (no scores available)	---
Factor 9 Deviance/ Drug Association	.75		**Goldberg** Surgency (Extroversion)	.91
Factor 10 PRB Blue Collar Jobs	.787		**Goldberg** Agreeableness	.96
Factor 11 Hard Drug Use	.93		**Goldberg** Conscientiousness	.94
Factor 12 Punitiveness	.814		**Goldberg** Emotional Stability	.87
Factor 13 Drinking/Fast Crowd	.863		**Goldberg** Intellect	.93
Factor 14 Diligence / Planning	.781			
Factor 15 General Theft (PSI)	.919			
Factor 16 Home Life	.829			
Factor 17 Emotional Stability	.90			
Factor 18 General Theft (Stanton)	.805			
Factor 19 Affectivity / Locus of Control	.915			

[a] Spearman-Brown Split-Halves estimate

[b] No estimate of internal consistency has been made on the Critical Score.
Personal communication with Hilson Research, March 11, 1995.

[c] median split-half estimate, corrected for length.

Although the ERI was included in the factor analysis to define the integrity test domain, numerical scores were unavailable so correlations with the composites could not be computed. As noted earlier in the test-type analyses, the three Big-5 instruments did not converge into five representative factors. Given this result, the decision was made to correlate factor composites with just one of the Big-5 instruments. The instrument selected was Goldberg's Adjective Checklist because it had the most published research supporting the five dimensions it intends to measure, and is in the public domain.

Insert Table 17 about here

Descriptive comments in this section will be broken into two parts, and limited to the corrected correlations with magnitudes which Cohen (1988) qualitatively refers to as medium (around .30) to large (.50 and above) effect sizes. First, associations within Factors, across tests, as shown in Table 17, will be described. Then, the rank-order of Factors within tests, as shown in Table 18, will be described.

Looking at Table 17 within Factor 1 - Social Conformity, across tests, the highest correlations are with three of the four personality-based instruments, IPI-.58, PDI-EI-.52, and PRB-.39, and .33 with the Stanton Survey. Of the Big-5 dimension, Factor 1 correlates most with Agreeableness at .38.

Factor 2 - Honesty Image is major component of the three overt tests, with medium-large correlations with the PRB and HPI-Reliability personality-based

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Table 17
Correlations Between Factor Composites and Test Scale Scores
(corrected for composite and scale score unreliability unless otherwise indicated)

	PSI-7ST Honesty Scale		Reid Report Raw Score		Stanton Survey Numerical Base	
	corrected	observed	corrected	observed	corrected	observed
Factor 1 Social Conformity	.25	.24	.28	.25	.33	.30
Factor 2 Honesty Image	.87	.79	.62	.54	.79	.70
Factor 3 Random Answer Items/No Theme	.52	.35	.63	.42	.59	.39
Factor 4 External Locus of Control/ LieScale	.50	.45	.43	.37	.49	.43
Factor 5 Theft (Reid)	.65	.61	.90	.83	.71	.65
Factor 6 Trust/ Low Self-Control	.61	.56	.41	.37	.56	.51
Factor 7 Extroversion	.25	.22	.26	.22	.28	.24
Factor 8 Social Drug Use	.40	.37	.36	.32	.44	.40
Factor 9 Deviance /Drug Association	.25	.21	.24	.20	.31	.25
Factor 10 PRB Blue Collar Jobs	.22	.19	.40	.33	.29	.24
Factor 11 Hard Drug Use	.28	.26	.21	.19	.18	.16
Factor 12 Punitiveness	.43	.37	.68	.58	.47	.41
Factor 13 Drinking/Fast Crowd	.43	.39	.44	.39	.42	.37
Factor 14 Diligence/Planning	.36	.31	.38	.32	.31	.26
Factor 15 Theft (PSI)	.78	.73	.56	.51	.57	.52
Factor 16 Home Life	.41	.36	.23	.20	.34	.29
Factor 17 Emotional Stability	.33	.31	.28	.25	.50	.45
Factor 18 Theft (Stanton)	.66	.58	.47	.40	.74	.63
Factor 19 Affectivity/Locus of Control	.46	.43	.25	.23	.45	.41

Table 17 (cont.)
Correlations Between Factor Composites and Test Scale Scores
(corrected for composite and scale score unreliability unless otherwise indicated)

	HPI Reliability Score		IPI[a] Critical Score		PDI-EI Performance		PRB Prb Score	
	corrected	observed	corrected	observed	corrected	observed	corrected	observed
Factor 1 Social Conformity	.30	.25	.58	.55	.52	.42	.39	.32
Factor 2 Honesty Image	.46	.37	.37	.34	.35	.28	.52	.42
Factor 3 Random Answer Items/No Theme	.47	.28	.58	.40	.49	.29	.55	.33
Factor 4 External Locus of Control / LieScale	.49	.39	.66	.61	.56	.44	.50	.40
Factor 5 Theft (Reid)	.44	.37	.52	.50	.55	.46	.39	.32
Factor 6 Trust/ Low Self-Control	.53	.43	.49	.46	.53	.43	.81	.65
Factor 7 Extroversion	.44	.35	.36	.33	.33	.26	.56	.44
Factor 8 Social Drug Use	.35	.29	.42	.40	.52	.43	.46	.38
Factor 9 Deviance /Drug Association	.16	.12	.57	.49	.40	.30	.21	.16
Factor 10 PRB Blue Collar Jobs	.27	.21	.28	.25	.36	.28	.50	.38
Factor 11 Hard Drug Use	.23	.19	.41	.40	.38	.32	.25	.21
Factor 12 Punitiveness	.25	.19	.30	.27	.35	.27	.26	.20
Factor 13 Drinking/Fast Crowd	.38	.30	.42	.39	.51	.41	.50	.40
Factor 14 Diligence/Planning	.38	.29	.31	.27	.36	.27	.60	.45
Factor 15 Theft (PSI)	.42	.35	.44	.43	.71	.58	.79	.64
Factor 16 Home Life	.65	.51	.38	.35	.41	.32	.72	.56
Factor 17 Emotional Stability	.47	.39	.83	.79	.43	.35	.59	.48
Factor 18 Theft (Stanton)	.47	.37	.67	.60	.60	.47	.30	.23
Factor 19 Affectivity/Locus of Control	.53	.44	.53	.51	.31	.25	.73	.60

[a] Factor correlations with IPI corrected for composite unreliability only.

Table 17 (cont.)
Correlations Between Factor Composites and Test Scale Scores
(corrected for composite and scale score unreliability unless otherwise indicated)

Goldberg's Adjective Checklist	Conscientious- ness		Agreeableness		Emotional Stability		Intellect		Surgency (extroversion)	
	corrected	observed	corrected	observed	corrected	observed	corrected	observed	corrected	observed
Factor 1 Social Conformity	.28	.26	.38	.35	.20	.18	.26	.24	.17	.15
Factor 2 Honesty Image	.38	.34	.31	.28	.24	.21	.27	.24	.26	.23
Factor 3 Random Answer Items/No Theme	.32	.22	.38	.26	.27	.17	.22	.15	.25	.17
Factor 4 External Locus of Control / Lie Scale	.38	.34	.35	.31	.22	.19	.33	.29	.29	.25
Factor 5 Theft (Reid)	.36	.34	.30	.28	.20	.18	.19	.18	.24	.22
Factor 6 Trust /Low Self-Control	.32	.29	.33	.30	.36	.34	.17	.16	.21	.19
Factor 7 Extroversion	.37	.32	.34	.30	.47	.40	.21	.18	.52	.45
Factor 8 Social Drug Use	.20	.19	.14	.13	.15	.14	.15	.14	.20	.18
Factor 9 Deviance /Drug Assoc.	.33	.28	.34	.29	.19	.15	.26	.22	.20	.16
Factor 10 PRB Blue Collar Jobs	.23	.20	.16	.14	.23	.19	.20	.17	.21	.18
Factor 11 Hard Drug Use	.24	.22	.23	.22	.16	.15	.22	.21	.09	.09
Factor 12 Punitiveness	.30	.27	.20	.18	.23	.19	.24	.21	.20	.18
Factor 13 Drinking/Fast Crowd	.23	.21	.22	.20	.22	.19	.27	.24	.37	.32
Factor 14 Diligence/ Planning	.50	.43	.30	.26	.35	.29	.32	.27	.36	.30
Factor 15 Theft (PSI)	.31	.29	.44	.42	.16	.14	.16	.15	.18	.17
Factor 16 Home Life	.22	.19	.23	.21	.34	.29	.19	.17	.22	.19
Factor 17 Emotional Stabilit	.39	.36	.32	.29	.56	.49	.30	.27	.35	.31
Factor 18 Theft (Stanton)	.42	.37	.32	.28	.21	.17	.33	.29	.31	.27
Factor 19 Affectivity/ Locus of Control	.29	.27	.23	.21	.36	.32	.17	.15	.28	.26

integrity tests. Corrected correlations with Factor 2 are .87, .79, .62 for the PSI-7ST, Stanton Survey and Reid Report, respectively, and .52, .46 for the PRB and HPI-Reliability, respectively. The largest Big-5 correlation is .38 with Conscientiousness, followed by .31 with Agreeableness.

Though lacking interpretive clarity, Factor 3 shows strong empirical relationships across all seven tests when corrected for unreliability, the highest correlations with the overt tests. With only 8 items in the factor, and low internal consistency, it is difficult to know what to make of these results. The Factor also correlates .38 with Agreeableness, and .32 with Conscientiousness of the Big-5.

At .66, the IPI exhibits the largest correlation with Factor 4 - External Locus of Control / Lie Scale, followed by .56 with the PDI-EI, .50 with both the PRB and PSI-7ST, .49 with both the HPI-Reliability score and Stanton Survey, and finally, .43 with the Reid Report. This factor appears rather complex in terms of the Big-5, with correlations of .38 with Conscientiousness, .35 with Agreeableness, .33 with Intellect, and .29 with Surgency (extroversion).

Factor 5 - General Theft is composed primarily of Reid Report items, so it is not surprising to observe a correlation of .90 between the two. Other high correlations are obtained with the overt tests include .71 with the Stanton Survey, and .65 with the PSI-7ST. High correlations of .55 and .52 were also seen with the PDI-EI and IPI, respectively. Conscientiousness correlated .36 and Agreeableness .30, of the Big-5 dimensions.

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The PRB appears to be the strongest measure of Factor 6 - Trust/ Low-Self Control, correlating .81. The PSI and Stanton Survey correlated .61 and .56, respectively, followed by .53 with both the HPI-Reliability score, and PDI-EI Performance score. The IPI and Reid Report correlated with Factor 6 .49, and .41 respectively. Three Big-5 dimensions showed medium-sized correlations with this factor: Emotional Stability - .36, Agreeableness - .33, and Conscientiousness - .32.

Extroversion, Factor 7 had only small correlations in the .20's with the overt integrity tests. Of the four personality-based tests, the highest correlation was .56 with the PRB, followed by .44 with HPI-Reliability. Although the factor contains eleven IPI items, it only correlates .36 with that instrument. This factor apparently defines something very central to Goldberg's Adjective Checklist, with some of the highest obtained factor correlations with the Big-5. Not surprisingly, Surgency (extroversion) correlated .52, followed by Emotional Stability, .47, Conscientiousness, .37, and Agreeableness, .34.

Factor 8 - Socially Acceptable Drug Use, is only a medium size correlate with most of the integrity instruments, and only small correlations with Big-5 dimensions. It correlates highest at .52 with the Performance score of the PDI-EI, and .46 with the PRB, followed by .44, .42, and .40 with the Stanton Survey, IPI, and PSI, respectively. Correlations of .36 with the Reid Report, and .35 with HPI-Reliability round out the associations with integrity tests and this factor.

Only two of the integrity tests show strong associations with Factor 9, Deviance/Drug Association. Although the factor is defined by Reid and IPI items, it

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is the IPI and PDI-EI which correlate strongly, at .57 and .40, respectively. This is

at best an "odd" factor, with the poles defining, at least superficially, very different

things. Among the Big-5 dimensions, correlations of .34 with Agreeableness, and .33

with Conscientiousness are obtained.

Dislike of Blue Collar Jobs, Factor 10 shows a strong correlation with the

PRB of .50, and moderate correlations of .40 and .36 with the Reid Report and PDI-

EI Performance score, respectively. There are only small associations with the Big-5

dimensions.

Hard Drug Use, Factor 11, shows only minimal correlations with Honesty

scores of the overt tests, which typically provide separate drug scale scores. Of the

personality-based tests, the IPI and PDI-EI Performance score, correlate .41 and .38,

respectively. This factor only exhibits small to negligible correlations with the five

personality dimensions.

Factor 12, Punitiveness correlates the most with overt tests as a group. The

corrected correlation with the Reid Report is .68, .47 with the Stanton Survey, and

.43 with the PSI. Medium size correlations of .35 with the PDI-EI, and .30 with

both the IPI and Conscientiousness were also found.

Factor 13, Drinking and like of a "Fast Crowd" appears to underlie all seven

integrity tests, perhaps due to its "thrill-seeking" element. Correlations of .51 with

the PDI-EI, and .50 with the PRB, top the list. Following down the line are the Reid

Report with .44, the PSI with .43, and both the IPI and Stanton Survey with

correlations of .42. The HPI-Reliability score correlated .38, and the Surgency dimension from the Big-5 correlated .37.

The Diligence /Planning Factor 14, shows association with all seven integrity tests, and all five personality dimensions. By far the strongest associations are .60 with the PRB, and .50 with the Conscientiousness dimension of personality. The remaining correlations with tests and dimensions are all of medium size in the .30's.

Surprisingly, the highest corrected correlation with Factor 15, the PSI influenced General Theft factor, is .79 with the PRB! The PSI does correlate highly at .78, and indeed shows the highest observed correlation of .73. Another surprising twist is that the PDI-EI with .71 correlated more strongly with this factor than did the other two overt integrity instruments. Correlations of .57 and .56 were obtained with the Reid Report and Stanton Survey, respectively. The IPI and HPI-Reliability correlated .44 and .42, respectively. As with the Reid Report-based theft factor, Factor 5, this factor correlates the most with the Conscientiousness and Agreeableness personality dimensions, however, the order of association is reversed. Agreeableness correlated the highest, at .44, followed by .31 for Conscientiousness.

The Home Life history factor, Factor 16, had strong correlations with the PRB of .72, and .65 with the HPI-Reliability score. Correlations of .41 were obtained with both the PSI and PDI-EI, followed by the IPI with .38, and the Stanton Survey with .34. A correlation of .34 was also obtained between Factor 16 and the personality dimension of Emotional Stability.

Factor 17, Emotional Stability shows a strong association with the IPI of .83. The PRB and Stanton Survey come next with correlations of .59, and .50. Corrected correlations of .47 with the HPI-Reliability score, .43 with the PDI-EI Performance score, .33 with the PSI, and .28 with the Reid Report complete the associations with integrity tests. All five personality dimensions showed at least medium correlations with this factor, led by Emotional Stability with a corrected correlation of .56. Conscientiousness, Surgency, Agreeableness and Intellect followed in that order, with correlations in the .30's.

The Stanton-based General Theft Factor 18, showed an interesting pattern of associations across the seven integrity tests. In order, the factor correlated .74 with the Stanton Survey, .67 with the IPI, .66 with the PSI, .60 with the PDI-EI, and .47 with both the Reid Report and HPI-Reliability score. The PRB correlated .30. This overt test Theft factor correlates across more of the Big-5 dimensions than did the Reid- or Stanton-based factors. It correlated .42 with Conscientiousness, .33 with Intellect, .32 with Agreeableness, and .31 with Surgency.

Finally, Factor 19 - Affectivity / Locus of Control correlated highest with the PRB at .73. Both the IPI and HPI-Reliability correlated .53, followed by the PSI at .46 and the Stanton Survey at .45, and the PDI-EI at .31. Emotional Stability was the strongest personality dimension correlate at .36.

b. Associations Within Tests Across Factors

Before examining the test score relationships with individual factors, some general observations are in order. Going down the columns of correlations, the PSI-

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7ST and Stanton Survey exhibit a similar pattern of associations with the factors, suggesting that they are highly similar instruments. The pattern of relationships between the PSI or Stanton Survey and the Reid Report, or among the four personality-based integrity test do not show such similarities. There are, however, subtle differences between the PSI and Stanton Survey which show up in the rank-order of factors within tests.

Table 18 presents the rank ordering of factors by correlation magnitude within each test. Although the order of all nineteen factors are presented for each test or scale in the table, comments will be limited to the major correlates.

Insert Table 18 about here

It is no surprise that among the major correlates of the individual overt tests are the test-specific Theft factors from each instrument. Factor 5, Reid Theft correlated the highest (.90) with the Raw Score from the Reid Report. A stronger correlate with the PSI and Stanton Survey then the PSI and Stanton Theft Factors was Factor 2, Honesty Image, however the PSI and Stanton Theft Factors were the second highest correlates with their respective honesty scores. As suggested earlier, the PSI and Stanton are quite similar, though not identical instruments. Each correlates strongly with the three overt Theft Factors, Factor 2 Honesty Image and Factor 6 Low-Self Control. For what it is worth, they also correlate with Factor 3, the Random Answer/No Theme factor. After these factors they do show differences in

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Table 18
Within Test Rank-order of Factor Correlations
(Factor number, [corrected correlation], factor name)

PSI-7ST Honesty	Reid Report Raw Score	Stanton Survey - Numeric Base	HPI Reliability	IPI Critical Score	PDI-EI Performance	PRB Score
F2 [.87] Honesty Image	F5 [.90] Reid Theft	F2 [.79] Honesty Image	F16 [.65] Home Life	F17 [.83] Emotional Stability	F15 [.71] PSI Theft	F6 [.81] Trust/ Low Self-Control
F15 [.78] PSI Theft	F12 [.68] Punitiveness	F18 [.74] Stanton Theft	F6 [.53] Trust / Low Self-Control	F18 [.67] Stanton Theft	F18 [.60] Stanton Theft	F15 [.79] PSI Theft
F18 [.66] StantonTheft	F3 [.63] No Theme	F5 [.71] Reid Theft	F19 [.53] Affectivity /Locus of Control	F4 [.66] External Locus of Control	F4 [.56] External Locus of Control	F19 [.73] Affectivity /Locus of Control
F5 [.65] Reid Theft	F2 [.62] Honesty Image	F3 [.59] No Theme	F4 [.49] External Locus of Control	F1 [.58] Social Conformity	F5 [.55] Reid Theft	F16 [.72] Home Life
F6 [61] Trust / Low Self-Control	F15 [.57] PSI Theft	F15 [.57] PSI Theft	F17 [.47] Emotional Stability	F3 [.58] No Theme	F6 [.53] Trust / Low Self-Control	F14 [.60] Diligence/Planning
F3 [.52] No Theme	F18 [.47] Stanton Theft	F6 [.56] Trust/ Low Self-Control	F18 [.47] Stanton Theft	F9 [.57] Deviance / Drug Association	F8 [.52] Social Drug Use	F17 [.59] Emotional Stability
F4 [.50] External Locus of Control	F13 [.44] Drinking / Fast Crowd	F17 [.50] Emotional Stability	F3 [.47] No Theme	F19 [.53] Affectivity /Locus of Control	F1 [.52] Social Conformity	F7 [.56] Extroversion
F19 [.46] Affectivity /Locus of Control	F4 [.43] External Locus of Control	F4 [.49] External Locus of Control	F2 [.46] Honesty Image	F5 [.52] Reid Theft	F13 [.51] Drinking / Fast Crowd	F3 [.55] No Theme
F12 [.43] Punitiveness	F6 [.41] Trust / Low Self-Control	F12 [.47] Punitiveness	F7 [.44] Extroversion	F6 [.49] Trust / Low Self-Control	F3 [.49] No Theme	F2 [.52] Honesty Image
F13 [.43] Drinking / Fast Crowd	F10 [.40] PRB Blue Collar Jobs	F19 [.45] Affectivity /Locus of Control	F5 [.44] Reid Theft	F15 [.44] PSI Theft	F17 [.43] Emotional Stability	F10 [.50] PRB Blue Collar Jobs
F16 [.41] Home Life	F14 [.38] Diligence/Planning	F8 [.44] Social Drug Use	F15 [.42] PSI Theft	F13 [.42] Drinking / Fast Crowd	F16 [.41] Home Life	F13 [.50] Drinking / Fast Crowd
F8 [.40] Social Drug Use	F8 [.36] Social Drug Use	F13 [.42] Drinking / Fast Crowd	F14 [.38] Diligence/Planning	F8 [.42] Social Drug Use	F9 [.40] Deviance/ Drug Association	F4 [.50] External Locus of Control

(cont.)

Table 18 (cont.)
Within Test Rank-order of Factor Correlations
(Factor number, [corrected correlation], factor name)

PSI-7ST Honesty	Reid Report Raw Score	Stanton Survey - Numeric Base	HPI Reliability	IPI Critical Score	PDI-EI Performance	PRB Score
F14 [.40] Diligence / Planning	F1 [.28] Social Conformity	F16 [.34] Home Life	F13 [.38] Drinking/ Fast Crowd	F11 [.41] Hard Drug Use	F11 [.38] Hard Drug Use	F8 [.46] Social Drug Use
F17 [.33] Emotional Stability	F17 [.28] Emotional Stability	F1 [.33] Social Conformity	F8 [.35] Social Drug Use	F16 [.38] Home Life	F10 [.36] PRB Blue Collar Jobs	F5 [.39] Reid Theft
F11 [.28] Hard Drug Use	F7 [.26] Extroversion	F9 [.31] Deviance/ Drug Association	F1 [.30] Social Conformity	F2 [.37] Honesty Image	F14 [.36] Diligence/Planning	F1 [.39] Social Conformity
F9 [.25] Deviance /Drug Association	F19 [.25] Affectivity /Locus of Control	F14 [.31] Diligence /Planning	F10 [.27] PRB Blue Collar Jobs	F7 [.36] Extroversion	F12 [.35] Punitiveness	F18 [.30] Stanton Theft
F7 [.25] Extroversion	F9 [.24] Deviance/ Drug Association	F10 [.29] PRB Blue Collar Jobs	F12 [.25] Punitiveness	F14 [.31] Diligence/Planning	F2 [.35] Honesty Image	F12 [.26] Punitiveness
F1 [.25] Social Conformity	F16 [.23] Home Life	F7 [.28] Extroversion	F11 [.23] Hard Drug Use	F12 [.30] Punitiveness	F7 [.33] Extroversion	F11 [.25] Hard Drug Use
F10 [.22] PRB Blue Collar Jobs	F11 [.21] Hard Drug Use	F11 [.18] Hard Drug Use	F9 [.16] Deviance/ Drug Association	F10 [.28] PRB Blue Collar Jobs	F19 [.31] Affectivity /Locus of Control	F9 [.21] Deviance / Drug Association

(cont.)

Table 18 (cont.)
Within Test Rank-order of Factor Correlations
(Factor number, [corrected correlation], factor name)

Goldberg Conscientious.	Goldberg Agreeableness	Goldberg Emotional Stabil.	Goldberg Intellect	Goldberg Surgency
F14 [.50] Diligence/Planning	F15 [.44] PSI Theft	F17 [.56] Emotional Stability	F18 [.33] Stanton Theft	F7 [.52] Extroversion
F18 [.42] Stanton Theft	F3 [.38] No Theme	F7 [.47] Extroversion	F4 [.33] External Locus of Control	F13 [.37] Drinking /Fast Crowd
F17 [.39] Emotional Stability	F1 [.38] Social Conformity	F19 [.36] Affectivity /Locus of Control	F14 [.32] Diligence/Planning	F14 [.36] Diligence/Planning
F4 [.38] External Locus of Control	F4 [.35] External Locus of Control	F6 [.36] Trust /Low Self-Control	F17 [.30] Emotional Stability	F17 [.35] Emotional Stability
F2 [.38] Honesty Image	F7 [.34] Extroversion	F14 [.35] Diligence/Planning	F13 [.27] Drinking /Fast Crowd	F18 [.31] Stanton Theft
F7 [.37] Extroversion	F9 [.34] Deviance /Drug Association	F16 [.34] Home Life	F2 [.27] Honesty Image	F4 [.29] External Locus of Control
F5 [.36] Reid Theft	F6 [.33] Trust /Low Self-Control	F3 [.27] No Theme	F1 [.26] Social Conformity	F19 [.28] Affectivity / Locus of Control
F9 [.33] Deviance /Drug Association	F18 [.32] Stanton Theft	F2 [.24] Honesty Image	F9 [.26] Deviance /Drug Association	F2 [.26] Honesty Image
F3 [.32] No Theme	F17 [.32] Emotional Stability	F10 [.23] PRB Blue Collar Jobs	F12 [.24] Punitiveness	F3 [.25] No Theme
F6 [.32] Trust /Low Self-Control	F2 [.31] Honesty Image	F12 [.23] Punitiveness	F11 [.22] Hard Drug Use	F5 [.24] Reid Theft
F15 [.31] PSI Theft	F5 [.30] Reid Theft	F13 [.22] Drinking /Fast Crowd	F3 [.22] No Theme	F16 [.22] Home Life
F12 [.30] Punitiveness	F14 [.30] Diligence/Planning	F4 [.22] External Locus of Control	F7 [.21] Extroversion	F10 [.21] PRB Blue Collar Jobs
F19 [.29] Affectivity /Locus of Control	F19 [.23] Affectivity /Locus of Control	F18 [.21] Stanton Theft	F10 [.20] PRB Blue Collar Jobs	F6 [.21] Trust/Low Self-Control
F1 [.28] Social Conformity	F11 [.23] Hard Drug Use	F5 [.20] Reid Theft	F16 [.19] Home Life	F8 [.20] Social Drug Use
F11 [.24] Hard Drug Use	F16 [.23] Home Life	F1 [.20] Social Conformity	F5 [.19] Reid Theft	F9 [.20] Deviance /Drug Association
F10 [.23] PRB Blue Collar Jobs	F13 [.22] Drinking /Fast Crowd	F9 [.19] Deviance /Drug Association	F6 [.17] Trust/Low Self-Control	F12 [.20] Punitiveness
F13 [.23] Drinking/ Fast Crowd	F12 [.20] Punitiveness	F15 [.16] PSI Theft	F19 [.17] Affectivity /Locus of Control	F15 [.18] PSI Theft
F16 [.22] Home Life	F10 [.16] PRB Blue Collar Jobs	F11 [.16] Hard Drug Use	F15 [.16] PSI Theft	F1 [.17] Social Conformity
F8 [.20] Social Drug Use	F8 [.14] Social Drug Use	F8 [.15] Social Drug Use	F8 [.15] Social Drug Use	F11 [.09] Hard Drug Use

associations, however, it is not clear if those differences are substantive or not.

The Reid Report is clearly different from the PSI and Stanton Survey with its heavier emphasis on Punitiveness. After the Reid Theft factor, ranks Punitiveness Factor 12, followed by Factor 3 with No Theme, Honesty Image Factor 2, and then the PSI and Stanton Theft factors. This pattern is consistent with the intent of the raw score to reflect punitiveness and general theft.

The PDI-EI Performance score seems to span the transition between the overt integrity tests, and the personality-based tests. Like the overt tests Performance shows high correlations with the PSI, Stanton and Reid Theft factors, and with Low-Self Control. It differs from the overt tests in that Honesty Image and Punitiveness correlations drop considerably in weight, while sociability or association factors like Social Drug Use, Social Conformity and Drinking/Fast Crowd increase.

Of the personality-based tests, the HPI Reliability score shows the lowest correlation with a theft factor, of .47 with Stanton Theft. A broader concept of deviance than that expressed by the overt tests is apparent in the higher correlations with Factor 16 Home Life, Factor 6 Low Self Control, Factor 19 Affectivity and Factor 4 External Locus of Control. Looking at relationships with the Big-5 type factors which formed, Reliability correlated .47 with Emotional Stability, .44 with Extroversion, and .38 with Diligence/Planning.

The strongest correlations with personality-type factors are with the IPI Critical Score. Emotional Stability correlated .83, followed by Stanton Theft at .67, External Locus of Control at .66 and Social Conformity at .56.

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The breadth of the "social waywardness" construct of the PRB is apparent from 12 factors it correlates above .50 with. First on the list is Low Self-Control Factor 6, followed by PSI Theft, Affectivity, Home Life, Diligence/Planning, Emotional Stability, Extroversion, Factor 3 with No Theme, Honesty Image, Factor 10 the PRB Blue Collar Jobs, Factor 13 Drinking/Fast Crowd, and Factor 4 External Locus of Control. Factor 14 Diligence/Planning is the factor closest to the construct of "conscientiousness". The correlation of .60 is by far stronger than that obtained with any of the other instruments, most of which correlated in the .30's.

Previous research by Ones (1993) indicated that integrity tests correlated strongly with three of the Big-5 dimensions, namely Conscientiousness, Agreeableness and Emotional Stability. Three of the 19 factors in the solution from this study correspond to three of the Big-5 measured by Goldberg's Adjective Checklist. Conscientiousness correlates .50 with Factor 14 Diligence/Planning, Emotional Stability correlates .56 with Factor 17 Emotional Stability, and Surgency correlates .52 with Factor 7 Extroversion. The other two dimensions, Agreeableness and Intellect did not define specific factors. In fact, they had only relatively small correlations with any of the factors. Agreeableness correlated .44 with Factor 15 PSI Theft, but Intellect had a high correlation of .33 with Factor 18 Stanton Theft.

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V. DISCUSSION

A. Hypotheses

There were five primary research questions stated as the agenda for this investigation. Those questions will be reviewed before proceeding with the remainder of the discussion.

(1) How many factors are needed to define the domain covered by overt integrity test items? The initial principal components solution extracted 127 factors meeting the eigenvalue greater than one criterion, from the 403 variables. Closer inspection revealed that the factors were test specific clusters of items, and that multiple clusters shared common themes. This overly broad solution offered little insight into the domain of integrity tests, so smaller models were run based on breaks in the curve of the scree plot, and relatively large differences between adjacent eigenvalues. Following this method, a 10 factor model was eventually adopted to explain the underlying dimensions of the overt integrity tests.

A number of factors were predominantly defined by items from one test. Items belonging to the Reid Report contributed the majority of loadings to the following four factors: (Reid) Theft Thoughts and Temptations; Drug Use Attitudes; Admissions of Specific Crimes; Punitiveness. PSI items contributed the majority of loadings to two factors: (PSI) Theft Thoughts and Temptations; and External Locus of Control/Low Self-Control. The Stanton Survey only dominated Perception of Workplace Theft Pervasiveness. The remaining three factors had more even item

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contributions from various pairings of the tests: Self Projection of Honesty, Drug/Alcohol Attitudes, and Supervision Attitudes.

(2) How many factors are needed to define the domain covered by personality-based integrity tests? The initial principal components solution extracted 195 factors with eigenvalues greater than one, from the 575 variables in the data set. For the same reasons specified in the overt-tests analyses, smaller factor solutions were extracted using the method described above. The factors judged to be most identifiable came from an 11 factor solution.

Four factors in the 11 factor model contained mostly IPI items: Emotional Stability; Deviance/Dependability/Sociability; Drinking/Delinquency/Thrill-Seeking; and Sociability. PRB items contributed the majority of items to three factors: PRB Blue Collar Jobs; Disheartened; and Conforming to Authority. ERI items defined one factor, Reflection, while the remaining three factors: Success/Achievement, Home Life, and Extroversion, were jointly defined by several tests.

(3) How many factors do items from overt tests and personality-based tests jointly define, and what are they? 327 factors were identified by the eigenvalues greater than one criterion, out of 934 usable items in the data set. Consistent with previous decisions and methods, a 19 factor solution was extracted, and the Harris-Kaiser rotation of that solution used as the major focus in this study. Three of the factors had about half of their loadings on overt items, and half on personality-based items. Those factors were Trust/Low Self-Control, Affectivity/Locus of Control, and Deviance/Associations with Drugs. Of the remaining factors, roughly half loaded

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primarily on overt test items, and the other half on personality-based test items. The overt associated factors were: Reid Theft & Admissions, PSI Theft & Admissions, Stanton Theft & Admissions, Honesty Image, Social Drug Use, Hard Drug Use, and Punitiveness. Personality-based tests were associated with: Social Conformity, External Locus of Control, Extroversion, Emotional Stability, PRB Blue Collar Jobs, Drinking/Fast Crowd, Diligence/Planning, Home Life, and Factor 3 which exhibited no apparent theme.

(4) What are the dimensions defined by the broad domain covered by the item pool from all three types of instruments? Out of the 1442 variable item pool, 479 factor were initially extracted. Further inspection suggested somewhere between 11 and 60 factors, with 11, 22, and 25 factor models actually being extracted. This line of investigation was abandoned when it became apparent that empirical results from the complete data set could not advance understanding of the integrity domain, as envisioned for this study. Personality scales from the Big-5 instruments broke into separate factors, as did theft factors and drug factors from the various integrity instruments. What the solutions lacked was a sense of where and how the factors overlapped.

(5) How do the factors identified relate back to specific tests? This question was answered by creating composites from factor items, and correlating those composites with test honesty scale scores. In general, the overt test scores, as a group, show a narrower, more similar association with the various factors than do the personality-based test scores. All three of the overt tests correlate strongly with the

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three Theft factors. The Reid Report differs from the other two overt instruments, in that it correlates most strongly with the Reid Theft factor, and then with Punitiveness. Neither the PSI, nor the Stanton correlate very strongly with Punitiveness. Instead both scores correlate most highly with Honesty Image, followed by their respective Theft factor.

Of the personality-based instruments, the PDI-EI Performance score is perhaps the least like the others. Instead, it correlates most strongly with PSI Theft, Stanton Theft, External Locus of Control, and Reid Theft, suggesting that it measures items more like those on an overt test than a personality-based test. The IPI Critical Score and PRB Score each correlated strongly with one of the Theft factors, but the IPI had its highest correlation with Emotional Stability, while the PRB's was with Trust/Low Self-Control. Across all four personality-based tests, the third highest correlation was with one of the two Locus of Control factors. Unlike the other instruments in its group, the HPI Reliability score did not have its second highest correlation with one of the Theft factors. Home Life, Trust/Low Self-Control, and Affectivity/Locus of Control factors correlated the highest with the HPI. Relative to the other scores, the Reliability score appears to be the most broadly defined measure of deviance.

B. Discussion of Findings

Earlier research by Ones on these data, at the test level, concluded that similarities among overt instruments, and among personality-based instruments were due to the presence of correlated subgroup factors (see Figure 2). The Reid Report did not correlate as strongly with the Overt Subgroup factor as did the PSI and

Stanton. Likewise, the PDI-EI did not correlate as strongly as the other three personality-based tests with their subgroup factor. An understanding of why those differences occur flows from the factor/test score correlations done in this study. The Reid is less like the PSI and Stanton because it places a far higher weight on Punitiveness than Honesty Image. The PDI-EI correlates less on the Personality-based Subgroup factor than the other instruments because the Performance score correlates more with the Theft/Admissions factors like the three overt instruments, than it does with broader personality factors.

A better understanding of why and how the two Subgroup factors are correlated may also be gleaned from the present research. The strongest common associations across tests are with the Theft-based factors, followed by Trust/Low Self-Control, and External Locus of Control, and Affectivity/Locus of Control. Figure 2 depicts the conclusion drawn by Ones that a general underlying Conscientiousness factor explained the correlated Subgroup factors and the associations among integrity tests. According to the previously reviewed work by Hogan and Ones, Conscientiousness has four component themes: (1) Self Control, (2) Orderliness, (3) Hard Work and Perseverance, and (4) Conformity. Although Orderliness and Hard Work appear to be equivalent to the factor of Diligence/Planning, and Conformity seems akin to the factor of Social Conformity/Deviance, neither of those two factors exert a consistent influence across instruments. It would appear then, that Self Control is the central underlying factor driving the relationships among integrity test, not what Ones labeled Conscientiousness.

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Overall, it could be said that the seven integrity tests measure various facets of the construct called Low Self-Control by Gottfredson and Hirschi (1990) which they describe as the underlying cause of criminal behavior. They propose that low self-control stems from family problems and lack of behavioral standards at home, and is manifested through criminal and noncriminal behaviors which serve to give short term gratification of needs. Among the noncriminal behaviors which manifest the lack of self-control are tendencies to smoke, drink, skip school, involvement in more accidents, and unwanted pregnancies. The statements are made that the "best predictor of crime is prior criminal behavior" (p.107) and that "low self-control is the primary individual characteristic causing criminal behavior" (p.111). These appear to underscore the differences between overt integrity tests as predictors of specific crimes versus personality-based tests as predictors of broader deviant behaviors which can be seen in Table 18. The overt tests correlate to Factor 6, Low Self-Control, but put greater emphasis on the three Admissions and Thoughts about Theft factors indicating more concern with predicting specific criminal behavior. In this regard, the PDI-EI shows itself to be much more like the overt tests, than the other personality-based tests. In fact, given the pattern of correlations with the factors, it is hard to believe that the PDI-EI is derived from or based on the CPI Socialization scale, as the PRB and HPI also claim to be. The PDI-EI's strong correlations with the theft factors indicate that it too, seeks to predict specific criminal behavior, not just broadly defined deviance. The HPI and PRB show similarities to each other in the relative emphasis given Low Self-Control, Home Life, Locus of Control and

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Emotional Stability - not identical relationships, but generally similar. These two instruments do apparently put greater emphasis on predicting broadly defined deviance, rather than specific theft behavior, even though the PRB does correlate strongly with the PSI Theft factor. At the end of the overt-personality-based spectrum is the IPI. It appears to be primarily a measure of Emotional Stability, with some theft, locus of control and conformity components. Although the IPI Critical Score correlates with the Stanton Theft factor at .67, and External Locus of Control .66, the Stanton Theft Factor and External Locus of Control are themselves correlated at -.31, and correlated to Emotional Stability at -.39, and .44, respectively. These intercorrelations suggest an even broader concern with Emotional Stability as a primary construct of interest, rather than theft or deviance.

What this all means is that as a group, integrity tests work because they measure a variety of indicators of the presence or absence of self-control, some with a more narrow predictive focus than others. The other three components of Conscientiousness - Orderliness, Hard Work, and Conformity - have less to do with the primary construct of interest, integrity.

C. Expected and Unexpected Findings

Actually, very few of the factors in this study formed as expected, based on prior research studies. As mentioned in the previous section, the four component themes of Conscientiousness seemed parallel to three of the factors. Also, Punitiveness, and Home Life (family) factors emerged as separate factors. The remaining factors, however, strayed from expectations in varying degrees. It was

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hypothesized that Thoughts About Theft and Admissions of Crimes would constitute two individual factors, but they merged into one factor. Even less expected was the formation of three Theft factors, one for each of the three overt instruments. Other factors were expected to emerge separately, but instead became part of complex factors. For example association with delinquents, risk taking, violence, and drug and alcohol related topics were components of Trust/Low Self-Control, Deviance/Drug Association, Social Drug Use and Hard Drug Use.

The factor about Normative Beliefs or Projection of Theft by Others all but disappeared. With the exception of one Stanton Survey question in the PSI Theft factor and one Stanton Survey question in the Stanton Theft factor, each of which asks about the extent of young people who steal from work, questions about normative beliefs of honesty/theft disappeared. Perhaps the formation of an opinion of what is "normal" to the individual is an integral part of a person's self image. Indeed, this may be the case since further investigation turned up the "missing" perception items as low loading (below .30) items of the Honesty Image factor. So the image of their own honesty a person portrays includes a notion of their standing relative to some referent others. If this is true, then publishers would not need to include separate questions about normative beliefs of the extent of theft activities if they measure an individual's honesty image.

Drug use contributed to not just one, but to three factors. There was the factor regarding Social Drug Use and socially acceptable drugs, like alcohol. An Association with Friends who use drugs factor, and Hard Drug Use factor.

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There was also the rather worrisome situation of seemingly identical items from different instruments loading on different factors. Consider for example, the following three questions: "Would you say you are too honest to steal?" (PSI), "Do you think you are above stealing anything at all?" (Stanton) and, "Do you believe you are too honest to steal?" (Reid). All three appear to be measuring the same question, yet the first two load on Factor 2 - Honesty Image, and the third loads on Factor 5, the Reid-based Theft factor. Are the questions really measuring different constructs, or is this evidence of a common-method variance problem? By extension, one needs to ask if the similarity in correlation patterns between the PSI and Stanton Survey and the factors are "real" or are they due to artifacts? Both the PSI and Stanton Survey are answered in their respective test booklets, while the Reid Report requires respondents to match questions to answers on a separate answer sheet. Does the effort of going from test booklet to answer sheet allow or encourage subjects to rethink their response? Yet, if any instrument of the three should separate out, one would expect it to be the PSI in which every item is answered on a 5 to 7 categorical scale, whereas both the Stanton and Reid instruments are primarily answered yes/no.

Also to be considered is the situation where seemingly irrelevant items load on otherwise clear factors. For example, Factor 15 PSI Theft, contains an item asking about how much attention a person pays to their personal grooming. While there may be empirical reasons for the item to be included, it lacks a surface rationale.

Are both of these situations indications of method variance problems? In their discussion of remedies and procedures to deal with method variance problems

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associated with self-reports, Podsakoff and Organ (1986) recommend the use of multiple measures from multiple sources using multiple methods. Where all of the data had to come from the same subjects, they recommended collecting crucial pieces at different times, in different settings. All of the instruments included in this study are self-report measures, and therefore not amenable to the directive to use multiple methods. However, the data collection design implemented by Ones did utilize different subjects, different times, and different settings which should have reduced some of the biases of concern. Since all respondents did not complete all instruments, the problem of response set answering should have been reduced. Likewise, social desirability answering should have been reduced by the mix of college student and applicant samples, if one assumes that the students would have less of a vested interest in portraying themselves in a particularly positive or negative light.

If the major method variance problems have been controlled for to the extent possible, perhaps what we are seeing is a statistical problem. One such statistical situation may explain the test specific factors, and "odd" loading of items, namely the standard errors of the correlations. The within test correlations from this data will have much smaller standard errors due to the larger sample sizes they are computed on, than will the between test correlations. In this investigation, average within test correlations are based on n's of about 450, while the between test n averages only 100. Using the estimate of the standard error of a correlation coefficient found in Crocker and Algina (1986), (1/square-root of N-1), it can be seen that for n=450, the

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standard error is about .047, while it more than doubles to .105 with n=100. Due to the smaller errors based on their much larger n's, the test driven factors should probably not be much of a surprise.

One other statistical consideration should be mentioned. It was acknowledged at the beginning of this project that the research violated the rule about having more observations than variables. In spite of this violation, it was possible for correlations to be computed, and interpretable factor solutions achieved, however the problem did prevent the use of maximum likelihood estimations for the factor solution. Perhaps some of what we are seeing are chance associations due to having more variables than observations in the data set. This may also explain why "odd" factors like Factor 10 - PRB Blue Collar Jobs, and Factor 3 - Random Answer Items/No Theme, and Factor 9 - Deviance/Drug Association formed.

D. Summary and Limitations

The news from this study is that correlations between integrity tests appear to be due primarily to their measurement of the Self-Control component of Conscientiousness, with far less concern over the Orderliness, Hard Work, and Conformity components. Overt tests tend to measure a more targeted set of behaviors with the intent of predicting specific criminal activities, while the personality-based tests look at broader associations with correlates of low self-control.

The implication of this finding for Big-5 measures of personality are unclear. Because this study ended up relying on only one Big-5 measure, it is not possible to draw conclusions for the domain.

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Perhaps the most evident limitation of this study is its empirical nature. It seems pretty evident that the test specific factors resulted from different within test and between test sample sizes. If all individuals had taken all of the tests, perhaps the resulting factor patterns would been different and simpler.

One other limitation to this study is its reliance for the most part, on a college student sample. As much as everyone would like to do research using "real" job applicants, the truth is that it is extremely difficult and rare to do so. Only 84 of the 1428 subjects in this study were known to be true job applicants. Tests from those 84 were filed separately, and test answers manually entered for this study. The remainder of the sample, although they could have been employed in some capacity, were sampled because of their connection to a midwestern university.

E. Future Research Directions

Given the insights and limitations of this study, the next logical step would seem to call for the rational formation of factors based on some judgement of item content. In spite of the arduous task of sorting 1489 items, it seems reasonable to expect that cleaner composites, of at least the major factors, would result. A rational sort of items was proposed initially as part of this study, but was dropped on the recommendation of committee members due to time constraints. Given the empirical results, a rational study seems warranted and is recommended as a project for future research.

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Additionally, future researchers should begin to establish the predictive validity evidence for the various test factors. Which of the factors predict relevant work behaviors such as performance, turn-over, and other measures of counterproductivity?

The general understanding of integrity instruments has grown tremendously over the past fifteen years. Research evidence establishing their valid use as predictors of important organizational outcomes, and their lack of adverse impact on protected classes continues to grow. This research study adds one more piece to the puzzle being assembled which tries to explain why and how they work.

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Appendix A

Overt Tests - Scree / Eigenvalues

163

The SAS System
15:37 Thursday, March 16, 1995

Overt Integrity Tests

Initial Factor Method: Principal Components

Scree Plot of Eigenvalues

Number

The SAS System

Overt Integrity Tests

15:37 Thursday, March 16, 1995

Initial Factor Method: Principal Components

Prior Communality Estimates: ONE

Eigenvalues of the Correlation Matrix: Total = 302   Average = 1

Component	Eigenvalue	Difference	Proportion	Cumulative
1	40.1916	22.2859	0.1052	0.1052
2	17.9058	6.6400	0.0469	0.1521
3	11.2640	1.5534	0.0295	0.1816
4	9.7115	1.2679	0.0254	0.2070
5	8.4436	0.8237	0.0221	0.2291
6	7.6200	0.5728	0.0199	0.2491
7	7.0472	0.4390	0.0184	0.2675
8	6.6081	0.4710	0.0173	0.2848
9	6.1372	0.6518	0.0161	0.3009
10	5.4853	0.1940	0.0144	0.3152
11	5.2913	0.1667	0.0139	0.3291
12	5.1246	0.1249	0.0134	0.3425
13	4.9997	0.2321	0.0131	0.3556
14	4.7676	0.1110	0.0125	0.3681
15	4.6566	0.1542	0.0122	0.3802
16	4.5024	0.0974	0.0118	0.3920
17	4.4050	0.1178	0.0115	0.4036
18	4.2872	0.0810	0.0112	0.4148
19	4.2062	0.1107	0.0110	0.4258
20	4.0954	0.0902	0.0107	0.4365
21	4.0052	0.1452	0.0105	0.4470
22	3.8600	0.1861	0.0101	0.4571
23	3.6739	0.0267	0.0096	0.4667
24	3.6472	0.0271	0.0095	0.4763
25	3.6201	0.0888	0.0095	0.4858
26	3.5313	0.0471	0.0092	0.4950
27	3.4842	0.0947	0.0091	0.5041
28	3.3895	0.0333	0.0089	0.5130
29	3.3562	0.0081	0.0088	0.5218
30	3.2681	0.0855	0.0086	0.5303
31	3.1826	0.0334	0.0083	0.5387
32	3.1493	0.0444	0.0082	0.5469
33	3.1049	0.1034	0.0081	0.5550
34	3.0015	0.0207	0.0079	0.5629
35	2.9808	0.0377	0.0078	0.5707
36	2.9431	0.0120	0.0077	0.5784
37	2.9311	0.0311	0.0077	0.5861
38	2.9000	0.0586	0.0076	0.5937
39	2.8414	0.0364	0.0074	0.6011
40	2.8050	0.0371	0.0073	0.6084
41	2.7679	0.0235	0.0072	0.6157
42	2.7444	0.0651	0.0072	0.6229
43	2.6793	0.0298	0.0070	0.6299
44	2.6495	0.0421	0.0069	0.6368
45	2.6074	0.0314	0.0068	0.6437
46	2.5760	0.0108	0.0067	0.6504
47	2.5653	0.0533	0.0067	0.6571
48	2.5120	0.0127	0.0066	0.6637
49	2.4993	0.0425	0.0065	0.6702
50	2.4568	0.0132	0.0064	0.6767
51	2.4437	0.0656	0.0064	0.6831
52	2.3780	0.0314	0.0062	0.6893
53	2.3467	0.0227	0.0061	0.6954
54	2.3240	0.0209	0.0061	0.7015
55	2.3031	0.0243	0.0060	0.7075
56	2.2788	0.0144	0.0060	0.7135
57	2.2643	0.0575	0.0059	0.7194
58	2.2069	0.0167	0.0058	0.7252
59	2.1902	0.0284	0.0057	0.7309
60	2.1618	0.0158	0.0057	0.7366
61	2.1460	0.0218	0.0056	0.7422
62	2.1242	0.0248	0.0056	0.7478
63	2.0994	0.0322	0.0055	0.7533
64	2.0672	0.0060	0.0054	0.7587
65	2.0611	0.0151	0.0054	0.7641
66	2.0461	0.0102	0.0054	0.7694
67	2.0359	0.0393	0.0053	0.7748
68	1.9966	0.0363	0.0052	0.7800
69	1.9603	0.0098	0.0051	0.7851
70	1.9505	0.0019	0.0051	0.7902
71	1.9446	0.0204	0.0051	0.7953
72	1.9242	0.0564	0.0050	0.8004
73	1.8718	0.0212	0.0049	0.8053
74	1.8506	0.0290	0.0048	0.8101
75	1.8216	0.0205	0.0048	0.8149
76	1.8010	0.0185	0.0047	0.8196
77	1.7825	0.0128	0.0047	0.8243
78	1.7697	0.0196	0.0046	0.8289
79	1.7501	0.0067	0.0046	0.8335
80	1.7434	0.0350	0.0046	0.8381

Appendix B

Personality-Based Tests - Scree / Eigenvalues

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Personality-based Integrity Tests 12:32 Tuesday. March 21. 1995

Initial Factor Method: Principal Components

Scree Plot of Eigenvalues

The SAS System

Personality-based Integrity Tests 12:32 Tuesday, March 21, 1995

Initial Factor Method: Principal Components

Prior Communality Estimates: ONE

Eigenvalues of the Correlation Matrix: Total = 575 Average = 1

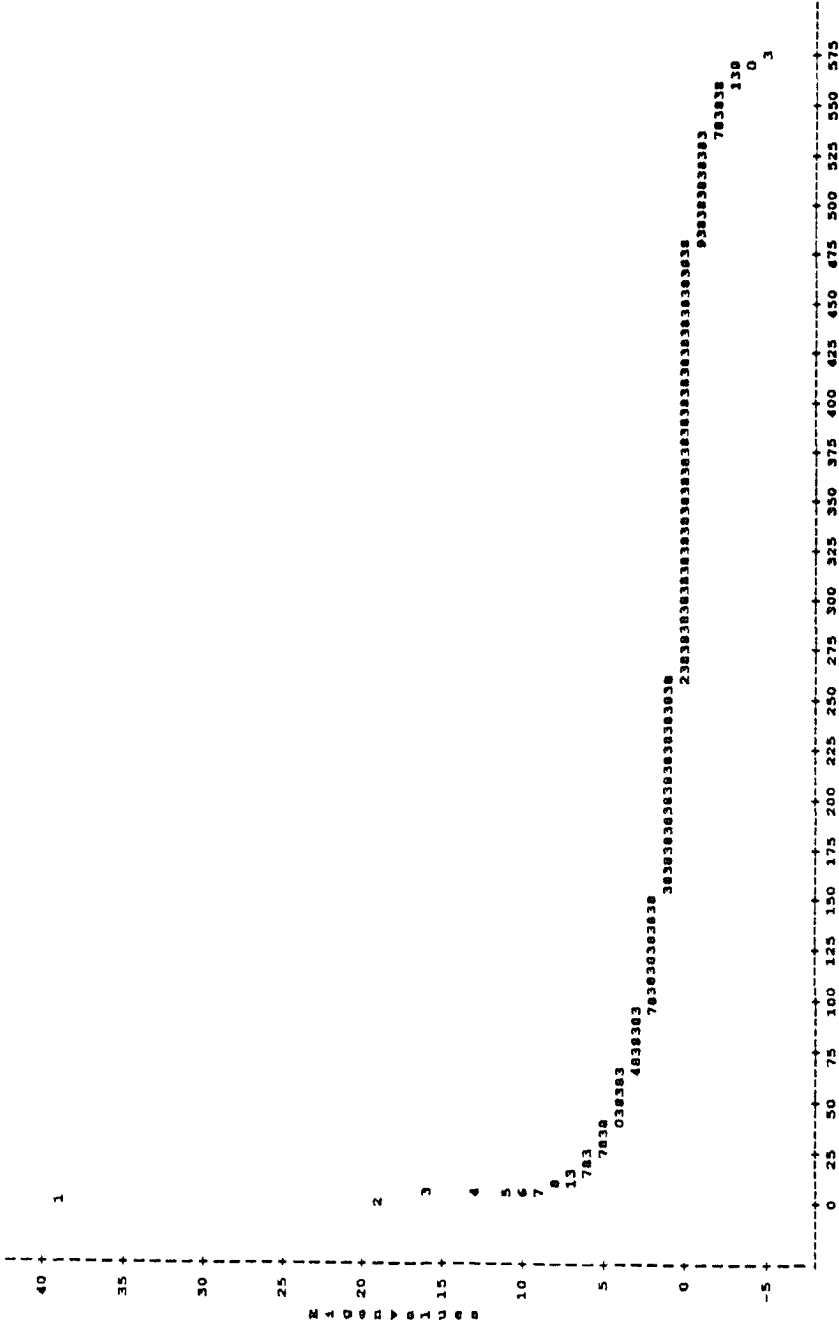|	1	2	3	4	5	6	7	8	9	10
Eigenvalue	39.4349	19.1661	16.4602	13.4502	10.9299	9.7404	9.0720	8.4001	8.2663	7.8661
Difference	20.2688	2.7059	3.0100	2.5203	1.1896	0.6684	0.6719	0.1338	0.4002	0.3780
Proportion	0.0686	0.0333	0.0286	0.0234	0.0190	0.0169	0.0158	0.0146	0.0144	0.0137
Cumulative	0.0686	0.1019	0.1305	0.1539	0.1729	0.1899	0.2057	0.2203	0.2346	0.2483

	11	12	13	14	15	16	17	18	19	20
Eigenvalue	7.4480	7.2056	7.1829	6.8978	6.6800	6.5352	6.4446	6.2607	6.2044	6.1734
Difference	0.2825	0.0227	0.2851	0.2178	0.1448	0.0907	0.1838	0.0563	0.0311	0.0652
Proportion	0.0130	0.0125	0.0125	0.0120	0.0116	0.0114	0.0112	0.0109	0.0108	0.0107
Cumulative	0.2613	0.2739	0.2864	0.2984	0.3100	0.3213	0.3326	0.3434	0.3542	0.3650

	21	22	23	24	25	26	27	28	29	30
Eigenvalue	6.1081	5.8948	5.8398	5.7004	5.5707	5.5259	5.4449	5.3654	5.2391	5.1241
Difference	0.2133	0.0550	0.1395	0.1297	0.0448	0.0610	0.0795	0.1262	0.1150	0.0197
Proportion	0.0106	0.0103	0.0102	0.0099	0.0097	0.0096	0.0095	0.0093	0.0091	0.0089
Cumulative	0.3756	0.3858	0.3960	0.4059	0.4156	0.4252	0.4347	0.4440	0.4531	0.4620

	31	32	33	34	35	36	37	38	39	40
Eigenvalue	5.1044	5.0413	4.9336	4.8561	4.8175	4.7844	4.7207	4.6664	4.5528	4.4974
Difference	0.0631	0.1077	0.0775	0.0385	0.0331	0.0637	0.0542	0.1137	0.0554	0.0298
Proportion	0.0089	0.0088	0.0086	0.0084	0.0084	0.0083	0.0082	0.0081	0.0079	0.0078
Cumulative	0.4709	0.4797	0.4883	0.4967	0.5051	0.5134	0.5216	0.5297	0.5377	0.5455

	41	42	43	44	45	46	47	48	49	50
Eigenvalue	4.4676	4.4291	4.3768	4.3073	4.2897	4.2700	4.2198	4.1770	4.1348	4.1072
Difference	0.0385	0.0522	0.0696	0.0176	0.0197	0.0502	0.0428	0.0422	0.0277	0.0669
Proportion	0.0078	0.0077	0.0076	0.0075	0.0075	0.0074	0.0073	0.0073	0.0072	0.0071
Cumulative	0.5532	0.5609	0.5686	0.5760	0.5835	0.5909	0.5983	0.6055	0.6127	0.6199

	51	52	53	54	55	56	57	58	59	60
Eigenvalue	4.0403	3.9976	3.9750	3.8914	3.8711	3.8134	3.8085	3.7235	3.7123	3.7015
Difference	0.0427	0.0226	0.0836	0.0203	0.0577	0.0049	0.0049	0.0112	0.0108	0.1196
Proportion	0.0070	0.0070	0.0069	0.0068	0.0067	0.0066	0.0066	0.0065	0.0065	0.0064
Cumulative	0.6269	0.6338	0.6408	0.6475	0.6543	0.6608	0.6675	0.6740	0.6805	0.6869

	61	62	63	64	65	66	67	68	69	70
Eigenvalue	3.5919	3.5565	3.5049	3.4551	3.4360	3.4083	3.3668	3.3605	3.2940	3.2735
Difference	0.0354	0.0516	0.0498	0.0191	0.0277	0.0415	0.0063	0.0665	0.0204	0.0605
Proportion	0.0062	0.0062	0.0061	0.0060	0.0060	0.0059	0.0059	0.0058	0.0057	0.0057
Cumulative	0.6931	0.6993	0.7054	0.7114	0.7174	0.7233	0.7292	0.7350	0.7407	0.7464

	71	72	73	74	75	76	77	78	79	80
Eigenvalue	3.2131	3.1881	3.1579	3.1023	3.0909	3.0470	3.0409	2.8900	2.8796	2.8332
Difference	0.0250	0.0302	0.0556	0.0113	0.0440	0.0061	0.0509	0.0104	0.0464	0.0199
Proportion	0.0056	0.0055	0.0055	0.0054	0.0054	0.0053	0.0053	0.0052	0.0052	0.0051
Cumulative	0.7520	0.7576	0.7631	0.7685	0.7738	0.7791	0.7844	0.7896	0.7948	0.7999

Appendix C

Big-5 Tests - Scree /Eigenvalues

169

14:29 Monday, March 20, 1995

FIRST PASS AT FACTORING BIGS DATA SET 3/10/95

Initial Factor Method: Principal Components

Scree Plot of Eigenvalues

FIRST PASS AT FACTORING BIGS DATA SET 3/19/95

Initial Factor Method: Principal Components
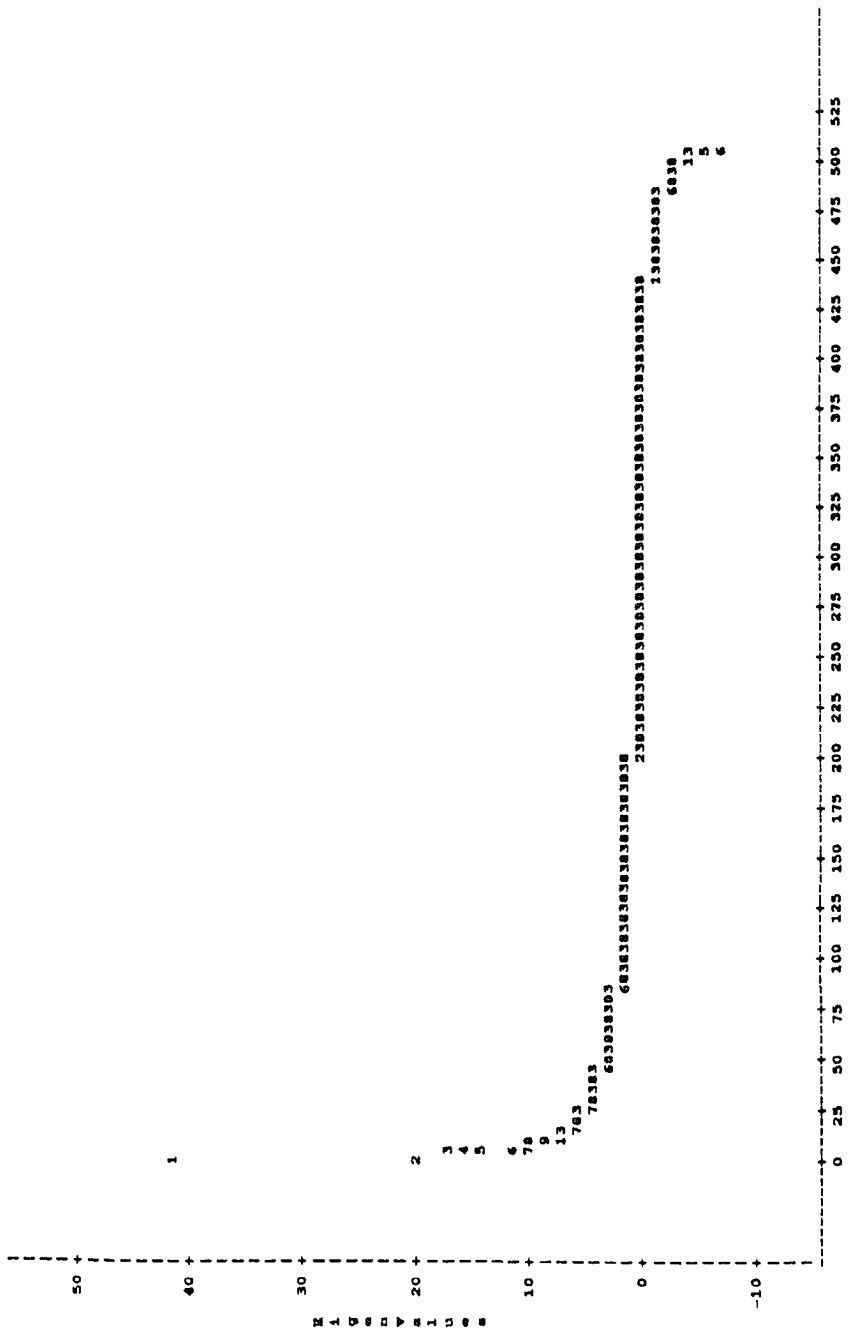
Prior Communality Estimates: ONE

Eigenvalues of the Correlation Matrix: Total = 506   Average = 1

	1	2	3	4	5	6	7	8	9	10
Eigenvalue	42.0453	20.1861	16.7553	15.6874	14.4805	12.1372	10.2547	10.0673	9.1324	8.2005
Difference	21.8592	3.4308	1.0680	1.2068	2.3433	1.8825	0.1874	0.9350	0.9319	0.7355
Proportion	0.0831	0.0399	0.0331	0.0310	0.0286	0.0240	0.0203	0.0199	0.0180	0.0162
Cumulative	0.0831	0.1230	0.1561	0.1871	0.2157	0.2397	0.2600	0.2799	0.2979	0.3141

	11	12	13	14	15	16	17	18	19	20
Eigenvalue	7.4650	7.2844	7.1952	6.8639	6.7017	6.6357	6.2398	6.0422	5.9315	5.7310
Difference	0.1806	0.0892	0.3312	0.0722	0.1580	0.3938	0.1977	0.1106	0.2005	0.0285
Proportion	0.0148	0.0144	0.0142	0.0136	0.0134	0.0131	0.0123	0.0118	0.0117	0.0113
Cumulative	0.3289	0.3433	0.3575	0.3711	0.3845	0.3976	0.4099	0.4218	0.4336	0.4449

	21	22	23	24	25	26	27	28	29	30
Eigenvalue	5.7025	5.4635	5.3417	5.2877	5.1358	5.0037	4.8862	4.7814	4.7057	4.6637
Difference	0.2390	0.1218	0.0541	0.1539	0.1300	0.1176	0.1048	0.0757	0.0420	0.0484
Proportion	0.0113	0.0108	0.0106	0.0104	0.0101	0.0099	0.0097	0.0094	0.0093	0.0092
Cumulative	0.4562	0.4670	0.4775	0.4880	0.4981	0.5080	0.5177	0.5271	0.5364	0.5456

	31	32	33	34	35	36	37	38	39	40
Eigenvalue	4.6142	4.4582	4.3771	4.3357	4.3078	4.1676	4.1208	4.0858	3.9773	3.9017
Difference	0.1560	0.0811	0.0413	0.0279	0.1402	0.0468	0.0350	0.1085	0.0756	0.0257
Proportion	0.0091	0.0088	0.0087	0.0086	0.0085	0.0082	0.0081	0.0081	0.0079	0.0077
Cumulative	0.5548	0.5636	0.5722	0.5808	0.5893	0.5975	0.6057	0.6138	0.6216	0.6293

	41	42	43	44	45	46	47	48	49	50
Eigenvalue	3.8760	3.8183	3.7590	3.7086	3.6530	3.5598	3.5273	3.5177	3.4735	3.3632
Difference	0.0577	0.0592	0.0505	0.0556	0.0932	0.0325	0.0095	0.0442	0.1103	0.0066
Proportion	0.0077	0.0075	0.0074	0.0073	0.0072	0.0070	0.0070	0.0070	0.0069	0.0066
Cumulative	0.6370	0.6445	0.6520	0.6593	0.6665	0.6735	0.6805	0.6875	0.6943	0.7010

	51	52	53	54	55	56	57	58	59	60
Eigenvalue	3.3567	3.3236	3.2015	3.2059	3.1494	3.0887	3.0444	3.0035	2.9963	2.9066
Difference	0.0330	0.0321	0.0056	0.0565	0.0607	0.0443	0.0408	0.0072	0.0885	0.0224
Proportion	0.0066	0.0066	0.0065	0.0063	0.0062	0.0061	0.0060	0.0059	0.0059	0.0057
Cumulative	0.7076	0.7142	0.7207	0.7270	0.7333	0.7394	0.7454	0.7513	0.7572	0.7630

	61	62	63	64	65	66	67	68	69	70
Eigenvalue	2.8843	2.8550	2.7831	2.7467	2.7282	2.6696	2.6477	2.5939	2.5792	2.5368
Difference	0.0293	0.0719	0.0364	0.0186	0.0586	0.0219	0.0538	0.0147	0.0424	0.0090
Proportion	0.0057	0.0056	0.0055	0.0054	0.0054	0.0053	0.0052	0.0051	0.0051	0.0050
Cumulative	0.7687	0.7743	0.7798	0.7852	0.7906	0.7959	0.8011	0.8063	0.8114	0.8164

	71	72	73	74	75	76	77	78	79	80
Eigenvalue	2.5277	2.5109	2.4884	2.4516	2.4216	2.4007	2.3726	2.3698	2.3274	2.3147
Difference	0.0169	0.0224	0.0368	0.0301	0.0209	0.0281	0.0028	0.0424	0.0127	0.0443
Proportion	0.0050	0.0050	0.0049	0.0048	0.0048	0.0047	0.0047	0.0047	0.0046	0.0046
Cumulative	0.8214	0.8263	0.8313	0.8361	0.8409	0.8456	0.8503	0.8550	0.8596	0.8642

Appendix D

Complete Data Set - 1442 Items

Scree / Eigenvalues

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Complete Merged Data Set

479 factors will be retained by the MINEIGEN criterion.   13:57 Thursday, March 30, 1995
Initial Factor Method: Principal Components (Fact.sas on Unix, 1442 variables)
Scree Plot of Eigenvalues
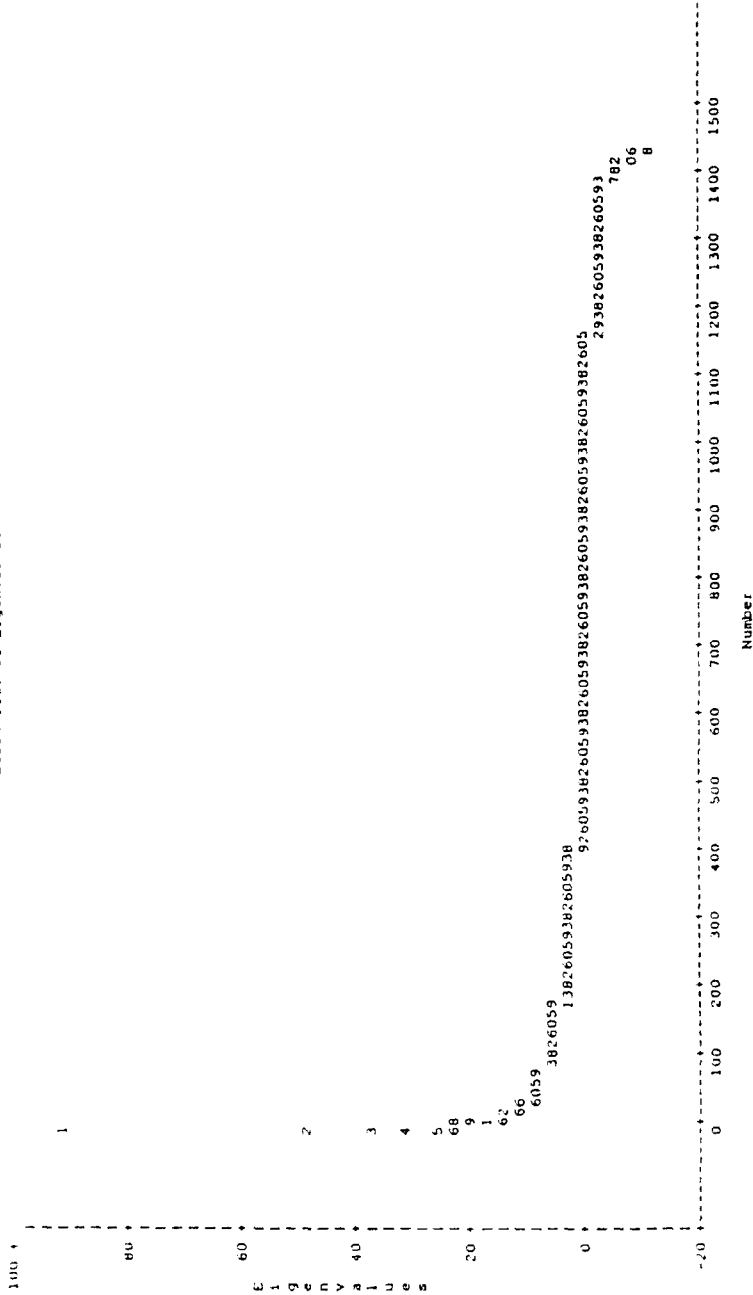
Complete Merged Data Set

Initial Factor Method: Principal Components

Prior Communality Estimates: ONE

Eigenvalues of the Correlation Matrix: Total = 1439 Average = 1
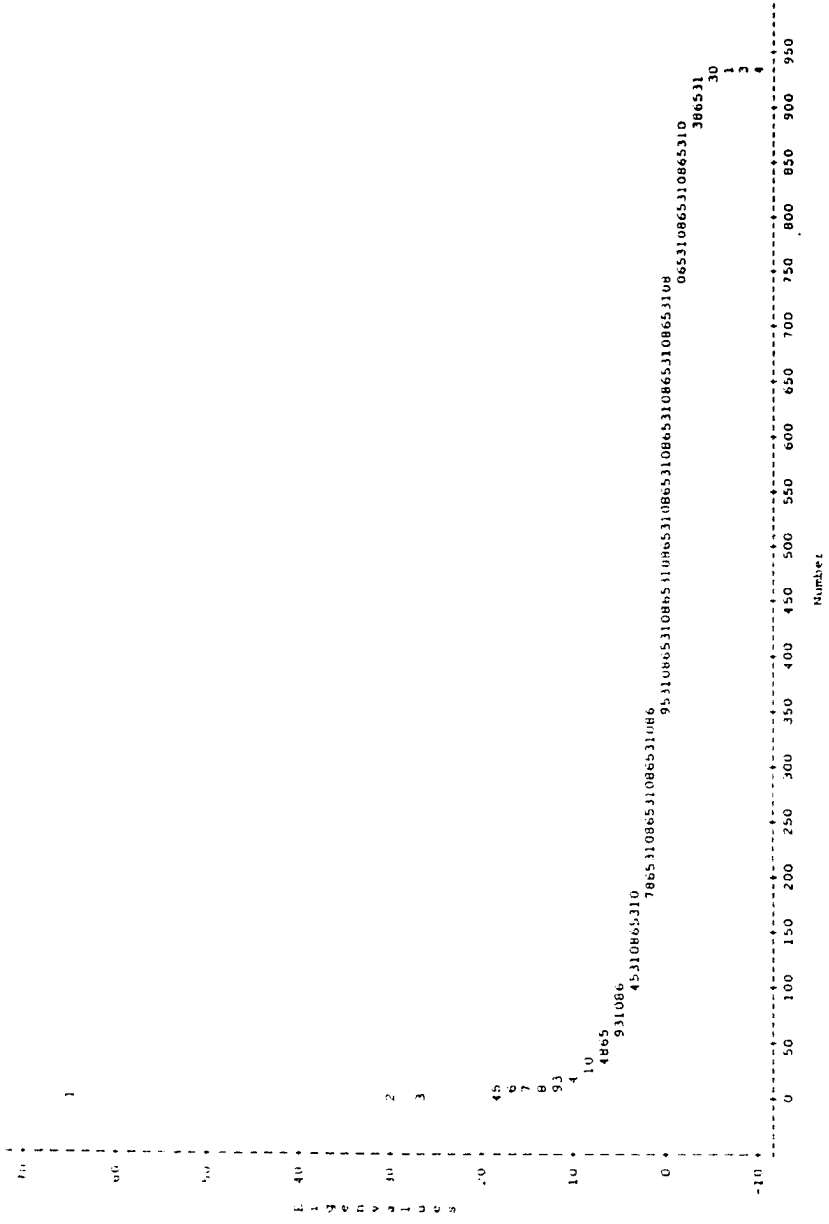
	Eigenvalue	Difference	Proportion	Cumulative
1	93.9414	43.5819	0.0635	0.0645
2	49.8115	10.6565	0.0332	0.0967
3	39.5774	6.5774	0.0258	0.1226
4	30.5776	5.2358	0.0212	0.1438
5	25.3418	1.3882	0.0176	0.1614
6	23.9736	1.5735	0.0167	0.1781
7	22.4001	0.7064	0.0156	0.1936
8	21.6937	1.2403	0.0151	0.2087
9	20.4534	1.4018	0.0142	0.2229
10	19.0516	0.5004	0.0132	0.2362

	Eigenvalue	Difference	Proportion	Cumulative
11	18.5512	1.5524	0.0129	0.2491
12	16.9987	0.3351	0.0118	0.2609
13	16.6737	0.3132	0.0116	0.2725
14	16.3605	0.5554	0.0114	0.2838
15	15.8051	0.5758	0.0110	0.2948
16	15.2294	0.3954	0.0106	0.3054
17	14.8339	0.0268	0.0103	0.3157
18	14.8071	0.5873	0.0103	0.3260
19	14.2198	0.1254	0.0099	0.3359
20	14.0944	0.3208	0.0098	0.3457

	Eigenvalue	Difference	Proportion	Cumulative
21	13.7735	0.1798	0.0096	0.3552
22	13.5937	0.4243	0.0094	0.3647
23	13.1694	0.1282	0.0092	0.3738
24	13.0412	0.1305	0.0091	0.3829
25	12.9107	0.3408	0.0090	0.3919
26	12.5699	0.1845	0.0087	0.4006
27	12.3454	0.0825	0.0086	0.4092
28	12.3029	0.1647	0.0085	0.4178
29	12.1183	0.0844	0.0084	0.4262
30	12.0538	0.2154	0.0084	0.4346

	Eigenvalue	Difference	Proportion	Cumulative
31	11.8384	0.1591	0.0082	0.4428
32	11.6793	0.2109	0.0081	0.4509
33	11.4683	0.2347	0.0080	0.4589
34	11.2336	0.0410	0.0078	0.4667
35	11.1926	0.2550	0.0078	0.4745
36	10.9376	0.0311	0.0076	0.4821
37	10.9065	0.0990	0.0076	0.4897
38	10.8075	0.1172	0.0075	0.4972
39	10.6903	0.1187	0.0074	0.5046
40	10.5716	0.1174	0.0073	0.5119

	Eigenvalue	Difference	Proportion	Cumulative
41	10.4542	0.2036	0.0073	0.5192
42	10.2506	0.0267	0.0071	0.5263
43	10.2239	0.0541	0.0071	0.5334
44	10.1698	0.1002	0.0071	0.5405
45	10.0696	0.0861	0.0070	0.5475
46	9.9835	0.1296	0.0069	0.5544
47	9.8539	0.1270	0.0068	0.5613
48	9.7268	0.0338	0.0068	0.5680
49	9.6930	0.2709	0.0067	0.5748
50	9.4222	0.0237	0.0065	0.5813

	Eigenvalue	Difference	Proportion	Cumulative
51	9.3985	0.0241	0.0065	0.5879
52	9.3744	0.0951	0.0065	0.5944
53	9.2793	0.0470	0.0064	0.6008
54	9.2322	0.1248	0.0064	0.6072
55	9.1074	0.0564	0.0063	0.6136
56	9.0510	0.1185	0.0063	0.6199
57	8.9325	0.0260	0.0062	0.6261
58	8.9065	0.0258	0.0062	0.6323
59	8.8807	0.0315	0.0062	0.6384
60	8.8492	0.1032	0.0061	0.6446

	Eigenvalue	Difference	Proportion	Cumulative
61	8.7460	0.0112	0.0061	0.6507
62	8.7348	0.0617	0.0061	0.6567
63	8.6731	0.0768	0.0060	0.6628
64	8.5962	0.0873	0.0060	0.6687
65	8.5089	0.0376	0.0059	0.6746
66	8.4713	0.0467	0.0059	0.6805
67	8.4246	0.1428	0.0059	0.6864
68	8.2818	0.0545	0.0058	0.6921
69	8.2273	0.0039	0.0057	0.6979
70	8.2234	0.0743	0.0057	0.7036

Appendix E

Integrity Data Set - 934 Items

Scree / Eigenvalues

175

The SAS System

Integrity Data Set

11:33 Monday, April 3, 1995

Initial Factor Method: Principal Components

Scree Plot of Eigenvalues

Initial Principal Components

Number

Initial Principal Components Solution - Integrity tests only

The SAS System

11:33 Monday, April 3, 1995

Integrity Data Set

Initial Factor Method: Principal Components

Prior Communality Estimates: ONE

Eigenvalues of the Correlation Matrix: Total = 914   Average = 1

	1	2	3	4	5	6	7	8	9	10
Eigenvalue	65.2224	29.9948	27.1746	18.8718	17.5479	15.9412	14.3305	13.4950	12.3921	11.5456
Difference	35.2277	2.8201	8.3029	1.3238	1.6067	1.6107	0.8355	1.1029	0.8465	0.3259
Proportion	0.0698	0.0321	0.0291	0.0202	0.0188	0.0171	0.0153	0.0144	0.0133	0.0124
Cumulative	0.0698	0.1019	0.1310	0.1512	0.1700	0.1871	0.2024	0.2169	0.2302	0.2425

	11	12	13	14	15	16	17	18	19	20
Eigenvalue	11.2197	11.0648	10.8439	10.7705	10.4719	9.9494	9.8390	9.5512	9.4717	9.2199
Difference	0.1550	0.2209	0.0734	0.2986	0.5225	0.1104	0.2038	0.0795	0.2518	0.1064
Proportion	0.0120	0.0118	0.0116	0.0115	0.0112	0.0107	0.0105	0.0102	0.0101	0.0099
Cumulative	0.2545	0.2664	0.2780	0.2895	0.3007	0.3114	0.3219	0.3321	0.3423	0.3522

	21	22	23	24	25	26	27	28	29	30
Eigenvalue	9.1135	8.8672	8.7280	8.5585	8.4455	8.3025	8.1870	8.0477	7.9863	7.9120
Difference	0.2463	0.1392	0.1695	0.1131	0.1429	0.1155	0.1393	0.0614	0.0743	0.1270
Proportion	0.0098	0.0095	0.0093	0.0092	0.0090	0.0089	0.0088	0.0086	0.0086	0.0085
Cumulative	0.3619	0.3714	0.3808	0.3899	0.3990	0.4079	0.4166	0.4252	0.4338	0.4423

	31	32	33	34	35	36	37	38	39	40
Eigenvalue	7.7850	7.6759	7.5973	7.4651	7.4176	7.3477	7.2422	7.1586	6.9992	6.9440
Difference	0.1091	0.0786	0.1321	0.0476	0.0698	0.1056	0.0835	0.1594	0.0553	0.0305
Proportion	0.0083	0.0082	0.0081	0.0080	0.0079	0.0079	0.0078	0.0077	0.0075	0.0074
Cumulative	0.4506	0.4588	0.4669	0.4749	0.4829	0.4907	0.4985	0.5062	0.5137	0.5211

	41	42	43	44	45	46	47	48	49	50
Eigenvalue	6.9134	6.8074	6.7207	6.5644	6.5320	6.4976	6.4788	6.4181	6.3381	6.3146
Difference	0.1060	0.0867	0.1563	0.0325	0.0343	0.0188	0.0607	0.0800	0.0235	0.0710
Proportion	0.0074	0.0073	0.0072	0.0070	0.0070	0.0070	0.0069	0.0069	0.0068	0.0068
Cumulative	0.5285	0.5358	0.5430	0.5500	0.5570	0.5640	0.5709	0.5778	0.5845	0.5913

	51	52	53	54	55	56	57	58	59	60
Eigenvalue	6.2437	6.1944	6.1360	6.1104	6.0257	5.9511	5.9275	5.8900	5.7678	5.7395
Difference	0.0493	0.0583	0.0256	0.0847	0.0746	0.0236	0.0375	0.1222	0.0283	0.0345
Proportion	0.0067	0.0066	0.0066	0.0065	0.0065	0.0064	0.0063	0.0063	0.0062	0.0061
Cumulative	0.5980	0.6046	0.6112	0.6177	0.6242	0.6306	0.6369	0.6432	0.6494	0.6555

	61	62	63	64	65	66	67	68	69	70
Eigenvalue	5.7049	5.6665	5.5925	5.5434	5.4699	5.4549	5.4320	5.4056	5.3522	5.3287
Difference	0.0385	0.0739	0.0491	0.0735	0.0150	0.0229	0.0263	0.0534	0.0235	0.0361
Proportion	0.0061	0.0061	0.0060	0.0059	0.0059	0.0058	0.0058	0.0058	0.0057	0.0057
Cumulative	0.6616	0.6677	0.6737	0.6796	0.6855	0.6913	0.6971	0.7029	0.7087	0.7144

	71	72	73	74	75	76	77	78	79	80
Eigenvalue	5.2926	5.2467	5.2153	5.1725	5.1456	5.1060	5.0523	5.0000	4.9632	4.9200
Difference	0.0459	0.0314	0.0428	0.0269	0.0396	0.0536	0.0524	0.0368	0.0432	0.0158
Proportion	0.0057	0.0056	0.0056	0.0055	0.0055	0.0055	0.0054	0.0054	0.0053	0.0053
Cumulative	0.7200	0.7257	0.7312	0.7368	0.7423	0.7478	0.7532	0.7585	0.7638	0.7691

Initial Principal Components Solution - Integrity tests only