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GROUP DIFFERENCES IN COGNITIVE ABILITY AND PERSONALITY ACROSS JOB LEVELS

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Jodi L. Himelright

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The dissertation of Jodi L. Himelright was reviewed and approved* by the following:

Rick R. Jacobs
Professor of Psychology
Dissertation Advisor
Co-Chair of Committee

James L. Farr
Professor Emeritus of Psychology
Co-Chair of Committee

Samuel T. Hunter
Associate Professor of Psychology

Kisha S. Jones
Assistant Professor of Psychology

John W. O'Neill
Professor of Hospitality Management

Melvin M. Mark
Professor of Psychology
Head of the Department of Psychology

*Signatures are on file in the Graduate School.

ABSTRACT

Understanding the magnitude of group differences in selection predictors is an important step toward reducing adverse impact. While much research has been conducted to estimate these differences for cognitive ability and personality measures, there are few investigations into whether the magnitude of these differences varies across job levels in organizations. In the current study, a sample of job applicants representing a variety of industries and job functions were examined for the extent of racial, gender, and age differences across three hierarchical job levels (executive/senior managers, mid-level managers, first-line managers) and professionals. Results for both cognitive ability and personality indicated these differences did not decline appreciably from the lowest to the highest job levels. The implications of these findings and future directions for group differences and selection research are discussed.

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CHAPTER 1

INTRODUCTION

In the last few decades, a great deal of attention in personnel selection research has been focused on understanding the adverse impact potential of predictor measures. Of particular interest are group differences between protected and non-protected classes due to the potential legal and societal consequences associated with these differences. Research efforts have primarily focused on precise estimation of the well-documented Black-White differences on cognitive ability measures and, subsequently, identifying ways to mitigate these differences given the well-documented gap between these two classes. More recently, using non-cognitive predictors (e.g., personality measures) that have smaller group differences than cognitive ability measures in selection batteries have been proposed as a way to reduce adverse impact (Hough, Oswald, & Ployhart, 2001; Ployhart & Holtz, 2008). However, relatively less is known about group differences on non-cognitive predictors and how these differences compare with those found in cognitive ability measures. Even less is known about how protected class groups differ from non-protected groups across job levels.

The rapidly evolving diversity of the U.S. population and workforce makes it even more critical to expand what is known about the potential adverse impact of predictors. Specifically, the racial composition of the U.S. population is changing. Between 2000 and 2010, both the Hispanic and Asian populations grew 43% -- a rate that was four times faster than the total U.S. population (U.S. Census Bureau, 2011, 2012). In looking at what this means for the future workforce, the Bureau of

Labor Statistics (2013) projects that Hispanic and Asian population workforce participation will increase by 27.8% and 23.8%, respectively, between 2012 and 2022. The workforce participation of American Indian and Alaska Native, Native Hawaiian and Other Pacific Islanders, as well as mixed racial groups is expected to increase to an even greater extent (30.7%) during this time period. These trends indicate that the workforce will continue growing steadily in racial diversity. Consequently, organizations will increasingly require guidance on making employment decisions for a much more diverse population than in decades past.

However, industrial-organizational psychology has been remiss to devote adequate research attention to group differences and protected classes beyond Blacks. In a recent focal article in *Industrial and Organizational Psychology* calling for research on marginalized employees, Ruggs et al. (2013) note, “In the past 20 years, 19 articles in the 7 identified I-O journals have focused on racial discrimination and/or diversity for groups other than Black employees.” (p. 41). Due to historically few studies including Hispanics, there has been limited data to draw firm conclusions about Hispanic-White differences to the same extent as Black-White differences (Roth, Bevier, Bobko, Switzer, & Tyler, 2001). Attention to Asian-White comparisons has also been limited; however, this is likely due to several findings indicating no disadvantage to Asians in cognitive ability, the predictor on which most group difference research has been focused. In fact, Asian-White differences in cognitive ability seem to favor East Asians (Nagoshi, Johnson, DeFries, Wilson, & Vandenberg, 1984), which ensures no adverse impact or discrimination. Given the limited research attention on Hispanics and Asians and

their projected increase in the U.S. workforce, research is needed to include these lesser-studied protected groups and examine how they compare to Blacks and Whites.

In addition to the surge of growth in the Hispanic and Asian populations, the U.S. workforce is growing older. Since the 1990s older worker labor participation has steadily increased (U.S. Bureau of Labor Statistics, 2008), as the median age of the workforce increased from 37.1 years old in 1992 to 41.9 in 2012 and is projected to further increase to 42.6 by 2022 (U.S. Bureau of Labor Statistics, 2013). Also, despite the baby boomer population entering retirement age, more older workers are remaining in the workforce (U.S. Census Bureau, 2014) than in the past. The U.S. Bureau of Labor Statistics reported a 101% increase in the employment of workers 65 years and older between 1977 and 2007 (U.S. Bureau of Labor Statistics, 2008). With these trends, concern for potential employment discrimination against older workers is warranted, as workers who are 40 years and older are protected under the Age Discrimination in Employment Act (ADEA) of 1967. However, research from industrial-organizational psychologists regarding age discrimination has not been commensurate with the growth of the aging population in the workforce (Ones, Dilchert, Viswesvaran, & Salgado, 2010). In their review of seven of the top I-O psychology and organizational behavior journals, Ruggs et al. (2013) found just nine studies focusing on age discrimination since 1990. Thus, it is imperative to continue building research on age differences on predictors as the average age of the working population increases and older workers remain in the workplace.

Gender diversity in certain sectors of the workforce also remains a concern. Although women hold near half of the college-educated jobs in the U.S. economy, they work in just 24% of science, technology, engineering, and math (STEM) jobs (U.S. Department of Commerce, 2011). Also, recent Catalyst research (2015) on female representation among the S&P 500 companies indicates fewer women are represented in upper levels of organizational hierarchies. Specifically, women comprise just 4.2% of CEOs, 19.2% of Board of Directors seats, 25.1% of Executive/Senior Level Officials and Managers, 36.8% of First-/Mid-Level Officials and Managers and 45% of the general labor force. Therefore, examining predictors for possible gender differences could assist in determining if discriminatory practices are related to the underrepresentation of women at higher organizational levels and in certain business sectors.

Also, although job complexity is known to play a moderating role in the cognitive ability-performance relationship (Hunter, 1980; Schmidt & Hunter, 1998), little is known about the nature of group differences and how they may differ (or remain the same) across job levels where different degrees of complexity exist.

In sum, the demography of the U.S. workforce is changing and industrial-organizational psychologists' efforts should aim to align their research efforts with these dynamics. Defining more precise estimates of group differences on predictors in lesser studied populations and across job levels is informative to advancing adverse impact research and to assisting organizations in their efforts to develop the most fair and appropriate selection batteries.

The focus of the current study is to further investigate the magnitude of group differences for three protected racial/ethnic groups (Black, Hispanic, and Asian), females, and older employees on cognitive ability and personality measures. To do so, a sample of job applicants that represent three hierarchical job levels will be examined: 1) executive/senior managers, 2) mid-level managers, and 3) first-line managers. A fourth job level or category, professionals, will also be examined.

CHAPTER 2

LITERATURE REVIEW

Adverse Impact

Definition

Adverse impact occurs when the selection rate for a protected group substantially differs from the majority or non-protected group. The term was first introduced in the *Uniform Guidelines on Employee Selection Procedures* (UGESP; Equal Employment Opportunity Commission, Civil Service Commission, Department of Labor, & Department of Justice, 1978) which defines discrimination with regard to Title VII of the 1964 Civil Rights Act, Executive Order 11246 and equal employment opportunity laws regarding race, color, national origin, religion and sex.

Adverse impact can be determined two ways. Most often, the "four-fifths rule" is applied which states that, "a selection rate for any race, sex, or ethnic group which is less than four-fifths (or 80%) of the rate for the group with the highest rate will generally be regarded by Federal enforcement agencies as evidence of adverse impact…" (Zedeck, 2010, p. 6). It is worth noting that this four-fifths or 80% rule is a rule of thumb rather than a legal requirement. Adverse impact is primarily derived from subgroup differences and is often calculated using subgroup *d*, which is the standardized mean difference between the majority group and the protected group (Zedeck, 2010).

In addition to the four-fifths rule, the UGESP also allows for establishing adverse impact through examining statistical and practical significance. The former approach involves statistical significance testing of the selection rate percentages for

the majority and protected groups and its use has increased in recent years (Murphy & Jacobs, 2012; Zedeck, 2010). However, a criticism of its application is that it is often applied in a short-sighted manner and is driven by the strength of a group's sample size rather than the potential discrimination or actual differences between groups (for further discussion see Jacobs, Murphy, & Silva, 2013; Murphy & Jacobs, 2012). Additional statistical methods may be used to calculate adverse impact such as Fisher's exact probability test, the chi square test and the z test (Tippins, 2010). In regard to establishing practical significance, the UGESP offer little guidance in terms of how this can be done or an acceptable strategy for doing so (Zedeck, 2010). Recent thinking has suggested effect size as one indicator of practical significance or importance (Jacobs et al., 2013; Murphy & Jacobs, 2012).

Legal, Organizational and Societal Implications

Although a finding of adverse impact in a predictor does not automatically indicate unlawful discrimination against a protected group(s), it gives a plaintiff a prima facie case for disparate impact discrimination under Title VII of the Civil Rights Act of 1964. The Supreme Court ruling in *Griggs v. Duke Power* (1971) defined disparate impact discrimination to include practices that were "fair in form, but discriminatory in operation" (91 S. Ct. 849, 853; 1971) and led to the inclusion of disparate impact into the 1991 Civil Rights Act.

Once a plaintiff establishes adverse impact, defendants (i.e., employers) may challenge the statistical methods used to determine adverse impact. The burden then lies with the employer to prove job relevance of the predictor in question and to show that alternative measures with no adverse impact were considered.

Employment discrimination litigation is a very costly endeavor for organizations. In fact, over $259 million was spent by organizations on payouts related to discriminatory race, gender, and age practices in 2014 (Equal Employment Opportunity Commission, 2014). It is worth noting that this sum is not inclusive of the costs associated with legal fees and the organizational resources expended in preparing a defense, which makes this expense even greater.

Efforts to mitigate employment discrimination can enable an organization to achieve its diversity goals and positively impact performance. To this point, workplace diversity has several benefits. Allen, Dawson, Wheatley, and White (2008) found that perceived diversity in senior management and non-managerial positions were positively related to perceived firm performance. Further, cultural diversity was found to positively impact firm performance in organizations with clear business growth strategies in place (Richard, 2000). From a selection perspective this makes sense because firms that reflect a larger pool of diverse employees are likely to attract a larger pool of diverse applicants. As applicant pools grow, selectivity increases and the quality of newly hired employees is enhanced. Therefore, organizations would be wise to understand the potential adverse impact against protected classes, as a means to avoid the staggering costs associated with discriminatory employment practices and foster diversity in every way possible.

From a societal perspective, the study of group differences and potential discrimination in selection measures is critical as employment is the gateway to financial access in everyday life. As stated earlier, a finding of adverse impact indicates that a protected class is selected at a lesser rate than another class,

presumably the non-protected class or Whites. Employment inequality is not without consequence. In the 2013 book, Just Who Loses?, Samuel Lucas suggests that discrimination "is costly to the sustenance of all groups" (p. 298). That being said, Lucas sheds light on correlates of workplace discrimination including entrance to the paid labor force, general earnings losses, poverty, and decreased life expectancy (Lucas, 2013). With this broader perspective in mind, it is important that selection devices used in employment settings do not perpetuate or exacerbate discrimination due to potentially harmful consequences for the discriminated and for society at large.

Adverse Impact Research

Most research efforts to date related to adverse impact can be categorized into two streams: 1) estimates of differences between protected and non-protected groups in selection devices and 2) identification of approaches to minimize or reduce adverse impact. Theorizing about the underlying causes of group differences and new insights on the application of intelligence testing have recently contributed to the adverse impact literature. These efforts are described below.

It is well-documented that the heavier the cognitive load of a predictor, the more adverse impact will likely be observed. Most commonly, adverse impact has been found in pure cognitive ability tests and the well-recognized Black-White difference of one standard deviation is often cited in the literature. Lesser or no differences in cognitive ability appear for other protected groups (e.g., Hispanics, Asians). Non-cognitive measures, such as personality measures, have also been

examined for potential and actual adverse impact and it appears that these differences are, in most cases, smaller (Foldes, Duehr, & Ones, 2008).

Despite calls by some to end some group difference research (Ryan & Ployhart, 2014), the continued study of even small differences is worthwhile. Although seemingly small correlations and effect sizes have been reported for racial, gender and age differences in personality, further investigation into these differences (such as the questions pertaining to job level undertaken in this study) is warranted for two primary reasons. First, current equal employment discrimination litigation primarily relies on tests of statistical significance to detect adverse impact. In doing so, large sample sizes will often signal adverse impact even when true differences and practical significance are quite small (Jacobs et al., 2013; Murphy & Jacobs, 2012). Second, when organizations apply small selection ratios (i.e., are highly selective) which is often the case in selection processes with large applicant pools (e.g., large municipal or state law enforcement agencies), even small effect sizes will result in adverse impact (Jacobs et al., 2013; Sackett & Ellingson,1997). For example, under a 90% majority group selection ratio, a *d* of .30 will not result in adverse impact (under the 4/5ths rule) as the minority to majority group selection ratio is .93. However, at a more selective majority group selection ratio of 50%, the minority group selection ratio drops to .76, a violation of the 4/5ths rule (Sackett & Ellingson, 1997). Thus, small differences have greater impact as selectivity increases, which is often an organizational reality.

To reduce adverse impact and, more specifically, the racial differences associated with cognitive ability, a number of strategies have been proposed.

Several articles have reviewed and evaluated these strategies (e.g., Hough et al., 2001; Sackett, Schmitt, Ellingson, & Kabin, 2001). Ployhart and Holtz (2008) summarized research efforts on reducing adverse impact and outlined 16 ways for practitioners to reduce adverse impact yet maintain both diversity and validity goals. These strategies included combining cognitive and non-cognitive predictors, reducing irrelevance from predictor scores, and fostering positive applicant reactions. The authors cited the use of alternative predictor measurement methods as one of the most effective strategies.

Recent research efforts have emphasized new ways of thinking about adverse impact reduction. Newman and Lyon (2009) found that targeted recruitment efforts that expand applicant pools by recruiting minority applicants for cognitive ability, conscientiousness, diversity, or a combination of these factors produced positive results toward achieving hiring and subsequent performance goals. Other work has focused on theorizing and identifying the underlying causes of racial disadvantage. Specifically, Outtz and Newman (2010) proposed a theoretical model of adverse impact that included socioeconomic status, exposure to test content, and exchange motivation as factors influencing group differences. Recently, Cottrell, Newman and Roisman (2015) posited and found support for a three-step model of the origins of adverse impact that included race, marital disadvantage, and parenting factors. In addition, some researchers argue for alternate measurement of the cognitive ability construct. For example, Goldstein and colleagues have explored redefining how intelligence is defined and measuring more specific factors of intelligence, such as fluid reasoning and learning, and neuropsychological influences

to mitigate racial differences (Goldstein, Scherbaum, & Yusko, 2010; Sabet, Scherbaum, & Goldstein, 2013; Scherbaum, Goldstein, Yusko, Ryan, & Hanges, 2012). Other cognitive constructs such as executive attention have also been proposed as an alternative to general mental ability (GMA) tests and have yielded Black-White differences smaller than GMA (Bosco, Allen, & Singh, 2015).

Cognitive Ability

Definition and History

Cognitive ability, also referred to as general mental ability, "*g*," or intelligence, is defined broadly as the ability to engage in information processing and manage complexity (Gottfredson, 2002). In general, the ability to problem solve and reason through daily matters is critical to successful negotiation through life (Gottfredson, 1997) and, more specifically, in the workplace. As the subject of multiple decades of research and academic discussion, cognitive ability is the most established predictor of important work outcomes, particularly training and job performance (Hunter, 1986; Kuncel, Ones, & Sackett, 2010; Ones, Viswesvaran, & Dilchert, 2005; Ryan & Ployhart, 2014).

In fact, research on this topic has a long history and can be traced back to the late 1800s and the early beginnings of differential psychology with Sir Francis Galton's study of the individual differences in mental qualities (Jensen, 1998) and James Cattell's measurement and testing of differences in physiological and sensory abilities (Cattell, 1890; Vinchur, 2007). For example, Galton, recognized as one of the founding fathers of empirical psychology, first proposed that an individual's mental ability is comprised of a general ability and several special abilities (Jensen,

1998). Unfortunately, Galton's attempts to measure individual differences in intelligence were unsuccessful largely due to the unavailability of proper statistical techniques at the time.

Influenced by Galton, Charles Spearman purported that *g* could be likened to a type of "mental energy" applied to all mental tasks (Spearman, 1927). With a background in engineering and interest in mathematics, Spearman developed factor analysis, which later enabled him to propose and confirm that different tests measuring different types of mental abilities appeared to share a common "general factor" or "*g*" (Jensen, 1998; Spearman, 1904) in his paper, "General Intelligence, Objective Determined and Measured." According to Spearman, *g* "denotes a power of mind that affects (to some degree) the quality of virtually everything a person does that requires more than simple sensory acuity or sheer physical strength, endurance, dexterity, or coordination" (Jensen, 1998, p. 13). Consequently, Thurstone (1938) posited a hierarchical model in which specific and more narrow abilities such as verbal ability and inductive reasoning are important. From Thurstone's work, the concepts of fluid and crystallized intelligence emerged (Thurstone & Thurstone, 1941). Fluid intelligence involves reasoning ability (e.g., inductive reasoning), whereas crystallized intelligence involves specific abilities related to the capacity to draw on explicit knowledge (e.g., verbal comprehension).

The emergence of Spearman's concept of *g* and Thurstone's hierarchical model gave rise to comprehensive research on the use and predictive capability of cognitive ability measures in academic settings and organizations during the early 20th century (Ones et al., 2010). Consequently, the successful application of

intelligence testing to screen U.S. Army recruits and identify qualified individuals for officer candidate school in World War I and subsequent psychological assessments by Robert Yerkes through World War II (Yerkes, 1921) brought such testing into the mainstream. Specifically, after the wars, testing became much more prevalent in government, education, and industry. (Landy & Conte, 2004; Scherbaum et al., 2012).

With the promulgation of cognitive ability testing in organizational contexts, mental abilities research and testing continued to advance over the next several decades. For instance, through years of research, Fleishman and colleagues developed a comprehensive taxonomy of human behavior and measurement scales for the work context that included cognitive abilities such as deductive reasoning, memorization, fluency of ideas, and numerical facility (Fleishman, 1966, 1975; Fleishman & Quaintance, 1984; Scherbaum et al., 2012). This taxonomy "provided an initial platform for conceptualizing how intelligence manifests itself as cognitive abilities that positively affect job performance in work organizations." (Scherbaum et al., 2012, p. 131).

A Powerful Predictor of Work-Related Outcomes

One reason why cognitive ability testing continues to be used nearly a century after its initial application in employment settings is due to the strong predictive relationships that have been demonstrated between cognitive ability measures and important work-related outcomes. However, this was not always the case. In the 1960s and 1970s, the evidence of the validity of these measures as a predictor of job performance was mixed at best (James & McIntyre, 2010). In these decades,

the relationship appeared modest and inconsistent which gave rise to the situational specificity hypothesis. This hypothesis suggested that local validity estimates were necessary to estimate predictive values. In the 1970s, Schmidt and Hunter (1977) demonstrated that the variability in cognitive ability studies was due to artifacts such as sampling error and range restriction. Through the use of meta-analysis they discredited the situational specificity hypothesis and established validity generalization as a legitimate assessment of employee selection measures (Ones et al., 2010). Hunter and colleagues' significant validity generalization work on the General Aptitude Test Battery (GATB) provided support for the relationship between cognitive ability and performance (Hunter 1980, 1986; Hunter & Hunter, 1984). It is also worth noting that research by McHenry and colleagues on Project A (McHenry, Hough, Toquam, Hanson, & Ashworth, 1990) produced strong validity evidence for the cognitive ability-performance relationship in the military across a wide variety of jobs.

Since that time several decades of research in the form of reviews, primary studies, and meta-analyses have consistently established that cognitive ability can be used to predict important life and occupational outcomes. For example, Hunter and Hunter (1984) conducted a number of meta-analyses to assess the validity of several predictors of job performance for entry-level jobs. The authors re-analyzed work by Ghiselli (1966, 1973) and others and found that general cognitive ability (r = .53) was the strongest predictor of entry-level job success involving post-hire training. Furthermore, in their seminal meta-analysis, Schmidt and Hunter (1998) summarized 85 years of selection research and determined that the predictive

validity for general mental ability (GMA) tests and training is .56 and for overall performance is .51.

Studies have shown that the strong predictive relationship between cognitive ability and job-related outcomes is due in large part because cognitive ability appears to enable the acquisition of job knowledge, which is critical to job-related learning and job performance (Hunter, 1986; McCloy, Campbell, & Cudeck, 1994; Ree, Carretta, & Steindl, 2001; Schmidt & Hunter, 2004). In a comprehensive review of meta-analytic findings, Ones et al. (2005) concluded that validities for cognitive ability in the prediction of training performance fall within the range of .50 to .60. In turn, those who are more successful in their training efforts are more effective in applying their training to the job and, as such, perform better on the job (Colquitt, LePine, & Noe, 2000). With such robust findings, Schmidt (2002) went so far as to suggest that, “there cannot be a debate” on the definitive relationship between cognitive ability and job performance.

Frequently, an outcome of better job performance within one’s chosen occupation is advancement in an organization. Both cross-sectional and longitudinal studies demonstrate that general mental ability predicts occupational attainment later in life. A review of several cross-sectional (e.g., Jensen, 1998; Schmidt, Hunter, & Pearlman, 1981) and longitudinal studies (e.g., Wilk, Desmarais, & Sackett, 1995; Wilk & Sackett, 1996) led Schmidt and Hunter (2004) to conclude that general mental ability routinely predicted one’s job performance and, ultimately, the occupational level attained. Similarly, Judge, Higgins, Thoresen, and Barrick (1999) examined three longitudinal human development studies conducted across six

decades and found that general mental ability was positively correlated with extrinsic success measures of income and occupational status.

Thus, those who possess high levels of cognitive ability appear to benefit from this intellectual horsepower in a number of important ways in the workplace (e.g., upward mobility) and throughout their careers.

Consequences of Use in Employee Selection

Although it is well-documented that tests of cognitive ability are the most empirically valid predictors of job performance (Schmidt & Hunter, 1998), particularly for complex jobs, a primary drawback is that their use in employee selection routinely results in group differences that disadvantage minority group members (Schmidt, 1988). While researchers have concluded there is no overt bias in cognitive ability tests (Rushton & Jensen, 2005; Sackett, Borneman, & Connelly, 2008), there are unique mean group differences that appear in traditional cognitive ability test scores. As noted earlier, these group differences are often the precursor to adverse impact. Therefore, the sole use of cognitive ability as a predictor can make organizations susceptible to legal scrutiny for discriminatory practices.

Group Differences

Group differences in cognitive ability have received a great deal of attention from researchers and the public across the decades (Herrnstein & Murray, 1994; Jensen, 1980, 1998; Lynn, 2006). In the study of cognitive ability, the most commonly investigated group differences are race and gender, and, to a much lesser degree, age. A review of the existing literature with respect to these group differences in cognitive abilities is presented below.

Racial Differences

The study of racial differences in mental ability has a long history. Differential psychologist, Sir Francis Galton, made early attempts to estimate racial group averages of mental capacity in the late 19th century (Jensen, 1998). Although Galton did not employ psychometric methods and instead based his hypotheses on anecdotal experiences across the globe, he did bring attention to several comparisons of racial groups on intelligence. Specifically, Galton investigated racial intelligence by his personal observation of identifying the number of geniuses within races. He concluded Greeks were most intelligent followed by Scottish, English, Africans, and Australian Aborigines (Galton, 1869, as cited in Lynn, 2006).

The construction of intelligence tests in the early 20th century by Binet (1905) and Terman (1916) led to a plethora of studies on group differences in cognitive ability. For example, in addition to his early contributions to developing the concept of *g*, Spearman proposed that racial group differences would emerge based on a mental test's saturation of *g* (Spearman, 1927).

Interest in racial differences in cognitive ability also grew through the decades with work by Arthur Jensen and particularly as a result of his article, "How Much Can We Boost IQ and School Achievement?" (1969) in the Harvard Educational Review (Rushton & Jensen, 2005). At the end of the 20th century between the 1990s and the early 2000s, the publication of <u>The Bell Curve: Intelligence and Class Structure in American Life</u> (Herrnstein & Murray, 1994) created much debate and discussion around intelligence testing and individual differences. Specifically, one of the most controversial topics in the book related to race and cognitive abilities, suggesting

heritability of intelligence as an underlying cause of the gap between Whites and Blacks on standardized tests. The high visibility of this book and the subsequent conversations it provoked further spurred industrial-organizational research in re-examining group differences and cognitive ability (e.g., Campbell, 1996).

Although there have been a few calls to shift research efforts away from estimating racial differences in cognitive ability, there is still much room for understanding in this regard especially given the changing demographics of the U.S. workforce described earlier. To the dismay of some (e.g., Ryan & Ployhart, 2014), researchers continue to undertake studies in pursuit of clarifying, updating and expanding what is known about group differences in cognitive ability tests and the implications of their use in organizations. However, as Roth et al. (2001) pointed out, much of the research on ethnic group differences has been in the form of narrative reviews rather than rigorous empirical tests. As a result, more empirical work is still needed to acutely define where these differences exist and precisely how this type of testing impacts different subgroups.

Research to date on Black-White, Hispanic-White and Asian-White differences is described below. In studying these differences I agree with other researchers (Jensen, 1980; Neisser et al., 1996) that it is important to point out that mean differences between groups are often smaller than the range of scores within groups. So, while the focus is on between-group racial differences, greater variability within the races suggests there are people of all levels of ability in every race.

Black-White Differences. The most frequently studied racial group comparison with regard to cognitive ability is between Blacks and Whites, primarily due to the large differences that have been uncovered repeatedly in employment contexts (Hunter & Hunter, 1984) and when used for educational admissions (Sackett & Shen, 2010). As noted in Rushton and Jensen (2005), comparisons between Europeans or Caucasians and Africans were made in the early efforts by Galton (1869), Thorndike (1921) and Spearman (1927). These studies uncovered large Black-White differences that were confirmed later by early Army Alpha (Rury, 1988) and Beta tests (Vernon, 1979, as cited in Roth et al., 2001) and in the wide-scale General Aptitude Test Battery (GATB; Sackett & Wilk, 1994).

Policies and popular press publications have also spurred research on Black-White differences. The passage of the 1964 Civil Rights Act (and subsequently, the 1991 Civil Rights Act) spurred industrial-organizational psychologists to make concerted efforts to study these differences more closely (Schmidt, 1988). Also, as mentioned earlier, differences in Black and White intelligence scores were thrust into the public eye for debate and discussion with the publication of The Bell Curve (Herrnstein & Murray, 1994). As a result, renewed and rigorous effort began in the mid-1990s to study the nature of these differences in cognitive ability tests where the widest gaps were detected.

Many primary and meta-analytic studies in the industrial-organizational psychology literature have reported Black-White difference values for cognitive ability tests. The standardized mean difference between Blacks and Whites on cognitive ability tests in employment contexts has been commonly reported in

scientific publications as one standard deviation (Bobko & Roth, 2013; Hough et al., 2001; Jensen, 1980, 1998; Roth et al, 2001; Sackett & Wilk, 1994). Over the years, researchers have sought to identify more precise estimates of this difference. For instance, Schmitt, Clause and Pulakos (1996) reviewed three decades of published studies in three major personnel selection-oriented journals (i.e., *Journal of Applied Psychology*, *Personnel Psychology* and *Journal of Occupational and Organizational Psychology*) and found a weighted effect size of -.83 for general cognitive ability tests. The authors found somewhat smaller effect sizes for more specific abilities such as spatial ability (-.66), manual dexterity (-.14), verbal ability (-.55), and math ability (-.64).

More recently, Bobko and Roth (2013) challenged the accuracy of the commonly accepted Black-White difference of one standard deviation. The authors purported that the inclusion of range-restricted incumbent samples and confounds between constructs and measurement methods resulted in previous narrative reviews and meta-analyses that were “plagued with some methodological problems” (p. 92). Taking these limitations into account, Bobko and Roth demonstrated that a more likely estimate of Black-White differences in cognitive ability is d = .72 for moderate complexity jobs and d = .86 for low complexity jobs (Bobko & Roth, 2013). Although Black-White differences may be somewhat smaller than initially understood when these considerations are taken into account, the differences are still substantive and can result in discrimination against Blacks. Thus, despite the call by Ryan and Ployhart (2014) to halt the estimation of racial differences as a stream of

research no longer worthy of continuing, the present author feels it is important to continue to accurately estimate current Black-White differences.

Hispanic-White Differences. Research on racial group differences on cognitive ability other than Black-White comparisons are the exception rather than the norm (Ployhart & Holtz, 2008; Schmitt et al., 1996). When it comes to Hispanic-White group differences on cognitive ability, Hispanics tend to score lower than Whites but not to the same extent as Blacks (Herrnstein & Murray, 1994; Pulakos & Schmitt, 1996). In looking at intelligence test scores, the most precise Neisser et al. (1996) could conclude was that these scores "typically lie between those of Blacks and Whites" (p.92).

Although Hispanic-White comparisons on cognitive ability measures in selection contexts are not easily found in the literature (Bobko & Roth, 2013; Whetzel, McDaniel, & Nguyen, 2008), a scant number of studies exist that have included Hispanic samples large enough for comparison. For instance, in their seminal meta-analysis on group differences, Roth and colleagues (2001) found that, in industrial samples, Hispanic-White differences in cognitive ability (d = .83) were smaller than Black-White differences (d = .99). In a review of the application of cognitive ability tests in education, employment, and credentialing, Sackett et al. (2001) noted that Hispanics scored approximately two-thirds of a standard deviation below Whites. Therefore, based on these few existing studies, it does appear that Hispanic-White group differences are smaller than Black-White group differences. However, these results were found over a decade ago and more updated estimates are needed.

Further, it is worth mentioning that a similar pattern emerges for other predictors. Specifically, Hispanic-White differences have been found to be smaller than Black-White differences on situational judgment tests (Whetzel et al., 2008) and assessment centers (Dean, Roth, & Bobko, 2008).

Asian-White Differences. The intelligence quotient (IQ) scores of Asians is often on par with or above their White counterparts. Results from intelligence tests point to East Asians generally scoring higher than Whites (d = .20), according to Herrnstein and Murray (1994). Moreover, the extraordinary achievements of Asians is notable (Neisser et al., 1996) and above expectations. In a longitudinal study, Flynn (1991) examined the mean IQs of Asian American children, specifically of Japanese and Chinese descent, and found their scores were more ordinary than extraordinary. However, Asian Americans scored one-third of a standard deviation above Whites on SAT performance. Further, the Asian Americans ascended to professional, managerial or technical roles much beyond White Americans. Nisbett and colleagues (2012) attribute these outcomes to cultural influences such as the Confucian background, which espouses that hard work results in intelligence (Choi, Nisbett, & Norenzayan, 1999; Heine et al., 2001).

In a study that looked at 15 cognitive test scores of Chinese, Japanese and White Americans living in Hawaii, Nagoshi and colleagues (1984) found “the more *g* loaded the test, the greater the mean East Asian-White difference favoring East Asians” (Nagoshi et al., 1984). Asians also demonstrate faster reaction times/information processing speed (e.g., Jensen & Whang, 1994), another correlate of cognitive ability.

As noted previously, largely due to the fact that Asians tend to score higher than Whites on general cognitive ability (Herrnstein & Murray, 1994; Nisbett et al., 2012) and, thus, are not limited in employment opportunities, very few research studies exist that examine Asian-White differences or in an employee selection context. Consequently, this subgroup comparison is omitted or minimally discussed in the major reviews of subgroup differences such as Hough et al. (2001) and Roth et al. (2001). In their Handbook of Employee Selection chapter on cognitive abilities, Ones et al. (2010) describe data on Asian-White differences as "scant to nonexistent" (p. 265). No empirical studies within the last 15 years could be found that examined Asian-White differences in cognitive ability tests used in employment decisions. Thus, research efforts to update how Asians compare to Whites and other protected classes in cognitive ability should be undertaken.

Gender Differences

Historically, very few, if any, overall differences between men and women in general cognitive ability tests have been found (Court, 1983; Halpern, 1992; Jensen, 1998; Maccoby & Jacklin, 1974; Sackett & Wilk, 1994). Exceptions where some differences favoring men have been found include visual-spatial measures such as spatial rotation (Voyer, Voyer & Bryden, 1995) and mechanical reasoning (Hedges & Nowell, 1995), and certain memory tasks favor women (Herlitz & Loven, 2013). In these instances, even small group differences could lead to adverse impact against women (Ones et al., 2010).

Jensen (1998) reviewed previous work and concluded that, "positive and negative mean differences in the various studies distributed about equally around

zero" (Jensen, 1998, p. 541). In fact, the gender similarities hypothesis (Hyde, 2005) suggests that women and men are more alike than different. Specifically, Hyde reviewed the effect sizes of the major meta-analyses conducted on psychological gender differences and found that 78% of the studies showed small to near zero effect sizes. The author concluded, "males and females are similar on most, but not all, psychological variables" (p. 581). In addition, a review and analysis of 42 mental ability tests by Johnson and Bouchard (2007) revealed that most tests showed little or no sex differences.

An alternative explanation for why these differences are not large or even moderate in magnitude is that standardized ability and intelligence tests are developed to minimize such differences (Hough et al., 2001; Neisser et al., 1996). For instance, Jensen (1980) notes that the Stanford-Binet and Wechsler Scales of Intelligence explicitly minimize sex differences by "discarding those items with the largest sex differences in the normative sample and by counterbalancing the number of remaining items that favor either sex" (p. 623).

Nevertheless, industrial-organizational psychologists concur that, with the few exceptions noted earlier, sex differences in cognitive ability are non-existent (Ones et al., 2010). However, Miller and Halpern (2014) have recently called for a reexamination into investigating sex differences and similarities in cognitive abilities. The authors suggest that new research findings in a variety of research streams such as brain differences, culture, stereotyping as well as new temporal trends point to differences not seen previously.

Age Differences

Lifespan research in the last two decades has demonstrated that a decline in cognitive ability occurs with age (Horn, 1982; Schaie & Willis, 1993). While crystallized abilities seem to show greater resistance to aging and may at times increase with age (Schwartzman, Gold, Andrews, Arbuckle, & Chaikelson, 1987), fluid abilities decline early and steadily over time (Salthouse, 2013). In addition, standardized intelligence test scores have risen over time, an observable trend known as the *Flynn effect* (Flynn, 1984). More specifically, Flynn's initial study found that intelligence quotient (IQ) scores increased approximately three points per decade between 1932 and 1978. Using more recent samples (1972-2006) from the Wechsler Adult Intelligence Scale (WAIS), the Wechsler Intelligence Scale for Children (WISC) and the Stanford-Binet, Flynn found a similar increase. Further, a recent meta-analysis by Trahan and colleagues (2014) looked at the magnitude of differences across multiple versions of several standardized intelligence tests and confirmed the three points per decade increase found by Flynn. Pietschnig and Voracek (2015) also conducted a meta-analysis on studies of intelligence tests representing 31 countries across six continents between 1909 and 2013. When comparing fluid and crystallized intelligence tests, the authors found fluid intelligence increased 4.1 points per decade compared to 2.1 points for crystallized intelligence. In an employment context, if later generations score notably higher than earlier generations at a similar age then the use of cognitive ability tests could lead to age differences and ultimately adverse impact for older employees.

Relative to the amount of research focused on examining racial and gender differences in cognitive ability measures used in an employment context, efforts to

understand age differences and potential adverse impact for older employees have been limited (Klein, Dilchert, Ones, & Dages, 2015; Ones et al., 2010). Over two decades ago, a large-scale study was conducted by Avolio and Waldman (1994) using General Aptitude Test Battery (GATB) data and showed that age-related declines in cognitive ability were similar across all racial groups. Ones et al. (2010) generated effect sizes from the Avolio and Waldman study data to estimate the magnitude of differences within racial groups and found that across races, younger employees were consistently advantaged over older employees.

Recently, Klein, Dilchert, Ones, & Dages (2015) found a negative relationship between age and general mental ability in a sample of applicants for executive-level positions, confirming previous findings. In samples of the general working population, the authors found test performance decreased with age on measures of fluid abilities, as expected. Consistent with some aging research (Schwartzman, et al., 1987, as cited in Klein et al., 2015), older employees scored higher than younger employees on crystallized abilities such as vocabulary and verbal ability tests. The authors recommend future investigations of age differences in additional ability measures and in complex jobs other than executive roles.

Personality

Due to the racial differences and subsequent adverse impact observed in the use of cognitive ability tests, researchers and practitioners find themselves facing what has been dubbed the *diversity-validity dilemma* (Pyburn, Ployhart, & Kravitz, 2008). This "dilemma" results from the tension caused by the need to use highly valid measures such as cognitive ability that, at the same time, negatively impact the pass rates of non-Whites. Minimizing adverse impact while maximizing the validity of employee selection procedures is considered to be the "holy grail" for employers striving to engage in fair employment practices and increase workforce diversity while ensuring job relevance.

As noted previously, one strategy for reducing adverse impact involves assessing the full range of job requirements. Specifically, this often involves adding non-cognitive predictors with cognitive ability tests to reduce the overall group difference of the predictor battery (Cascio, Jacobs, & Silva, 2010; Ployhart & Holtz, 2008; Tippins, 2010). This strategy is based upon the assumption and general finding that group differences on personality are smaller than those found for cognitive ability measures (Hough, 1998; Hough et al., 2001). When paired with cognitive ability tests, personality measures can help reduce adverse impact (Campbell, 1996; Hough et al., 2001) and still correspond with important aspects of job performance. While the degree to which non-cognitive predictors lessen adverse impact ratios when added to cognitive predictors is debated (Ryan, Ployhart, & Friedel, 1998; Potosky, Bobko, & Roth, 2005), it is generally accepted that they do help in many situations (Sackett & Ellingson, 1997). In further support of their use,

personality variables generally have small correlations with cognitive ability measures (Ackerman & Heggestad, 1997) and can show strong incremental validity (Hough & Dilchert, 2010).

Within the last twenty years, the use of personality measures in employee selection has grown and the volume of research attention has grown in parallel. A review of the personality literature and a discussion about group differences observed in personality measures follows.

Use in Employee Selection

Across the decades, personality has come in and out of favor with industrial-organizational psychologists. In 1965, Guion and Gottier concluded that the relationship between personality and work performance was minimal, which contributed to the lack of interest in personality use in applied contexts for the next two decades (Hough & Oswald, 2008). The time between the 1960s and early 1980s was dubbed the “dark age for personality” (Hough & Ones, 2001, p. 233) during which this non-cognitive predictor was largely ignored by industrial-organizational psychologists. In the late 1980s, work conducted as part of Project A revitalized efforts and interest in personality (Hough & Oswald, 2008). Consistent with Ghiselli’s findings (1966), the Project A research team found that job relevant personality constructs correlated with discretionary performance measures more than cognitive ability (McHenry et al., 1990), which ignited further interest in these non-cognitive constructs in selection batteries.

Since the early 1990s, research has demonstrated the predictive validity of personality variables for a number of important criteria such as overall job

performance, organizational citizenship behaviors, counterproductive work behavior, managerial effectiveness, and job satisfaction (Hough & Dilchert, 2010).

Although the validity and use of personality in employee selection is not without debate (e.g., Morgeson et al., 2007; Murphy & Dzieweczynski, 2005; Ones, Dilchert, Viswesvaran, & Judge, 2007), over the last two decades, personality measures are viewed as vital to the prediction of job performance and effectiveness (Hough & Ones, 2001).

One organizing framework for the structure of personality has received greater attention than most others proposed to date. Specifically, the Five-Factor Model (FFM) "is the most widely accepted structure of personality variables" (Hough & Dilchert, 2010, p. 299). Factors of the FFM include Emotional Stability, Extraversion, Openness to Experience, Conscientiousness, and Agreeableness. The seminal meta-analysis by Barrick and Mount (1991) established clear linkages between these "Big Five" personality measures and job performance and became one of *Personnel Psychology's* most cited articles (Hollenbeck, 1998).

Over time, personality research by industrial-organizational psychologists has mainly focused on taxonomy development (e.g., Barrick & Mount, 1991; Hough & Ones, 2001), validity of personality measures (e.g., Guion & Gottier, 1965), and response distortion (e.g., Ones, Viswesvaran, & Reiss, 1996; Viswesvaran & Ones, 1999) rather than on group differences.

Group Differences

Racial Differences

There is a relative paucity of quantitative research on subgroup differences in personality measures and theorizing has been minimal (Foldes et al., 2008). Until recently, very few quantitative studies or summaries related to racial differences in personality variables used in selection contexts have been conducted.

A correlational study conducted by Goldberg, Sweeney, Merenda, and Hughes (1998) was one of the first quantitative studies of personality variables and race. The authors surveyed 3,629 U.S. working adults on Big Five dimensions and an alternative five-factor model using Activity Vector Analysis (AVA) dimensions. Not dissimilar from the Big Five, the AVA dimensions included Assertiveness, Sociability, Tranquility/Calmness, Tractability/Conformity, and Conscious Restraint. The authors mostly found small correlations between race and these personality factors. For the Big Five factors, the most notable correlations were found in Conscientiousness in which Blacks and Hispanics described themselves as slightly less conscientious than Whites. For the AVA vectors, similarly weak correlations between race and personality were found with the exception of the Conscious Restraint vector (similar to Conscientiousness) on which Hispanics correlated less strongly than Whites. From this evidence, it was initially concluded that relationships between race and personality variables in working employees were small. However, a primary limitation of this study was the use of correlations to examine differences rather than using the more commonly accepted *d* statistic, which is not sensitive to the size of the groups under comparison (Ones & Anderson, 2002).

Hough et al. (2001) provided a comprehensive summary of mean subgroup ethnic, age and gender differences for personality, cognitive and physical abilities based on nine studies conducted in the late 1990s. In their review of studies reporting differences on personality scales, they concluded, “minimal differences exist” between ethnic/cultural groups at the factor level. In fact, the largest factor level difference was *d* = -.21, in which Blacks scored lower than Whites on Openness to Experience. However, at the facet level, some larger (yet still small) differences were uncovered. Specifically, on the Achievement facet of Conscientiousness, Hispanics and Asian Americans scored “slightly higher” than Whites (*d* = .04 and *d* = .13, respectively). At the same time, these groups scored lower than Whites on dependability (Asian *d* = -.11 and Hispanic *d* = -.29), another facet of Conscientiousness. For Extraversion, Blacks scored higher than Whites on the Surgency facet (*d* = .12) while scoring lower on the Affiliation facet (*d* = -.31). Blacks also had lower scores than Whites on Dependability, a facet of Conscientiousness. Additionally, Blacks scored .30 standard deviation lower than Whites on measures of Managerial Potential, although the stability of the estimate was questionable due to unreported sample sizes. Further, Asians and Hispanics differed from Whites on Social Desirability measures. In sum, the authors found very little differences in personality across ethnic groups at the factor level, but found greater differences at the facet level. In terms of limitations, although Hough and colleagues reported findings from Hispanic and Asian populations, the sample sizes for these groups were particularly small.

A recent meta-analysis by Foldes et al. (2008) represents a substantive undertaking to empirically investigate racial group differences in personality. The authors examined Black-White, Asian-White, Hispanic-White, and American Indian-White differences on a wide array of personality scales organized by the Hough and Ones (2001) taxonomy. Generally, the findings of this meta-analysis point to small racial group differences for the Five Factor model. Similar to Hough et al.'s (2001) findings, Black-White comparisons yielded small differences at the factor level for Extraversion (*d* = -.16), Emotional Stability (*d* = -.09), Openness to Experience (*d* = -.10), Agreeableness (*d* = -.03) and Conscientiousness (*d* = .07). However, the authors also examined facet-level personality and found that some facets yielded larger differences than what was found at the factor level. For example, the sociability facet of Extraversion yielded a larger Black-White difference (*d* = -.39) than what was found at the factor level (*d* = -.16). Similarly, the magnitudes of Hispanic-White, Asian-White and American Indian-White differences were small across factors with a few exceptions in facet-level comparisons. Such findings point to the need to examine facet-level personality to uncover subtle differences that may not be found by assessing only factor- or global-level traits. While Foldes et al.'s meta-analysis makes a substantive contribution to the adverse impact literature and expands what is known about racial differences in personality measures, its limitations reveal questions about the generalizability and applicability of its findings. For example, only 14% of the overall database represented job applicants and only 31% of the samples were derived from organizations. In addition, the organizational samples represented a wide array of jobs that ranged in complexity. Thus, whether

similar racial group differences would be found in an applicant sample across job levels is still unknown.

Gender Differences

Understanding how men and women differ on personality traits has been investigated to a greater extent than other individual differences such as race (Goldberg et al., 1998). However, Berry, Kim, Wang, Thompson, and Mobley (2013) noted there is a "general lack of research on sex-based differential prediction of Five-Factor Model personality tests" (p. 4). Determining differential prediction first requires understanding the magnitude of the differences in these personality constructs and where the greatest differences exist.

The agency-communion framework (Bakan, 1966, as cited in Powell, Goffin, & Gellatly, 2011) has been applied to explain gender differences in personality (Berry et al., 2013; Powell et al., 2011). As a two-factor approach, Hogan and Shelton (1998) posit that the factors of agency and communion represent "getting ahead" and "getting along," respectively. Using this framework, women are regarded as being more "passive, warm, and concerned about others' welfare" whereas men are viewed as "having more forceful, instrumental qualities" (Berry et al., 2013, p.6).

When exploring gender differences in personality, the first major review that warrants discussion is the seminal work by Maccoby and Jacklin (1974). The authors conducted a narrative review of gender differences in intellect, social behavior, and temperament. The authors concluded that men were more assertive (dominant) and aggressive, but less anxious than women. They found no gender

differences in self-esteem. Despite the qualitative nature of this review, the general findings have been replicated and well-supported in subsequent quantitative studies and meta-analyses. Several studies have demonstrated that men describe themselves as more assertive than women (e.g., Eagley & Steffen, 1996; Feingold, 1994; Hyde, 1984). For example, Feingold (1994) meta-analyzed the studies reported in Maccoby and Jacklin (1974) and the normative data of 13 commercial personality inventories organized by the Five-Factor model facets and found that men and women differed greatly on Assertiveness. Also, more recent studies indicate that while men tend to report less general anxiety than women, they are similar on social anxiety (Feingold, 1994). Feingold's (1994) work also showed that women report greater tender-mindedness or nurturance (*d* = -.97) and trust (*d* = -.28) than men.

There are other personality constructs on which men and women show no or weak overall differences. Feingold (1994) consistently found no gender differences on self-esteem or locus of control. Goldberg et al. (1998) sought to extend Feingold's work by examining gender differences in the global Big Five factors and the AVA Factors mentioned in the previous section. Aside from significant correlations between gender and Assertiveness (partial *r* = .26 when other demographic variables were controlled), Goldberg et al. (1998) found most gender-personality correlations in Big Five and AVA factors to be weak (less than *r* = .20). In taking a deeper dive, the authors found that the strongest correlations between gender and terms used in the individual items related to common gender stereotypes of masculinity (e.g., competitive, deliberate) and femininity (e.g.,

romantic, soft-hearted). Further, Ones and Viswesvaran (1998) reported trivial differences when compared against White scores for Blacks, Hispanics, and American Indians on integrity tests, which are said to measure a combination of Conscientiousness, Agreeableness, and Emotional Stability (Ones, 1993, as cited in Ones & Viswesvaran, 1998).

More recent investigations of gender differences explore and compare personality constructs at both the factor and facet levels. Hough et al. (2001) meta-analyzed gender differences on personality constructs for 10 studies conducted between 1993 and 1998 (including Goldberg et al., 1998). They found gender differences at both the Big Five factor and facet levels. At the factor level, they found women scored higher than men on Agreeableness and lower on Adjustment. However, although women scored similarly to men on Conscientiousness and Extraversion factors, there were differences in two facets of these factors: surgency (men scored higher) and dependability (women scored higher). In a sample of 572 job applicants for a Canadian oil refinery, Powell et al. (2011) found greater effect sizes at the facet level than for the general factors of Conscientiousness and Extraversion. Specifically, they found a larger standardized difference favoring men for the industriousness facet (d = .18) than for its factor, Conscientiousness (d = .13). And, they reported greater differences on the facets of affiliation (d = -.26) and dominance (d = .41) than for the Extraversion factor (d = .08). With these results, the authors estimated adverse impact and concluded the use of these facets would result in greater impact than if the general factors were used. The authors focused on just two of the Five Factor Model traits and call for subsequent studies to

examine gender differences in more personality constructs using wider samples in diverse contexts.

In sum, the gender differences described in the above studies are quite small with a few exceptions. In fact, when Berry et al. (2013) investigated differential prediction of personality using the Five Factor Model and actual performance ratings, the authors found minimal bias against either gender. However, greater potential for adverse impact can result with the use of facet-level personality constructs. As such, additional study on subfactor-level differences in a wider array of personality constructs is needed.

Age Differences

A number of qualitative summaries document the relationships between age and personality constructs (e.g., McCrae & Costa, 1990; Schaie & Willis, 1991, 1993). Life span research has demonstrated trends suggesting there will be some age differences, particularly when making comparisons of working adults below 40 years old and at or above that age.

Recently, Soto, John, Gosling, and Potter (2011) examined a cross-sectional sample of over 1.2 million children, adolescents, and adults from 10 to 65 years old to investigate age differences in factor- and facet-level personality. Specifically, among the authors' many findings about personality at various age stages, the results showed that through adulthood, Conscientiousness and Agreeableness showed positive trends where as Neuroticism showed a negative trend. Extraversion and Openness to Experience remained fairly stable and showed no

change through adulthood. Trends in facet-level personality largely mirrored what was found at the factor level.

Goldberg et al. (1998) presented a first attempt to quantitatively investigate the age-personality relationship in a large sample of working adults. After controlling for other demographic variables, the authors found age correlated positively with Conscientiousness (r = .31), Assertiveness (r = .18), and Conscious Restraint (r = .26). Although these authors did not explore facet-level personality, they identified item-level terms correlating most strongly (in either direction) with age. These terms included industriousness (r = .19), pleasure-seeking (r = -.22), and prudent (r = .18) and suggested that older individuals appear to describe themselves as slightly more conscientious and restrained than younger individuals, which is consistent with previous literature. Similarly, although Hough et al. (2001) had very few studies to draw upon, their meta-analysis found minimal differences except for facets of Conscientiousness, such that older employees were notably higher on dependability (d = .49) and lower on achievement (d = -.24).

Based on the sum of previous research, older individuals seem to show greater factor- and facet-level Conscientiousness than younger individuals. Because Conscientiousness is a commonly used non-cognitive measure due to its ability to predict task performance (Barrick, Mount, & Judge, 2001), more updated estimates of age differences on this construct are needed. In general, the efforts described above are almost two decades old and estimates of effect sizes at the factor- and facet-level are needed in job applicant populations to assist in more precisely determining the adverse impact potential of personality.

Hierarchical Job Levels and Homogeneity

There are a number of factors that likely contribute to increased homogeneity and smaller group differences on psychological variables with ascension in an organizational hierarchy.

Job Complexity and Cognitive Demands

Recognition of distinct job requirements across organizational levels is found in the early 20th century work of Weber (1947) on bureaucracy. The idea that job complexity at higher organizational levels requires similarly increasing cognitive complexity can be traced back to Ashby's (1952) principle of requisite variety (as cited in Kaiser, Craig, Overfield, & Yarborough, 2011). Moreover, Katz (1955) and Mann (1965) argued that requisite leadership skills varied by organizational level. Both researchers suggested that the need for technical skills decreases while the need for conceptual skills increases in importance as one moves upward in organizational hierarchies (Hunt, 1991).

Work by Daniel Katz and Robert Kahn serves as the foundation for more contemporary empirical understanding of the uniqueness of organizational roles and their subsequent demands. The authors posited a *systems model* of organizations (Katz & Kahn, 1978). Within these systems lie hierarchically structured levels of leadership that demand "different cognitive styles, different degrees and types of knowledge, and different affective characteristics" (Katz & Kahn, 1978, p. 538). More specifically, they proposed three unique leadership levels in organizations. Roles at the highest hierarchical level introduce structural or policy change. Roles at the next level downward in the hierarchy interpret structure and positions at the

lowest level apply structure. The cognitive demands for each level of leadership vary from taking a system-wide perspective at the highest levels to applying technical knowledge and understanding rules at the lowest levels.

Building upon the work of Katz and Kahn, Jaques (1989) proposed a "requisite organization" and posited *stratified systems theory*, which helped to further define how the nature of work differs across levels and has influenced current multi-level theories and research (Kaiser et al., 2011). The author proposed that as job level increases, so does the role's complexity via time span between action and consequence. More specifically, Jaques suggested that level of work is "measured by those tasks in the role with the longest maximum target completion times" (Jaques, 1989, p.16) and can be categorized into three main leadership levels (strategic corporate, integrative general, operational) and a fourth non-leadership level, shop/office floor. These levels were further defined by eight organizational strata bound by specific time spans. For example, the actions of operators/clerks impact the organization within one day, whereas the consequences of a vice president of business development's actions may impact the organization within 10 to 20 years. Jaques suggested that judgment and decision making were required at all levels; however, the complexity and ability to exercise discretion increase by level.

Job analysis research also supports the idea that cognitive complexity is the primary distinguishing factor among jobs (Gottfredson, 1997). Arvey's (1986, as cited in Gottfredson, 1997) factor analytic work demonstrated that among 140 jobs in the petrochemical industry, judgment and reasoning accounted for 45% of the

variance. Also, Gottfredson (1984) examined a wide variety of jobs and conducted a principal components factor analysis, which showed that overall mental difficulty accounted for 26% of the variance. The author concluded that, “job complexity arises in large part from complexity of information processing demands” (Gottfreson, 1997, p. 106). Gottfredson (1997) also found that jobs loading higher on a job complexity and intelligence factor tended to be more critical to the organization.

Empirical work using job complexity measures also supports the idea that higher job levels require greater cognitive demands. Goodwin and Ziegler (1998) proposed and tested a model of organizational cognitive complexity in a sample of 220 employees representing several organizations and five job levels: plant worker, clerical/secretarial, first level professional/manager, middle-level professional manager, and upper level professional/manager. Job complexity was based on a nine-item measure rated by participants’ supervisors that asked about the extent to which the job required combining different information and coordination of work activities. Among their findings, the authors found a positive relationship ($r = .42$, $p < 0.01$) between job complexity and job level, further supporting the notion that jobs are more complicated upward in organizations.

Additionally, Kaiser and colleagues (2011) conducted a review of the literature on managerial job level differences. Based on the premise that complexity increases with each job level, the authors identified several additional key considerations beyond time span in defining job complexity: functional activities, required skills, and organizational responsibility.

In sum, jobs become more complex as one moves upward in organizations. Unique requirements and responsibilities exist at each organizational level that contribute to increased complexity at the highest levels.

Educational Requirements

In employee selection procedures, educational attainment is often used as an initial screen and can be "viewed as a proxy for specific knowledge and skill, for personality characteristics such as persistence or motivation, or for cognitive ability, among others" (Berry et al., 2006). As jobs become more complex, the level of education required also rises. Gottfredson (1997, 2002) confirmed this notion and demonstrated strong, positive relationships between job complexity and higher levels of education (r = .88) and vocational training (r = .76). Thus, with each hierarchical level, education requirements likely become more stringent and there is less variability in the highest level of education held by employees.

Vocational Choice

Holland's model of vocational interests (1959, 1973, 1997) approaches occupational choice as a function of personality and that "most persons can be categorized as one of six personality types arranged on a hexagon: Realistic, Investigative, Artistic, Social, Enterprising, or Conventional (RIASEC)" (Holland, 1997, p. 2 as cited in Larson, Rottinghaus, & Borgen, 2002). Holland's position purports that people are attracted to occupations and environments that correspond to their strongest personality orientation (Neiner & Owens, 1985, p.132). Using meta-analyses, Larson et al. (2002) investigated the relationship between vocational choice and personality using Holland's RIASEC typology and Big Five personality

factors. The authors found notable relationships between Artistic and Openness (r = .48), Enterprising and Extraversion (r = .41), and Social and Extraversion (r = .31). These findings confirm there is overlap between personality and vocational interests, and that people with certain personalities will likely make similar job choices as others with similar personalities. Furthermore, Neiner and Owens (1985) studied the strength of the relationship between individual characteristics and the job choices of undergraduates. Using biodata, the authors found that environmental experiences that influence personality largely predicted the job categories the students selected.

Furthermore, Holland's work (1997) also explored how individuals make decisions about their occupational level. He proposed that intelligence in combination with one's self-evaluation (a function of socioeconomic origin, need for status, education, and self-concept) determine a person's chosen occupational level. In sum, personality plays a role in both initial vocational choice and in subsequent decisions about the level of job pursued. From this framework, it is plausible to expect that people who pursue similar job levels would be more alike than different in their personality characteristics.

Gravitational Hypothesis

The *gravitational hypothesis* posits that a person will rise to a particular occupational level because of gravitation toward a role compatible with his or her cognitive capacity. This theoretical framework suggests individuals will, over time, come to occupy jobs that are commensurate with their abilities (McCormick, DeNisi, & Shaw, 1979; McCormick, Jeanneret, & Mecham, 1972). Wilk, Desmarais, and Sackett (1995) tested this hypothesis in two ways. First, using a subset of data from

the National Longitudinal Survey, the authors investigated the relationship between ASVAB scores and the complexity level of jobs the participants held five years later. Results generally confirmed the gravitational hypothesis and indicated those with higher ASVAB scores gravitated toward higher complexity jobs and those with lower ASVAB scores tended to report holding lower complexity jobs. Second, in an indirect test, the authors hypothesized that incumbent tenure in occupations would be positively related to cognitive ability, in this case, GATB scores. The authors found greater variability among individuals with less tenure than those with greater tenure in job and in the organization, supporting the gravitational hypothesis.

Building upon this work, Wilk and Sackett (1996) conducted additional tests of the gravitational hypothesis over longer time periods than what was examined in Wilk et al. (1995). In one study, the authors used the same data source (The National Longitudinal Study – Youth Cohort; NLSY) as the previous paper, but now had access to data that spanned 12 years and multiple time periods. To ensure their findings were not simply characteristic of the subjects in the same data set under study, the authors also examined data from the National Longitudinal Study of the Class of 1972 (NLS-72). Results from these studies indicate that ability-job complexity fit played a role in occupational mobility, which lends additional support to the gravitational hypothesis. From this research, one can conclude that people at the highest levels of organizations are likely to have similarly high levels of cognitive ability.

Homophily

In sociology, the *homophily principle* describes the notion that, “contact between similar people occurs at a higher rate than among dissimilar people” (McPherson, Smith-Lovin, & Cook, 2001). Put simply, people interact and have social ties with others who are similar. Social network research has shown that educational and occupational homophily plays a role in an individual’s formal and informal network ties (McPherson et a., 2001). By the nature of how organizations are structured hierarchically, individuals holding jobs at similar levels in the organization should establish connections and experience higher rates of contact with people who are similar.

Such connections and social networks have proven to be quite important to advancement in organizations. Podolny and Baron (1997) investigated the relationship between social networks and the mobility of employees in a high-tech firm. The authors found that employees with vast social networks that provided task-related information and resources appeared to advance upward in the organization more than for employees who had networks with greater “structural holes” or indirect ties in their social networks. Therefore, those who advance to higher levels of organizations likely have more extensive connections than those in lower levels and, as such, interact more frequently with people who are similar.

Perceived Similarity

To move upward into highly complex jobs, a requisite level of performance effectiveness is usually required. Ascension is indicative of, among other things, high performance, which is often determined through managerial performance

ratings. Research has demonstrated that perceived similarities can affect these ratings. In a study of manager and subordinate dyads, Pulakos and Wexley (1983) found that managers gave significantly different (i.e., higher) performance ratings to subordinates who they perceived as more similar to themselves than dissimilar. Additionally, Turban and Jones (1988) confirmed Pulakos' and Wexley's results and found that supervisor-subordinate perceptual congruence about behaviors important to meriting a pay raise led to higher performance ratings. These studies imply perceived similarity is an important determinant of who is judged as a high performer and that those who are less similar are likely not moving upward at the same rate as those who are dissimilar.

Nepotism

An additional factor that may influence increased similarity in the highest levels of organizations is nepotism. For instance, employees in privately held, family-owned companies in which merit-based employment decisions are not in place may engage in nepotism, defined as "a form of preferential selection in which family members of those who are employed by an organization are given preference in the hiring process." (Padgett, Padgett, & Morris, 2015, p. 283). Such preferential treatment by management may result in similar types of people being favored which results in similarity within and across organizational levels.

CHAPTER 3

HYPOTHESES AND RESEARCH QUESTIONS

Cognitive Ability

Based on the literature described earlier, there is support for the positive relationship between job level and cognitive ability. However, there is very little research that has investigated differences in cognitive ability across specific job levels with the exception of Ones and Dilchert (2009). The authors calculated mean score differences on general mental ability and three reasoning tests for three job categories: executives, mid-level managers, and supervisors/first-line managers. Using normative data from the Wonderlic Personnel Test (general mental ability), eTest Deductive Reasoning Scale (deductive reasoning), Watson-Glaser Critical Thinking Appraisal (critical reasoning) and primary data from the Wesman Personnel Classification Test (verbal reasoning), the authors found that with each increasing hierarchical level, cognitive ability and reasoning was successively higher than the norm. For example, executives differed most from the general working population norms on general mental ability (1.10 SD units) and scored .77 and .50 SD units higher than first-line and mid-level managers, respectively.

Additionally, a recent, unpublished dissertation (Natali, 2014) using a primary sample of 4,108 bottom-, mid- and top-level managers showed cognitive scores increased commensurate with increasing organizational level.

Given support for the gravitational hypothesis and the positive relationship between job complexity and cognitive ability, individuals with the highest cognitive ability likely reside in the highest levels of organizations, presumably at the executive

level where their abilities best match the complex cognitive demands of the job. Those with the lowest cognitive ability should be expected to find optimal ability-demand fit in the lower levels of the organization.

In the current study, I expect to replicate these findings:

Hypothesis 1: As hierarchical job level increases, cognitive ability scores will also increase.

Empirical evidence suggests there is more homogeneity in cognitive ability at higher levels than lower levels in organizations. For instance, Wilk and Sackett (1996) found greater range restriction in the cognitive ability of employees in medium- and high-complexity jobs than in lower complexity jobs. This finding is consistent with the vocational literature and with Schneider's (1987) position that restriction of range influences similarity.

Race. A meta-analysis by Roth and colleagues (2001) demonstrated racial differences in cognitive ability were less than one standard deviation in different settings and jobs, and that job complexity played a role in these differences. More specifically, when analyzing within-job studies involving job applicants, the authors found that standardized difference scores for Black-White comparisons decreased with increasing job complexity. They found *d* scores for high, moderate, and low complexity jobs to be .63, .72, and .86, respectively. It is worth noting here that the authors' analysis included only two studies that involved high complexity jobs. Thus, their conclusions about these differences in high complexity jobs should be interpreted with a degree of caution.

Greater homogeneity with increased job complexity also has been shown for other employment predictors. For instance, in a meta-analysis of employment interviews, Huffcutt and Roth (1998) demonstrated that group differences tend to decrease as job complexity increases. Specifically, the authors found that, in Black-White comparisons, interview evaluations in jobs of low complexity yielded *d* = .43, in medium complexity jobs *d* = .22 and in high complexity jobs = -.09. Results for Hispanic-White comparisons yielded a similar pattern of results for low to high complexity jobs (d = .54, .20, -.23, respectively). Interestingly, as can be seen, Blacks and Hispanics evidenced greater performance in interviews than Whites in high complexity jobs.

Past research has clearly established racial differences in cognitive ability. Given the reasons presented above for increasing similarity at higher organizational levels, including the gravitational hypothesis, and past research that shows diminishing racial differences in cognitive ability as complexity increases, I expect to confirm these previous findings across hierarchical job levels:

Hypothesis 2: Racial differences (Black-White, Hispanic-White, Asian-White) in cognitive ability, regardless of magnitude, will decrease as hierarchical job level increases.

Gender. As noted previously, differences between men and women in general cognitive ability largely have not been found with a few unique exceptions (e.g., visual spatial measures, mechanical reasoning, certain memory tasks). Thus, I propose:

Hypothesis 3: Gender differences in cognitive ability will be small regardless of job level.

Age. The literature review above includes evidence of the Flynn Effect, suggesting that younger employees will perform better than older employees on cognitive ability tests. I expect to confirm this result in the current study.

Hypothesis 4a: Across all job levels, younger employees (i.e., below age 40) will have higher scores than older employees (i.e., at or above age 40) on cognitive ability.

Based on stringent educational requirements for high complexity jobs and the gravitational hypothesis, I expect that age differences in cognitive ability will become more homogeneous as job level increases.

Hypothesis 4b: Age differences in cognitive ability, regardless of magnitude, will decrease as hierarchical job level increases.

Personality

A few studies have investigated general personality trends across job levels. For example, one study examined the general correlative relationships between NEO-PI and MBTI dimensions with managerial level (Moutafi, Furnham, & Crump, 2007) in a British sample. The results indicated that after controlling for gender and age, Conscientiousness, Extraversion, and Intuition positively correlated with managerial level. Neuroticism, Introversion, and Sensing were negatively correlated with managerial level. Further, using normative data from the Global Personality Inventory, Ones and Dilchert (2009) assessed mean score differences across top executives, executives and mid-level managers. They concluded that a consistent profile or pattern emerges at each of these three levels such that, on Big Five personality characteristics, top executives score highest followed by executives and mid-level managers. And, the profile remained consistent at all levels such that Emotional Stability and Extraversion scores were highest followed by

Agreeableness. The authors also examined variability of the Big Five personality dimensions within top executives, executives, mid-level managers, first-line managers, and supervisors. They found that, with the exception of Agreeableness, top executives were more homogeneous than the other job levels. Supervisors, the lowest level examined, appeared to show the greatest heterogeneity. Therefore, this evidence suggests that, generally, homogeneity in personality increases as one moves upward in the organization and in roles that involve greater complexity.

At this point, there has been little research that allows for hypothesizing the magnitude of specific group differences (or lack of) for specific personality variables across job levels. Thus, the hypotheses stated below are consistent with the evidence above that groups should be more similar on personality measures at higher job levels than lower job levels.

Factor- vs Facet-Level Research

Upon concluding a thorough review of individual differences across a wide variety of predictor constructs, Hough et al. (2001) concluded that examining subfacets of predictor constructs may reveal notable subgroup differences and called for research to advance our understanding of when to expect to find group differences. For instance, they unexpectedly found moderate group differences in facet-level traits of personality measures that were not observed in broad-level measures. Further, the recent meta-analysis by Foldes et al. (2008) revealed that otherwise minimal racial differences in broad-level personality constructs were modest for specific facets. Because facet-level personality appears to reveal greater

differences than factor-level constructs, the current study plans to investigate both factor- and facet-level differences for each demographic variable under investigation.

Hypothesis 5: Racial differences (Black-White, Hispanic-White, Asian-White) in facet-level and factor-level personality, regardless of magnitude, will decrease as hierarchical job level increases.

Hypothesis 6: Gender differences in factor-level and facet-level personality, regardless of magnitude, will decrease as hierarchical job level increases.

Hypothesis 7: Age differences in factor-level and facet-level personality, regardless of magnitude, will decrease as hierarchical job level increases.

Cognitive Ability-Personality Correlations

Additional research questions regarding the correlation between cognitive ability and personality are proposed in this study. Specifically, these questions relate to understanding the impact of demographic differences on the cognitive ability-personality relationship. As noted earlier, the use of non-cognitive predictors such as personality instruments in conjunction with highly valid cognitive ability tests is one strategy employed by organizations to reduce adverse impact. This strategy is generally most effective in doing so when the intercorrelation between the two predictors is low (Ployhart & Holtz, 2008). Thus, a weak correlation strengthens the ability of personality to lessen group differences (and reduce the likelihood of adverse impact), whereas a stronger correlation indicates personality would not increment prediction very well or lessen potential adverse impact associated with cognitive ability. Previous research has shown that cognitive ability and personality are largely uncorrelated (Ackerman & Heggested, 1997); however, the current study aims to determine whether race, gender, or age differences exist in this relationship and if these correlations vary across job levels.

Research Question 1a & 1b: Are there racial differences in the correlation between cognitive ability test scores and personality? Do they vary across job levels?

Research Question 2a & 2b: Are there gender differences in the correlation between cognitive ability test scores and personality? Do they vary across job levels?

Research Question 3a & 3b: Are there age differences in the correlation between cognitive ability test scores and personality? Do they vary across job levels?

CHAPTER 4

METHOD

Data and Sample

Data used in this study were obtained from a U.S.-based human resources consulting firm. The data represent U.S. job applicants for a variety of jobs in a range of industries who participated in various selection processes that included computerized, online cognitive ability tests and personality measures. In 2013, the firm provided the author with a database of anonymous test scores and demographic information that was created for research purposes.

Applicant data were included in the study for individuals who had completed a cognitive ability or personality instrument and provided job level and demographic information (race, gender, or age). More specific demographic information about the samples on each instrument is provided in subsequent sections of this paper.

All demographic variables were self-reported by job applicants. Race, gender, and age were examined in this study. The racial groups examined in this study included White, Black, Hispanic, and Asian. Male and female identifiers were used for gender. The database included decade-wide age categories for each applicant (e.g., 20-29, 30-39). Because the Age Discrimination in Employment Act (ADEA), protects individuals at or above age 40 from discrimination, applicants were grouped into two age categories: 1) individuals under age 40 and 2) individuals at or above age 40.

Applicants were given the option to select their representative job level from several choices. For the purpose of this study, job levels were grouped into the

following four categories: 1) Executives/Senior Manager, 2) Mid-Level Manager, 3) Supervisor/Entry-Level Manager/Manager Trainee and 4) Professional. For the purpose of this study, the third group is abbreviated and referred to as First-Line Managers. As can be seen, the first three job levels represent hierarchical job levels. The fourth group, Professional, is somewhat undefined regarding where this job group fits into the hierarchy. According to the firm which provided the data, the intent is for individuals without formal leadership responsibility (i.e., individual contributors) to select this job level. However, these types of roles can be situated above or below first-line and mid-level managers. For comparison purposes, this analysis is generally discussed separately from the other three hierarchical job levels.

Measures

Cognitive Ability. Three widely available standardized tests of cognitive ability were used in the current study: Raven's Standard Progressive Matrices (RPM; Raven, 1986), the Thurstone Test of Mental Alertness (TMA; Thurstone & Thurstone, 1968), and the Watson-Glaser Critical Thinking Appraisal (Form S; Watson and Glaser, 1980, 1994).

Raven's Standard Progressive Matrices (RPM). This instrument was developed in the 1930s to assess nonverbal or abstract reasoning ability and is "widely regarded as the best or one of the best tests of Spearman's *g*" (Lynn & Irwing, 2004, p. 482). RPM is "a nonverbal, untimed test that requires inductive reasoning about perceptual patterns" (Neisser et al, 1996, p. 78). With permission from J.C. Raven, a shortened, 35-item version of the RPM is available. The

correlation of the typical long version with the shortened version of the RPM is *r* = .97 (Assess Systems, 2009, 2015).

Thurstone Test of Mental Alertness (TMA). This timed, 126-item test is a measure of flexibility in thinking and intellectual quickness. TMA test items involve verbal and quantitative problems, and measure the ability to "learn quickly, adapt to new problem situations and comprehend complex relationships" (Assess Systems, 2009, p. 40).

Watson-Glaser (WG) Critical Thinking Appraisal (Form S). Shorter than the original Watson-Glaser Critical Thinking Appraisal, Form S is an untimed, 40-item test designed to measure high-level critical thinking ability and verbal skills (Watson & Glaser, 1980, 1994).

Assess Personality Survey (APS). The 350-item, 26-scale personality instrument is adapted from the Guilford-Zimmerman Temperament Survey (Guilford, Zimmerman, & Guilford, 1976) and Dynamic Factors Opinion Survey (Guilford & Martin, 1944; Guilford, Christensen, & Bond, 1956), as well as scales developed by Assess Systems. To evaluate the factor structure of this instrument and its fit with the better known Five-Factor Model (FFM), Assess Systems recently conducted an exploratory factor analysis that yielded a five-factor solution (RMSEA <.05, CFI >.95; Assess Systems, 2015). Then, a multi-level confirmatory factor analysis was conducted on 70,011 individuals, which also confirmed the data best fit a five-factor model (RMSEA = .03, CFI = .94) with all significant factor loadings. The five factors that emerged from this analysis mapped onto the FFM structure of Conscientiousness, Extraversion, Openness to Experience, Agreeableness and

Emotional Stability. The five factors and their corresponding APS scales and definitions are presented in Table 1. Percentile scale scores were used in the analyses. Factor scores were computed by adding the percentile scale scores and then dividing by the number of scales comprising each factor.

Table 1

Assess Personality Survey (APS) Factor Structure and Scales

Factor	Scale	Scale Definition
Agreeableness	Need to Be Liked	Desire to be accepted and liked by others, as opposed to having little concern about acceptance.
	Need for Recognition	Extent to which one wants or needs personal attention, recognition, and positive feedback.
	Need for Freedom	Extent to which one prefers personal freedom and independence in his/her job.
Conscientiousness	Need for Task Closure	Extent to which one has a strong need to complete each task started.
	Fact-Based	Tendency to view information and situations factually and dispassionately, as opposed to viewing situations from a more personal frame of reference.
	Structured	Preference for thinking through problems or situations using logical, systematic procedures and a structured approach, as opposed to problem solving or reaching conclusions in a more direct, single-step fashion.
	Detail Orientation	Extent to which one prefers tasks which require them to be detail-oriented or thorough in their work.
	Work Organization	Tendency to be organized, playful, and structured in the way one works and handles tasks.
	Self-Control	Tendency toward a highly self-controlled, deliberate, and serious style as opposed to a more unrestrained and carefree style.
Emotional Stability	Optimism	Tendency to have an optimistic and positive outlook under most circumstances, as opposed to having a more negative or pessimistic outlook.
	Criticism Tolerance	The response to actual or perceived criticism. “Thick-skinned” vs. “thin skinned.”
	Positive about People	Tendency to be trusting and optimistic in one’s outlook toward people, as opposed to being critical or cynical.
Extraversion	Assertiveness	Tendency to take the initiative with people and make one’s presence felt, as opposed to a preference for remaining in the background.
	Work Pace	Pace at which one prefers to do things.
	Sociability	Extent to which one seeks and feels comfortable in social situations.
	Multi-tasking	Tendency to prefer variety and handling multiple tasks, versus predictability and focusing on one thing at a time.
Openness to Experience	Reflective/Insight	Tendency to be perceptive, introspective and philosophical, as opposed to a tendency to be less contemplative.
	Realistic Thinking	Tendency to be an imaginative, perhaps wishful thinker, as opposed to a more practical and here-and-now thinker.
	Self-Reliance	Preference for relying on oneself and accepting responsibility as opposed to relying on or seeking/accepting support from others.

Analyses

T-tests were used to assess the relationships between gender and age on the cognitive ability instruments and the APS factors. One-way ANOVAs were performed to examine overall job level differences in cognitive ability. Two-way between-subjects ANOVAs were carried out to examine group differences on the cognitive ability and personality measures by job level. For post-hoc analyses, where Levene's statistic indicated non-homogeneous variance, one-way ANOVAs were performed and Games-Howell tests were applied (which subsequently yielded the same results as Tukey's honest significant difference (HSD) test). When homogeneity of variances among groups was found, Tukey's honest significant difference (HSD) test was applied. Additionally, standardized mean differences (*ds*) were computed by subtracting the mean of the majority/unprotected groups (e.g., Whites, males, younger than age 40) from the minority groups (e.g., Hispanics, Asians, females, and 40 and older) dividing by the pooled standard deviation. The *d* statistic was used because it describes differences in standard deviation units and, for the most part, is not influenced by sample size like significant tests (Murphy & Jacobs, 2012). The magnitude of differences was evaluated for size using Cohen's (1988) criteria of small (.20), medium (.50) and large (.80). Further, Fisher's *r* to *z* transformation was applied for the cognitive ability-personality comparisons in Research Questions 1 through 3.

CHAPTER 5

RESULTS

Cognitive Ability

Hypothesis 1 predicted that cognitive ability (CA) scores would increase with hierarchical job level. Table 2 presents the means and standard deviations for CA scores on each instrument by job level. A one-way ANOVA was performed to test for job level differences. Levene's statistic indicated heterogeneity of variance for all three instruments ($p < .001$) and Welch tests were performed to account for this lack of homogeneity. On all three instruments, a statistically significant main effect for job level on cognitive ability was found [RPM: $F(3, 6783) = 31.92$, $p < .001$; TMA: $F(3, 3953) = 150.10$, $p < .001$; WG: $F(3, 6054) = 140.56$, $p < .001$], indicating that scores on cognitive ability differed by job level. Games-Howell post-hoc comparisons were used to determine where differences existed. For all CA instruments, these results revealed that executives had higher scores than all other job levels. Although mid-level managers scored higher than first-line managers on the TMA and WG, they did not significantly differ from first-line managers on RPM. Thus, Hypothesis 1 was fully supported for the TMA and WG, but partially supported for the RPM. It is worth noting that mid-level managers did not demonstrate significantly higher cognitive ability than professionals on all three instruments. As noted previously, it cannot be assumed that the professional level is considered below first-line managers in organizational hierarchy, but comparisons with this group are still made and discussed.

Table 2

Means and Standard Deviations for Cognitive Ability by Job Level

Job Level	*n*	Mean (SD)
	Raven's Progressive Matrices	
Executive/Senior Manager	2283	29.39 (3.73)
Mid-Level Manager	2729	28.66 (3.94)
First-Line Manager	4548	28.43 (4.09)
Professionals	4342	28.82 (4.26)
	Thurstone Test of Mental Alertness	
Executive/Senior Manager	1396	69.32 (16.83)
Mid-Level Manager	1710	63.80 (17.54)
First-Line Manager	2063	56.81 (17.76)
Professionals	2372	62.94 (18.83)
	Watson-Glaser Critical Thinking Appraisal	
Executive/Senior Manager	2425	31.92 (5.09)
Mid-Level Manager	2715	30.38 (5.37)
First-Line Manager	2638	28.78 (5.93)
Professionals	3313	30.11 (5.78)

In Hypothesis 2, I predicted that racial differences in cognitive ability, regardless of magnitude, would decrease as hierarchical job level increased. Table 3 presents the means and standard deviations for each racial group by job level on the three cognitive ability instruments. Two-way, between subjects ANOVAs were conducted and the results are presented in Table 4. Statistically significant race by job level interactions were found for RPM and the WG, but not for the TMA. A review of the estimated marginal means and post-hoc tests on the RPM and WG indicated Blacks and Hispanics consistently scored below Whites and Asians across all job levels and this gap did not lessen until the executive/senior manager level. Effect sizes (Table 3) corroborate the finding that the smallest racial differences consistently occur at the executive/senior manager level for RPM. Asian-White

differences on RPM showed a clear decrease with each hierarchical level (*d* = .66 to .29 to -.04). However, in several instances (e.g., Blacks on RPM and TMA, Hispanics on RPM, Asians on TMA), differences increased from the first-line to mid-level and then notably decreased at the executive/senior manager level. An example of this trend is found for Asians on the TMA whereby *ds* progressively increased from -.45 to -.54, then fell to -.04. Notably, in the opposite direction of the prediction, effect sizes for Hispanic-White differences on the WG grew with hierarchical job level from -.45 at the first-line to -.47 at the mid-level to -.60 at the executive/senior manager level. Thus, given this inconsistent pattern of effect size decline and increase in differences across job levels, Hypothesis 2 was unsupported. It is worth noting here that no consistent trends in racial difference scores for professionals in relation to other job levels were observed, as this group did not yield consistently larger or smaller differences than first-line or mid-level managers.

Gender differences in CA were predicted to be small regardless of job level in Hypothesis 3. Table 5 presents the means and standard deviations for women and men across job levels on each instrument. Independent sample t-tests revealed statistically significant differences favoring men on all three instruments [RPM (t = -13.26, df = 13856, p <.01), TMA (t = -19.28, df = 7944, p <.001), and WG (t = -16.99, df = 9262, p <.001]. Two-way, between subjects ANOVA results are presented in Table 6. These results revealed no gender x job level interaction for RPM, but did yield significant interaction effects for the TMA and WG. Effect sizes were computed (Table 5) and revealed generally small *ds* across the three hierarchical job levels on

RPM and the WG. However, near medium to medium-sized differences favoring males were observed at the professional level on the WG and TMA (*d* = -.43 and -.51, respectively). Therefore, given these findings, Hypothesis 3 was supported for the RPM, but not the WG or TMA.

In Hypothesis 4a, I predicted that younger applicants (i.e., under 40 years old) would have higher cognitive ability scores than older applicants (i.e., 40 years and older) across all job levels. Table 7 presents the means and standard deviations for younger and older applicants across job levels. Independent sample t-tests revealed that, younger applicants scored significantly higher than older applicants on RPM (t = -10.42, df = 10722, p <.001), but older applicants performed significantly better on the WG (t = 2.11, df = 9714, p <.05) and the TMA (t = 9.96, df = 6888, p <.001). Despite these statistically significant findings, effect size estimates indicated these age differences were generally quite small for each test (Overall RPM *d* = -.19, TMA *d* = .22, WG *d* = .04) and across most job levels. Notably, on the WG, younger applicants outperformed older applicants at all job levels except for the executive/senior manager level (*d* = .20). In sum, although applicants under 40 were slightly advantaged on the RPM, this result was not consistently found across levels on the TMA or WG. Thus, Hypothesis 4a was only partially supported. Further analyses were conducted to determine the average age of applicants within each job level as a possible explanation for the inconsistent findings. Using the midpoint of each decade and 60 for the '60 and older category,' mean age by job level was computed and is provided in Table 8. As can be seen, age progressively increased with job level on all three cognitive ability instruments with the youngest applicants at

the first-line level and the oldest at the executive/senior manager level. Therefore, no unexpected irregularities in age existed which may have explained the lack of support for Hypothesis 4a.

Table 8

Mean Applicant Age by Job Level on Cognitive Ability Tests

Job Level	RPM *M(SD)*	TMA *M(SD)*	WG *M(SD)*
Executive/Senior Manager	43.04 (8.66) n=1756	43.98 (8.07) n=1187	43.25 (8.47) n=1840
Mid-Level Manager	39.63 (9.31) n=2230	39.70 (9.25) n=1331	40.53 (8.87) n=2139
First-Line Manager	35.64 (9.94) n=3781	35.39 (10.00) n=1632	35.43 (9.90) n=2147
Professional	36.20 (9.99) n=3372	36.28 (10.01) n=1837	35.34 (9.71) n=2501

Hypothesis 4b predicted age differences in cognitive ability would decrease as hierarchical job level increases. Two-way, between subjects ANOVAs revealed that interactions between age and job level were statistically significant on all three cognitive ability instruments (Table 9). As noted above, the effect sizes were fairly small across levels; however, they were assessed for the predicted, declining trend across job levels. For RPM, age differences progressively became smaller with each hierarchical job level (*d* = -.31, -.17, and -.03) as predicted. However, this same pattern did not hold true for the TMA or WG and thus, Hypothesis 4b is only partially supported. While the age gap did not become smaller with each hierarchical job level on these two instruments, differences were generally small and trended in the direction of favoring older applicants, which was also observed on RPM.

Personality

In Hypothesis 5, I predicted racial differences for Blacks, Hispanics, and Asians on personality factors and facets would decrease with each hierarchical job level. Tables 10 through 14 present the means and standard deviations of each racial group on the five personality factors (Agreeableness, Conscientiousness, Emotional Stability, Extraversion and Openness to Experience) and their associated facets. Table 15 presents the results of the two-way, between subjects ANOVAs performed to assess race by job level interactions on factor-level personality scores. Interaction effects were significant for Extraversion, $F(9, 22983) = 2.11$, $p < .05$, but were not significant for the other four personality factors. As presented in Table 16, effect sizes (Cohen's *d*) were computed to determine whether the magnitude of racial group differences in personality factors and facets decreased with each hierarchical level. In general, the minority-majority racial differences on APS factors and facets were consistently small. Many *d*-values were near zero or small with very few medium effects, leaving little room to vary across job levels. Results for each factor are described below.

Agreeableness. Table 15 presents two-way, between subjects ANOVA results for the Agreeableness factor. Although there were significant main effects for race and job level, the interaction effect was not significant, indicating the effects of race did not depend on job level. In examining the effect sizes across job levels (Table 16), differences on the overall factor were generally near zero and quite small across racial groups and job levels. A similar finding was observed for the facets of Agreeableness. Decreasing differences across the three hierarchical job levels were

indeed found for Asians on the Need for Freedom scale (*d* = .23 to .17 to .04). Conversely, Black-White differences increased on this scale (*d* = -.28 to -.34 to -.41). Hispanic-White differences did not vary across job levels for Agreeableness.

Conscientiousness. Two-way, between subjects ANOVA results (Table 15) indicated significant main effects for race and job level, but the interaction was not significant. A review of the effect sizes (Table 16) revealed particularly small differences, often favoring protected racial groups, on the overall factor and its facets. Only a few instances of decreasing *ds* across job levels were found. For instance, Asian-White differences did decrease very slightly with hierarchical job level on Need for Task Closure (*d* = -.36, -.32, -.30) and Structured (*d* = .61, .54, .40). Further, some differences favoring protected racial groups increased with job level. For instance, Black-White differences (favoring Blacks) increased across job levels for Fact-Based (*d* = .26, .32, .47) and Work Organization (*d* = .24, .25, .35). Also, Asian-White differences notably increased (favoring Asians) on Fact-Based (*d* = .17, .24, .54).

Emotional Stability. As displayed in the two-way, between subjects ANOVA results presented in Table 15, main effects for race and job level were significant, but the interaction effect was not for Emotional Stability. Effect sizes (Table 16) also indicate small differences in the Emotional Stability factor across job levels with only a few instances of change across hierarchical job levels at the facet level. Asian-White differences on Optimism decreased with each hierarchical job level (*d* = -.34, -.25, -.17); however, differences favoring Whites over Asians slightly increased with hierarchical job level on Positive about People (*d* = -.31, -.33, -.42). Black-White

differences also slightly increased with hierarchical job level on Positive about People (*d* = -.20, -.23, -.31).

Extraversion. As presented in Table 15, main effects of race and job level as well as the interaction were significant, indicating the effects of race depend on job level. An examination of the effect sizes (Table 16) revealed mostly small racial differences. At the factor level, racial differences for all three protected groups slightly decreased from the first-line level to mid-level, but often increased to some degree at the executive/senior manager level. Also, Asian-White differences, favoring Whites, tended to increase between the mid-level and the executive level as *ds* increased from -.18 to -.45 for the overall factor, from .-32 to -.58. on Multi-tasking and from -.14 to -.30 on Assertiveness. Notably, Asian professionals differed greatly from their White counterparts (*d* = -.62) on Multi-tasking, which was the largest effect size found for Extraversion and its facets and across all personality factors and facets.

Openness to Experience. Based on two-way, between subjects ANOVA results, significant main effects for race and job level were found, but the interaction effect was not significant (Table 15). Effect sizes presented in Table 16 also corroborate this non-significant finding, as difference scores largely remained near zero or small across all racial groups and job levels.

In sum, with few exceptions, racial differences in personality were often small and did not consistently decrease with each progressive job level for the factors or facets as predicted. Thus, Hypothesis 5 was unsupported.

In Hypothesis 6, I predicted that gender differences regardless of magnitude would decrease as hierarchical job level increased. Tables 17 through 21 present the means and standard deviations for women and men across job levels on the five personality factors. Independent sample t-tests performed on the personality factors revealed a statistically significant difference in gender for Agreeableness (t = 6.11, df = 22685, p <.01), such that women scored higher than men. However, significant differences favoring men were found on Conscientiousness (t = -9.59, df = 22201, p <.01), Emotional Stability (t = -5.79, df = 27500, p <.01) and Openness to Experience (t = -7.90, df = 27500, p <.01). No significant gender difference was found for Extraversion (t = .15, df = 27500, *ns)*. Two-way, between subjects ANOVA results are presented in Table 22. These results revealed significant interaction effects between gender and job level for Agreeableness and Extraversion, but not for the other factors. Despite these statistically significant findings, effect sizes presented for all five factors and facets in Table 23 indicated that effect sizes were quite small with little variation. Therefore, Hypothesis 6 is not supported. It is worth noting that across all four job levels, several facets of Conscientiousness (Structured, Fact Based, Self Control), as well as Assertiveness (Extraversion), and Need for Recognition (Agreeableness) yielded greater differences (favoring males) than at the factor level. For example, although the overall gender d for Conscientiousness is -.08, its facet of Structured yields an overall gender d of -.30.

In Hypothesis 7, I predicted age differences in factor-level and facet-level personality, regardless of magnitude, would decrease as job level increases. Tables 24 through 28 present the means and standard deviations for younger and older

applicants on each personality factor and facet. Independent sample t-tests performed on the personality factors revealed statistically significant differences that favored older applicants (i.e., 40 and older) in Agreeableness (t = 5.28, df = 23968, p <.01), Emotional Stability (t = 13.60, df = 22854, p <.01) and Openness to Experience (t = 9.48, df = 22750, p <.01). In contrast, significant differences favoring younger applicants (i.e., younger than 40) were found on Conscientiousness (t = -20.31, df = 21894, p <.01) and Extraversion (t = -7.08, df = 23968, p <.01). As can be seen in Table 29, results of the two-way, between subjects ANOVAs indicated significant interaction effects between age and job level for Agreeableness, Conscientiousness, and Openness to Experience, but not for Emotional Stability and Extraversion. Similar to race and gender effect sizes, *ds* presented in Table 30 for age differences in personality factors and facets were rather small. A few personality factors and facets showed notable decreases in age differences between the first-line and mid-level manager levels. For instance, age differences for Openness to Experience and its subscales (Reflective, Realistic Thinking, and Self-Reliance) all decreased between the first-line to mid-level and then remained small. Other notable decreases between these two levels include Agreeableness (d = -.23 to .01), Need for Recognition (d = -.39 to -.18) and Sociability (d = -.40 to -.26). However, some differences increased with job level such as Conscientiousness (d = -.10 to -.22 to -.31) and Detail Oriented (d = -.28 to -.35 to -.43). Therefore, Hypothesis 7 was only partially supported. Using the same approach used for the cognitive ability tests, mean age by job level was computed and is presented in

Table 31. Applicant age progressively increased with each hierarchical job level and was ruled out as a possible explanation for the lack of support for this hypothesis.

Table 31

Mean Applicant Age by Job Level on the APS

Job Level	APS *M(SD)*
Executive/Senior Manager	43.72 (8.85) n=4751
Mid-Level Manager	39.97 (9.27) n=4365
First-Line Manager	34.30 (9.94) n=7127
Professional	36.99 (10.10) n=7070

Cognitive Ability-Personality Correlations

Research Questions 1 through 3 pertained to investigating group differences in cognitive ability-personality (CA-P) correlations and whether any differences would vary across job levels. Applicants' RPM scores were correlated with the five personality factors (Agreeableness, Conscientiousness, Emotional Stability, Extraversion, and Openness to Experience) across each of the job levels and overall. To make pairwise comparisons between groups and determine their equality, Fisher's *r* to *z* transformation was applied and tests for differences were performed.

Research questions 1a and 1b pertained to investigating racial differences in CA-P correlations and potential variability across job levels. Table 32 presents the correlations for all racial groups and job levels as well as the *z* values for comparisons between correlations for each protected group and Whites. For the

most part, the CA-P correlations were quite small for most racial groups and across job levels. However, in a few instances, Hispanics and Asians significantly differed from Whites. For example, Hispanic CA-Emotional Stability correlations were significantly stronger than for Whites, particularly at the mid- and first-line levels (z = 2.89 and 2.56, respectively). Additional Hispanic correlations that were significantly stronger than Whites included the CA-Agreeableness correlations (z = 2.26) for executives/senior managers and CA-Extraversion correlations for first-line managers (z = 3.91). Overall Asian correlations that were significantly stronger than Whites were found for Emotional Stability (z = 3.71), Extraversion (z = 4.11), and Openness to Experience (z = 6.82) as well as for Asian first-line managers on Agreeableness (z = 2.05).

Examining gender differences in the ability-personality relationship and potential variation in these differences across job levels was the focus of Research Questions 2a and 2b. Near zero and often non-significant CA-P correlations (r = .00 to .16) were found for both males and females, and across job levels (Table 33). Notably, significant z values were found at the professional level for Emotional Stability (z = -4.75) and Openness to Experience (z = -2.27), indicating that the CA-personality relationship was stronger for men than women. However, these relationships were particularly weak.

Research Questions 3a and 3b pertained to examining CA-P correlations for age differences in younger (under 40) and older (40 or above) applicants and potential variability across job levels. As presented in Table 34, similar to the results found for race and gender comparisons, age CA-P relationships were often quite

weak (r = .01 to r = .19) or non-significant. Notably, older individuals (r = .14) had significantly stronger CA-Emotional Stability correlations than younger individuals (r = .06), although these relationships are still quite weak. This difference was particularly evident in the professional level (z = 3.42), but at no other job level was a significant difference found. A significant z value also was found for overall Extraversion (z = 2.95) such that the CA-Extraversion correlation was stronger for older individuals (r = .04) than for younger individuals (r = -.02, *ns*). However, as can be seen, these relationships are not strong.

Table 3

Descriptive Statistics and Effect Sizes for Cognitive Ability (CA) Tests by Race

	Raven's Progressive Matrices							
	Whites		Blacks			Hispanics		
Job Level	*n*	Mean (SD)	*n*	Mean (SD)	*d*	*n*	Mean (SD)	*d*
Executives/Senior Managers	1534	29.52 (3.63)	78	27.86 (3.67)	-.45	71	28.30 (3.93)	-.32
Mid-Level Managers	1895	28.91 (3.73)	119	26.44 (3.97)	-.64	156	26.53 (5.09)	-.53
First-Line Managers	2873	28.72 (3.72)	394	26.59 (4.60)	-.51	254	26.50 (4.89)	-.51
Professionals	2572	29.22 (3.71)	218	26.76 (4.71)	-.58	174	27.05 (4.81)	-.51
Overall	8874	29.04 (3.72)	809	26.73 (4.47)	-.56	655	26.85 (4.85)	-.51
	Thurstone Test of Mental Alertness							
Executives/Senior Managers	1060	71.11 (15.95)	44	57.59 (18.77)	-.78	57	58.67 (16.54)	-.77
Mid-Level Managers	1161	65.10 (16.77)	60	48.23 (14.75)	-1.07	81	52.68 (17.81)	-.72
First-Line Managers	1326	59.48 (16.89)	121	44.07 (14.77)	-.97	105	44.10 (16.28)	-.93
Professionals	1529	66.18 (17.68)	103	46.89 (16.17)	-1.14	120	49.67 (19.42)	-.89
Overall	5076	65.21 (17.38)	328	47.53 (16.30)	-1.05	363	50.14 (18.33)	-.84
	Watson-Glaser Critical Thinking Test							
Executives/Senior Managers	1650	32.56 (4.69)	87	28.67 (6.60)	-.68	64	29.22 (6.34)	-.60
Mid-Level Managers	1883	30.66 (5.22)	109	27.41 (6.19)	-.57	99	27.95 (6.30)	-.47
First-Line Managers	1601	29.34 (5.67)	178	25.01 (6.39)	-.72	115	26.71 (5.89)	-.45
Professionals	2053	30.68 (5.58)	167	27.49 (5.97)	-.55	127	27.52 (6.51)	-.52
Overall	7187	30.81 (5.43)	541	26.84 (6.39)	-.67	405	27.66 (6.29)	-.54

Note. Negative *ds* indicate scores favoring Whites.

Table 3 (continued)

Descriptive Statistics and Effect Sizes for Cognitive Ability (CA) Tests by Race

	Raven's Progressive Matrices		
	Asians		
	n	Mean (SD)	*d*
Executives/Senior Managers	65	29.34 (4.48)	-.04
Mid-Level Managers	72	29.99 (3.65)	.29
Supervisors/Entry-Level	178	31.19 (3.75)	.66
Managers/Manager Trainees			
Professionals	347	28.71 (5.75)	-.11
Overall	662	29.58 (5.06)	.12
	Thurstone Test of Mental Alertness		
Executives/Senior Managers	25	70.44 (16.38)	-.04
Mid-Level Managers	25	57.12 (12.47)	-.54
Supervisors/Entry-Level	42	52.33 (14.59)	-.45
Managers/Manager Trainees			
Professionals	84	55.42 (19.01)	-.59
Overall	176	57.06 (17.65)	-.47
	Watson-Glaser Critical Thinking Test		
Executives/Senior Managers	44	30.89 (6.05)	-.31
Mid-Level Managers	66	30.68 (5.51)	.00
Supervisors/Entry-Level	154	30.47 (6.33)	.19
Managers/Manager Trainees			
Professionals	173	29.16 (6.21)	-.26

Note. Negative *ds* indicate scores favoring Whites.

Table 4

Two-Way ANOVAs for Cognitive Ability (CA) Tests by Race and Job Level

Source	*SS*	*df*	*MS*	*F*	η_p^2
		Raven's Progressive Matrices			
Job Level	220.81	3	73.60	4.78*	.001
Race	4621.69	3	1540.56	100.11*	.027
Job Level x Race	1132.46	9	125.83	8.18*	.007
Error	169027.38	10984	15.39		
Note: R^2 = .05, adj. R^2 = .05					
		Thurstone Test of Mental Alertness			
Job Level	27307.65	3	9102.55	31.85*	.016
Race	129201.70	3	43067.23	150.67*	.071
Job Level x Race	4011.02	9	445.67	1.56	.002
Error	1694148.68	5927	285.84		
Note: R^2 = .14, adj. R^2 = .14					
		Watson-Glaser Critical Thinking Appraisal			
Job Level	1441.28	3	480.43	16.05*	.006
Race	8923.39	3	2974.46	99.39*	.034
Job Level x Race	800.59	9	88.95	2.97*	.003
Error	255987.04	8554	29.93		
Note: R^2 = .08, adj. R^2 = .08					

*p <.01

Table 5

Descriptive Statistics and Effect Sizes for Cognitive Ability (CA) Tests by Gender

Job Level	Females		Males		
	n	Mean (SD)	*n*	Mean (SD)	*d*
		Raven's Progressive Matrices			
Executives/Senior Managers	569	28.94 (3.53)	1581	29.55 (3.81)	-.17
Mid-Level Managers	911	28.10 (3.84)	1608	29.04 (3.95)	-.24
First-Line Managers	1947	28.23 (3.91)	2105	28.83 (4.16)	-.15
Professionals	1762	28.39 (4.02)	2158	29.34 (4.28)	-.23
Overall	5189	28.34 (3.90)	7452	29.18 (4.09)	-.21
		Thurstone Test of Mental Alertness			
Executives/Senior Managers	255	64.87 (16.42)	1052	70.53 (16.69)	-.34
Mid-Level Managers	586	60.26 (17.25)	985	66.11 (17.16)	-.34
First-Line Managers	792	54.80 (17.32)	980	59.25 (18.13)	-.25
Professionals	1002	58.45 (17.74)	1097	67.79 (18.61)	-.51
Overall	2635	58.38 (17.62)	4114	66.05 (18.14)	-.43
		Watson-Glaser Critical Thinking Test			
Executives/Senior Managers	578	30.69 (5.36)	1647	32.35 (4.92)	-.34
Mid-Level Managers	757	29.79 (5.32)	1656	30.67 (5.39)	-.16
First-Line Managers	937	27.95 (5.78)	1385	29.54 (5.97)	-.27
Professionals	1433	28.99 (5.79)	1527	31.41 (5.42)	-.43
Overall	3705	29.16 (5.70)	6215	31.05 (5.51)	-.34

Note. Negative *d*s indicate scores favoring males.

Table 6

Two-Way ANOVAs for Cognitive Ability (CA) Tests by Gender and Job Level

Source	*SS*	*df*	*MS*	*F*	η_p^2
		Raven's Progressive Matrices			
Job Level	740.37	3	246.79	15.40*	.004
Gender	1569.67	1	1569.67	97.95*	.008
Job Level x Gender	88.13	3	29.38	1.83	.000
Error	202450.80	12633	16.03		
Note: R^2 = .02, adj. R^2 = .01					
		Thurstone Test of Mental Alertness			
Job Level	74766.85	3	24922.28	80.82*	.035
Gender	54278.71	1	54278.71	176.01*	.025
Job Level x Gender	6329.40	3	2109.80	6.84*	.003
Error	1694148.68	5927	285.84		
Note: R^2 = .08, adj. R^2 = .08					
		Watson-Glaser Critical Thinking Appraisal			
Job Level	7616.10	3	2538.70	84.08*	.025
Gender	5793.95	1	5793.95	191.88*	.019
Job Level x Gender	744.84	3	248.28	8.22*	.002
Error					
Note: R^2 = .06, adj. R^2 = .06					

*p <.01

Table 7

Descriptive Statistics and Effect Sizes for Cognitive Ability (CA) Tests by Age

Job Level	Under 40		40 and above		
	n	Mean (SD)	*n*	Mean (SD)	*d*
		Raven's Progressive Matrices			
Executives/Senior Managers	602	29.45 (3.81)	1154	29.33 (3.79)	-.03
Mid-Level Managers	1193	28.97 (3.88)	1037	28.28 (4.02)	-.17
First-Line Managers	2528	28.91 (3.91)	1253	27.67 (4.09)	-.31
Professionals	2222	29.25 (3.91)	1150	28.10 (4.67)	-.27
Overall	6545	29.09 (3.90)	4594	28.33 (4.20)	-.19
		Thurstone Test of Mental Alertness			
Executives/Senior Managers	351	66.93 (17.07)	836	70.97 (16.59)	.24
Mid-Level Managers	708	62.65 (17.63)	623	64.39 (16.88)	.10
First-Line Managers	1105	56.89 (17.70)	527	55.89 (17.56)	-.06
Professionals	1210	62.07 (18.37)	627	65.60 (19.73)	.19
Overall	3374	61.00 (18.14)	2613	65.07 (18.43)	.22
		Watson-Glaser Critical Thinking Test			
Executives/Senior Managers	610	31.44 (5.54)	1230	32.52 (4.74)	.20
Mid-Level Managers	1051	30.58 (5.56)	1088	30.20 (5.22)	-.07
First-Line Managers	1452	29.40 (5.91)	695	27.66 (5.96)	-.29
Professionals	1734	30.33 (5.74)	767	30.19 (5.76)	-.02
Overall	4847	30.25 (5.76)	3780	30.49 (5.59)	.04

Note. Negative *ds* indicate scores favoring younger applicants.

Table 9

Two-Way ANOVAs for Cognitive Ability (CA) Tests by Age and Job Level

Source	*SS*	*df*	*MS*	*F*	η_p^2
		Raven's Progressive Matrices			
Job Level	1305.87	3	435.29	27.14**	.007
Age	1499.66	1	1499.66	93.49**	.008
Job Level x Age	406.50	3	135.50	8.45**	.002
Error	178558.42	11131	16.04		
Note: R^2 = .02, adj. R^2 = .02					
		Thurstone Test of Mental Alertness			
Job Level	98466.82	3	32822.27	103.92**	.050
Age	5639.64	1	5639.64	17.86**	.003
Job Level x Age	5230.94	3	1743.65	5.52**	.003
Error	1888362.41	5979	315.83		
Note: R^2 = .07, adj. R^2 = .07					
		Watson-Glaser Critical Thinking Appraisal			
Job Level	10462.66	3	3487.55	112.98**	.038
Age	166.16	1	166.16	5.38*	.001
Job Level x Age	1770.30	3	590.10	19.12**	.007
Error	266066.19	8619	30.87		
Note: R^2 = .05, adj. R^2 = .05					

*p <.05, **p <.01

Table 10

Descriptive Statistics for Agreeableness and Race

	White		Black			Hispanics		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*	*n*	Mean (SD)	*d*
Agreeableness	4064	57.46 (12.31)	212	53.88 (12.54)	-.29	223	56.78 (13.01)	-.05
Need to Be Liked		61.25 (25.86)		65.42 (24.58)	.17		67.11 (22.59)	.24
Need for Recognition		55.44 (28.36)		51.78 (28.32)	-.13		55.49 (28.49)	.00
Need for Freedom		55.68 (27.42)		44.43 (27.49)	-.41		47.73 (27.46)	-.29
Mid-Level Managers								
Agreeableness	3804	55.32 (12.39)	229	52.10 (13.03)	-.25	227	53.67 (13.29)	-.13
Need to Be Liked		63.99 (25.18)		65.02 (24.81)	.04		65.14 (24.36)	.04
Need for Recognition		53.22 (28.55)		51.58 (29.30)	-.06		54.57 (30.66)	.05
Need for Freedom		48.75 (26.68)		39.70 (26.78)	-.34		41.30 (27.56)	-.27
First-Line Managers								
Agreeableness	5498	52.86 (12.18)	595	50.15 (11.90)	-.23	525	51.40 (11.99)	-.12
Need to Be Liked		66.21 (24.84)		69.65 (24.41)	.14		68.61 (26.25)	.09
Need for Recognition		55.44 (28.36)		51.78 (28.32)	-.13		55.49 (28.49)	.00
Need for Freedom		41.42 (26.38)		34.06 (25.43)	-.28		35.29 (26.50)	-.23
Professionals								
Agreeableness	5596	55.46 (12.16)	423	51.56 (11.52)	-.33	478	53.67 (11.74)	-.15
Need to Be Liked		68.41 (24.74)		73.80 (22.51)	.23		72.44 (23.40)	.17
Need for Recognition		50.05 (29.52)		42.30 (29.76)	-.26		48.46 (31.07)	-.05
Need for Freedom		47.91 (26.95)		38.57 (25.79)	-.35		40.10 (26.35)	-.29
Total								
Agreeableness	18962	55.11 (12.35)	1459	51.41 (12.13)	-.30	1453	53.33 (12.40)	-.14
Need to Be Liked		65.35 (25.24)		69.51 (24.16)	.17		69.10 (24.62)	.15
Need for Recognition		52.10 (29.39)		46.95 (29.97)	-.17		51.16 (30.75)	-.03
Need for Freedom		47.86 (27.30)		37.76 (26.28)	-.38		39.72 (27.06)	-.30

Note. Negative effect sizes indicate scores favoring Whites.

Table 10 (continued)

Descriptive Statistics for Agreeableness and Race

		Asians	
Executives/Senior Managers	*n*	Mean (SD)	*d*
Agreeableness	180	58.40 (11.35)	-.08
Need to Be Liked		59.27 (26.34)	-.08
Need for Recognition		59.24 (30.12)	.13
Need for Freedom		56.70 (28.20)	.04
Mid-Level Managers			
Agreeableness	128	59.24 (12.04)	.32
Need to Be Liked		62.55 (26.46)	-.06
Need for Recognition		61.75 (30.82)	.29
Need for Freedom		53.43 (28.46)	.17
First-Line Managers			
Agreeableness	336	56.71 (12.49)	.31
Need to Be Liked		64.06 (26.51)	-.08
Need for Recognition		58.21 (28.99)	.10
Need for Freedom		47.88 (29.14)	.23
Professionals			
Agreeableness	481	57.06 (12.06)	.13
Need to Be Liked		63.42 (24.88)	-.20
Need for Recognition		56.69 (29.21)	.23
Need for Freedom		51.05 (29.29)	.11
Total			
Agreeableness	1125	57.42 (12.10)	.19
Need to Be Liked		62.85 (25.81)	-.10
Need for Recognition		58.13 (29.48)	.20
Need for Freedom		51.28 (29.09)	.12

Note. Negative effect sizes indicate scores favoring Whites.

Table 11

Descriptive Statistics for Conscientiousness and Race

	White		Black			Hispanics		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*	*n*	Mean (SD)	*d*
Conscientiousness	4064	56.13 (18.40)	212	61.25 (16.21)	.30	223	60.65 (18.31)	.25
Need for Task Closure		66.86 (26.52)		67.19 (26.64)	.01		70.56 (25.59)	.14
Fact-based		52.11 (28.64)		65.01 (26.79)	.47		57.97 (29.87)	.20
Structured		53.61 (29.41)		57.32 (29.88)	.13		56.66 (30.86)	.10
Detail Orientation		53.79 (31.02)		55.71 (28.73)	.06		58.19 (30.00)	.14
Work Organization		58.92 (31.26)		69.30 (27.57)	.35		69.19 (29.33)	.34
Self-Control		51.46 (27.87)		52.99 (25.67)	.06		51.35 (27.06)	.00
Mid-Level Managers								
Conscientiousness	3804	58.96 (18.26)	229	62.79 (18.15)	.21	227	64.23 (16.75)	.30
Need for Task Closure		68.07 (26.63)		68.29 (27.74)	.01		70.13 (27.20)	.08
Fact-based		56.46 (29.16)		65.69 (28.04)	.32		65.47 (28.55)	.31
Structured		55.99 (30.37)		59.76 (31.22)	.12		63.24 (28.16)	.25
Detail Orientation		59.51 (30.07)		62.90 (29.86)	.11		66.77 (26.99)	.25
Work Organization		64.15 (30.28)		71.61 (29.69)	.25		71.80 (28.01)	.26
Self-Control		46.61 (28.02)		48.48 (27.31)	.00		47.99 (26.60)	.05
First-Line Managers								
Conscientiousness	5498	63.43 (17.83)	595	67.44 (16.34)	.23	525	65.82 (16.91)	.14
Need for Task Closure		70.41 (27.60)		69.74 (28.99)	-.02		68.73 (28.18)	-.06
Fact-based		60.50 (29.31)		67.76 (26.54)	.26		67.52 (26.83)	.25
Structured		60.74 (29.81)		65.03 (28.36)	.15		65.58 (30.06)	.16
Detail Orientation		69.83 (27.28)		71.76 (25.10)	.07		70.78 (25.94)	.04
Work Organization		71.20 (28.49)		77.71 (24.97)	.24		75.44 (25.83)	.16
Self-Control		47.90 (27.99)		52.65 (27.08)	.17		46.87 (26.94)	-.04

Note. Negative effect sizes indicate scores favoring Whites.

Table 11 (continued)

Descriptive Statistics for Conscientiousness and Race

	White		Black			Hispanics		
Professionals	*n*	Mean (SD)	*n*	Mean (SD)	*d*	*n*	Mean (SD)	*d*
Conscientiousness	5596	59.49 (18.00)	423	64.31 (16.70)	.28	478	63.26 (17.60)	.21
Need for Task Closure		68.24 (27.17)		70.31 (27.56)	.08		70.62 (27.67)	.09
Fact-based		56.96 (29.02)		66.03 (26.74)	.33		64.04 (27.26)	.25
Structured		55.10 (30.65)		57.39 (30.01)	.08		59.62 (29.57)	.15
Detail Orientation		64.88 (28.72)		67.35 (27.29)	.09		70.36 (26.67)	.20
Work Organization		64.48 (30.38)		74.68 (26.49)	.36		71.44 (27.59)	.24
Self-Control		47.32 (27.62)		50.09 (27.54)	.10		43.46 (26.43)	-.14
Total								
Conscientiousness	18962	59.81 (18.28)	1459	64.90 (16.86)	.29	1453	63.94 (17.41)	.23
Need for Task Closure		68.54 (27.08)		69.31 (28.04)	.03		69.85 (27.46)	.05
Fact-based		56.85 (29.20)		66.53 (26.86)	.35		64.59 (27.88)	.27
Structured		56.60 (30.21)		60.87 (29.71)	.14		61.89 (29.89)	.18
Detail Orientation		62.86 (29.70)		66.76 (27.60)	.14		68.08 (27.33)	.18
Work Organization		65.17 (30.34)		74.65 (26.73)	.33		72.60 (27.38)	.26
Self-Control		48.83 (27.91)		51.30 (27.08)	-.09		46.61 (26.84)	-.17

Note. Negative effect sizes indicate scores favoring Whites.

Table 11 (continued)

Descriptive Statistics for Conscientiousness and Race

	Asians		
Executives/Senior Managers	*n*	Mean (SD)	*d*
Conscientiousness	180	59.76 (17.55)	.20
Need for Task Closure		59.17 (25.52)	-.30
Fact-based		67.22 (27.44)	.54
Structured		65.06 (28.35)	.40
Detail Orientation		55.14 (32.36)	.04
Work Organization		63.60 (29.87)	.15
Self-Control		48.39 (27.87)	-.11
Mid-Level Managers			
Conscientiousness	128	62.42 (16.80)	.20
Need for Task Closure		59.45 (28.05)	-.32
Fact-based		63.23 (27.86)	.24
Structured		71.47 (26.69)	.54
Detail Orientation		62.76 (27.77)	.11
Work Organization		69.04 (28.67)	.17
Self-Control		48.55 (27.27)	.07
First-Line Managers			
Conscientiousness	336	64.24 (16.38)	.05
Need for Task Closure		60.08 (30.34)	-.36
Fact-based		65.22 (27.21)	.17
Structured		77.28 (23.82)	.61
Detail Orientation		68.05 (27.59)	-.06
Work Organization		72.36 (27.94)	.04
Self-Control		42.42 (27.03)	-.20

Note. Negative effect sizes indicate scores favoring Whites.

Table 11 (continued)

Descriptive Statistics for Conscientiousness and Race

		Asians	
Professionals	*n*	Mean (SD)	*d*
Conscientiousness	481	61.02 (16.87)	.09
Need for Task Closure		57.47 (29.56)	-.38
Fact-based		66.20 (26.39)	.33
Structured		70.30 (26.00)	.53
Detail Orientation		60.92 (28.15)	-.14
Work Organization		68.24 (27.74)	.13
Self-Control		42.97 (26.52)	-.16
Total			
Conscientiousness	1125	61.94 (16.89)	.12
Need for Task Closure		58.75 (29.01)	-.35
Fact-based		65.73 (26.96)	.32
Structured		71.68 (26.14)	.53
Detail Orientation		62.33 (28.95)	-.02
Work Organization		68.82 (28.36)	.12
Self-Control		44.31 (27.06)	-.26

Note. Negative effect sizes indicate scores favoring Whites.

Table 12

Descriptive Statistics for Emotional Stability and Race

	White		Black			Hispanics		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*	*n*	Mean (SD)	*d*
Emotional Stability	4064	70.73 (19.60)	212	67.60 (19.68)	-.16	223	70.33 (19.44)	-.02
Optimism		67.79 (27.27)		66.26 (26.29)	-.06		67.14 (26.58)	-.02
Criticism Tolerance		67.41 (27.67)		66.81 (26.57)	-.02		70.58 (27.19)	.12
Positive about People		76.98 (21.86)		69.74 (24.96)	-.31		73.27 (22.72)	-.17
Mid-Level Managers								
Emotional Stability	3804	69.48 (19.79)	229	66.80 (20.51)	-.13	227	67.73 (22.34)	-.08
Optimism		66.23 (27.32)		64.36 (27.24)	-.07		65.05 (28.08)	-.04
Criticism Tolerance		67.40 (27.77)		67.03 (27.27)	-.01		67.50 (30.00)	.00
Positive about People		74.80 (23.09)		69.02 (26.43)	-.23		70.63 (26.63)	-.17
First-Line Managers								
Emotional Stability	5498	66.03 (21.85)	595	62.91 (22.52)	-.14	525	63.53 (23.88)	-.11
Optimism		62.76 (28.36)		62.03 (28.04)	-.03		58.44 (29.41)	-.15
Criticism Tolerance		64.80 (29.33)		61.57 (30.66)	-.11		66.60 (29.66)	.06
Positive about People		70.54 (26.14)		65.13 (28.29)	-.20		65.54 (27.84)	-.19
Professionals								
Emotional Stability	5596	67.78 (20.88)	423	65.83 (20.98)	-.09	478	68.79 (20.53)	.05
Optimism		64.66 (28.03)		62.53 (26.73)	-.08		64.03 (27.77)	-.02
Criticism Tolerance		65.60 (28.41)		65.78 (27.65)	.01		70.72 (27.72)	.18
Positive about People		73.10 (24.69)		69.17 (25.91)	-.16		71.61 (25.30)	-.06
Total								
Emotional Stability	18962	68.25 (20.76)	1459	65.05 (21.43)	-.15	1453	66.96 (22.07)	-.06
Optimism		65.09 (27.89)		63.16 (27.30)	-.07		62.65 (28.41)	-.09
Criticism Tolerance		66.12 (28.42)		64.41 (28.78)	-.06		68.71 (28.75)	.09
Positive about People		73.53 (24.35)		67.58 (26.91)	-.23		69.52 (26.24)	-.16

Note. Negative effect sizes indicate scores favoring Whites.

Table 12 (continued)

Descriptive Statistics for Emotional Stability and Race

		Asians	
Executives/Senior Managers	*n*	Mean (SD)	*d*
Emotional Stability	180	64.33 (21.67)	-.31
Optimism		62.91 (29.29)	-.17
Criticism Tolerance		63.09 (29.29)	-.15
Positive about People		67.01 (25.36)	-.42
Mid-Level Managers			
Emotional Stability	128	63.15 (18.72)	-.33
Optimism		59.38 (27.03)	-.25
Criticism Tolerance		63.05 (27.35)	-.16
Positive about People		67.02 (24.08)	-.33
First-Line Managers			
Emotional Stability	336	58.59 (23.15)	-.33
Optimism		52.87 (29.42)	-.34
Criticism Tolerance		60.79 (30.63)	-.13
Positive about People		62.10 (28.21)	-.31
Professionals			
Emotional Stability	481	60.38 (23.03)	-.34
Optimism		56.98 (29.67)	-.27
Criticism Tolerance		60.52 (29.99)	-.17
Positive about People		63.64 (26.77)	-.37
Total			
Emotional Stability	1125	60.79 (22.47)	-.34
Optimism		56.97 (29.40)	-.28
Criticism Tolerance		61.30 (29.77)	-.17
Positive about People		64.10 (26.73)	-.37

Note. Negative effect sizes indicate scores favoring Whites.

Table 13

Descriptive Statistics for Extraversion and Race

		White		Black			Hispanics	
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*	*n*	Mean (SD)	*d*
Extraversion	4064	68.71 (17.05)	212	63.74 (16.79)	-.29	223	66.93 (15.13)	-.11
Assertiveness		74.72 (22.20)		72.15 (23.06)	-.11		74.83 (21.84)	.00
Work Pace		67.54 (25.30)		62.10 (25.05)	-.22		63.55 (23.80)	-.16
Sociability		64.73 (29.41)		59.92 (28.08)	-.17		66.72 (27.03)	.07
Multi-tasking		67.86 (26.75)		60.80 (26.60)	-.26		62.61 (25.15)	-.20
Mid-Level Managers								
Extraversion	3804	65.89 (18.17)	229	64.28 (15.83)	-.09	227	64.93 (17.65)	-.05
Assertiveness		70.46 (24.06)		72.86 (21.44)	.11		70.64 (23.27)	.01
Work Pace		63.91 (26.36)		59.85 (26.18)	-.15		62.25 (25.34)	-.06
Sociability		64.87 (29.62)		64.49 (28.04)	-.01		64.81 (28.34)	.00
Multi-tasking		64.30 (27.58)		59.93 (26.28)	-.16		62.00 (26.46)	-.09
First-Line Managers								
Extraversion	5498	62.69 (19.62)	595	59.23 (18.62)	-.18	525	60.04 (18.75)	-.14
Assertiveness		62.97 (27.24)		62.57 (23.62)	-.02		63.46 (26.55)	.02
Work Pace		62.16 (27.59)		58.71 (27.29)	-.13		58.59 (26.40)	-.13
Sociability		66.44 (29.18)		61.12 (27.63)	-.19		63.03 (28.87)	-.12
Multi-tasking		59.18 (28.16)		54.51 (28.90)	-.16		55.09 (27.08)	-.15

Note. Negative effect sizes indicate scores favoring Whites.

Table 13 (continued)

Descriptive Statistics for Extraversion and Race

	White		Black			Hispanics		
Professionals	*n*	Mean (SD)	*n*	Mean (SD)	*d*	*n*	Mean (SD)	*d*
Extraversion	5596	61.95 (19.77)	423	58.72 (17.90)	-.17	478	62.20 (18.84)	.01
Assertiveness		62.52 (27.02)		62.48 (23.70)	.00		63.74 (25.80)	.05
Work Pace		59.41 (27.44)		54.02 (26.71)	-.20		58.02 (26.04)	-.05
Sociability		65.07 (29.83)		61.13 (27.37)	-.14		66.79 (26.53)	.06
Multi-tasking		60.78 (28.48)		57.25 (27.77)	-.13		60.22 (27.20)	-.02
Total								
Extraversion	18962	64.40 (19.04)	1459	60.53 (17.87)	-.21	1453	62.57 (18.25)	-.10
Assertiveness		66.86 (26.04)		65.55 (23.66)	-.05		66.42 (25.48)	-.02
Work Pace		62.85 (26.98)		58.03 (26.75)	-.18		59.74 (25.80)	-.12
Sociability		65.35 (29.52)		61.48 (27.69)	-.14		65.11 (27.78)	-.01
Multi-tasking		62.54 (28.03)		57.07(27.93)	-.20		59.01 (26.88)	-.13

Note. Negative effect sizes indicate scores favoring Whites.

Table 13 (continued)

Descriptive Statistics for Extraversion and Race

	Asians		
Executives/Senior Managers	*n*	Mean (SD)	*d*
Extraversion	180	60.86 (18.16)	-.45
Assertiveness		67.73 (24.74)	-.30
Work Pace		63.83 (23.82)	-.15
Sociability		60.83 (30.27)	-.13
Multi-tasking		51.04 (30.38)	-.58
Mid-Level Managers			
Extraversion	128	62.55 (18.63)	-.18
Assertiveness		66.85 (26.08)	-.14
Work Pace		61.47 (26.78)	-.09
Sociability		66.24 (27.65)	.05
Multi-tasking		55.63 (27.01)	-.32
First-Line Managers			
Extraversion	336	57.04 (19.86)	-.29
Assertiveness		58.93 (28.27)	-.15
Work Pace		54.92 (27.13)	-.26
Sociability		64.37 (29.35)	-.07
Multi-tasking		49.93 (28.66)	-.33

Note. Negative effect sizes indicate scores favoring Whites.

Table 13 (continued)

Descriptive Statistics for Extraversion and Race

		Asians	
Professionals	*n*	Mean (SD)	*d*
Extraversion	481	53.45 (19.76)	-.43
Assertiveness		55.35 (27.30)	-.26
Work Pace		53.48 (26.04)	-.22
Sociability		61.97 (29.67)	-.10
Multi-tasking		43.00 (29.00)	-.62
Total			
Extraversion	1125	56.74 (19.68)	-.40
Assertiveness		59.71 (27.48)	-.27
Work Pace		56.47 (26.39)	-.24
Sociability		62.99 (29.46)	-.08
Multi-tasking		47.79 (29.21)	-.52

Note. Negative effect sizes indicate scores favoring Whites.

Table 14

Descriptive Statistics for Openness to Experience and Race

	White		Black			Hispanics		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*	*n*	Mean (SD)	*d*
Openness to Experience	4064	55.69 (13.53)	212	56.58 (13.30)	.07	223	53.76 (14.24)	-.14
Reflective/Insight		55.94 (28.10)		62.94 (26.26)	.26		54.21 (27.22)	-.06
Realistic Thinking		59.64 (27.70)		53.91 (29.50)	-.20		57.23 (28.74)	-.09
Self-Reliance		51.48 (25.72)		52.90 (25.59)	.06		49.84 (26.34)	-.06
Mid-Level Managers								
Openness to Experience	3804	55.08 (13.72)	229	55.98 (15.04)	.06	227	55.51 (13.80)	.03
Reflective/Insight		56.77 (28.40)		65.12 (28.00)	.30		56.44 (27.86)	-.01
Realistic Thinking		56.54 (28.03)		50.82 (29.70)	-.20		56.70 (30.13)	.00
Self-Reliance		51.92 (26.41)		52.00 (27.74)	.00		53.37 (27.18)	.05
First-Line Managers								
Openness to Experience	5498	53.54 (14.15)	595	54.49 (14.34)	.07	525	51.90 (14.77)	-.11
Reflective/Insight		57.96 (29.42)		62.01 (27.71)	-.30		53.53 (28.22)	-.15
Realistic Thinking		51.61 (29.67)		48.12 (29.05)	-.12		51.77 (29.75)	.01
Self-Reliance		51.07 (28.34)		53.33 (27.86)	.08		50.41 (30.21)	-.02
Professionals								
Openness to Experience	5596	54.20 (14.15)	423	56.21 (13.92)	.14	478	54.27 (13.59)	.01
Reflective/Insight		55.79 (29.05)		58.74 (28.20)	.10		52.44 (29.18)	-.12
Realistic Thinking		54.81 (28.75)		54.72 (29.49)	.00		54.69 (29.20)	.00
Self-Reliance		52.01 (27.83)		55.17 (28.36)	.11		55.69 (28.24)	.13
Total								
Openness to Experience	18962	54.51 (13.96)	1459	55.53 (14.20)	.07	1453	53.53 (14.21)	-.07
Reflective/Insight		56.65 (28.84)		61.68 (27.75)	.18		53.73 (28.34)	-.10
Realistic Thinking		55.27 (28.80)		51.30 (29.46)	-.14		54.34 (29.53)	-.03
Self-Reliance		51.60 (27.26)		53.59 (27.66)	.07		52.52 (28.61)	.03

Note. Negative effect sizes indicate scores favoring Whites.

Table 14 (continued)

Descriptive Statistics for Openness to Experience and Race

		Asians	
Executives/Senior Managers	*n*	Mean (SD)	*d*
Openness to Experience	180	51.67 (14.66)	-.28
Reflective/Insight		59.67 (26.93)	.14
Realistic Thinking		50.54 (28.82)	-.32
Self-Reliance		44.79 (29.97)	-.24
Mid-Level Managers			
Openness to Experience	128	54.32 (13.51)	-.06
Reflective/Insight		65.99 (25.81)	.34
Realistic Thinking		49.08 (28.71)	-.26
Self-Reliance		47.88 (27.47)	-.15
First-Line Managers			
Openness to Experience	336	50.89 (15.00)	-.18
Reflective/Insight		65.95 (27.61)	.28
Realistic Thinking		44.67 (29.34)	-.24
Self-Reliance		42.05 (29.32)	-.31
Professionals			
Openness to Experience	481	51.18 (15.47)	-.20
Reflective/Insight		60.78 (27.42)	.18
Realistic Thinking		46.50 (29.65)	-.28
Self-Reliance		46.26 (29.69)	-.20
Total			
Openness to Experience	1125	51.53 (15.01)	-.21
Reflective/Insight		62.74 (27.32)	.22
Realistic Thinking		46.89 (29.35)	-.29
Self-Reliance		44.95 (29.41)	-.23

Note. Negative effect sizes indicate scores favoring Whites.

Table 15

Two-Way ANOVAs for Personality Factors by Race and Job Level

Source	*SS*	*df*	*MS*	*F*	η_p^2
		Agreeableness			
Job Level	11866.13	3	3955.38	26.45**	.00
Race	21294.50	3	7098.17	47.47**	.01
Job Level x Race	2060.41	9	228.94	1.53	.00
Error	3436594.32	22983	149.53		
Note: R^2 = .03, adj. R^2 = .02					
		Conscientiousness			
Job Level	27905.26	3	9301.75	29.03**	.00
Race	41538.00	3	13846.00	43.22**	.01
Job Level x Race	2912.74	9	323.64	1.01	.00
Error	7363356.62	22983	320.38		
Note: R^2 = .03, adj. R^2 = .03					
		Emotional Stability			
Job Level	26987.80	3	8995.93	20.60**	.00
Race	46294.43	3	15431.48	35.33**	.01
Job Level x Race	3546.72	9	394.08	.90	.00
Error	10038832.40	22983	436.79		
Note: R^2 = .02, adj. R^2 = .01					
		Extraversion			
Job Level	41156.15	3	13718.72	38.95**	.01
Race	44595.88	3	14865.29	42.20**	.01
Job Level x Race	6687.17	9	743.02	2.11*	.00
Error	8095487.77	22983	352.24		
Note: R^2 = .03, adj. R^2 = .03					
		Openness to Experience			
Job Level	5231.07	3	1743.69	8.88**	.00
Race	8232.82	3	2744.27	13.97**	.00
Job Level x Race	2330.77	9	258.98	1.32	.00
Error	4515185.24	22983	196.46		
Note: R^2 = .01, adj. R^2 = .01					

*p <.05, **p <.01

Table 16

Summary of Effect Sizes for Personality by Race and Job Level

Agreeableness	Factor	Need to Be Liked	Need for Recognition	Need for Freedom
Black-White				
Executive/Senior Manager	-.29	.17	-.13	-.41
Mid-Level Manager	-.25	.04	-.06	-.34
First-Line Manager	-.23	.14	-.13	-.28
Professional	-.33	.23	-.26	-.35
Total	-.30	.17	-.17	-.38
Hispanic-White				
Executive/Senior Manager	-.05	.24	.00	-.29
Mid-Level Manager	-.13	.04	.05	-.27
First-Line Manager	-.12	.09	.00	-.23
Professional	-.15	.17	-.05	-.29
Total	-.14	.15	-.03	-.30
Asian-White				
Executive/Senior Manager	-.08	-.08	.13	.04
Mid-Level Manager	.32	-.06	.29	.17
First-Line Manager	.31	-.08	.10	.23
Professional	.13	-.20	.23	.11
Total	.19	-.10	.20	.12

Emotional Stability	Factor	Optimism	Criticism Tolerance	Positive about People
Black-White				
Executive/Senior Manager	-.16	-.06	-.02	-.31
Mid-Level Manager	-.13	-.07	-.01	-.23
First-Line Manager	-.14	-.03	-.11	-.20
Professional	-.09	-.08	.01	-.16
Total	-.15	-.07	-.06	-.23
Hispanic-White				
Executive/Senior Manager	-.02	-.02	.12	-.17
Mid-Level Manager	-.08	-.04	.00	-.17
First-Line Manager	-.11	-.15	.06	-.19
Professional	.05	-.02	.18	-.06
Total	-.06	-.09	.09	-.16
Asian-White				
Executive/Senior Manager	-.31	-.17	-.15	-.42
Mid-Level Manager	-.33	-.25	-.16	-.33
First-Line Manager	-.33	-.34	-.13	-.31
Professional	-.34	-.27	-.17	-.37
Total	-.34	-.28	-.17	-.37

Note. Negative effect sizes indicate scores favoring Whites.

Table 16 (continued)

Summary of Effect Sizes for Personality by Race and Job Level

Extraversion	Factor	Assertive-ness	Work Pace	Sociability	Multi-tasking
Black-White					
Executive/Senior Manager	-.29	-.11	-.22	-.17	-.26
Mid-Level Manager	-.09	.11	-.15	-.01	-.16
First-Line Manager	-.18	-.02	-.13	-.19	-.16
Professional	-.17	.00	-.20	-.14	-.13
Total	-.21	-.05	-.18	-.14	-.20
Hispanic-White					
Executive/Senior Manager	-.11	.00	-.16	.07	-.20
Mid-Level Manager	-.05	.01	-.06	.00	-.09
First-Line Manager	-.14	.02	-.13	-.12	-.15
Professional	.01	.05	-.05	.06	-.02
Total	-.10	-.02	-.12	-.01	-.13
Asian-White					
Executive/Senior Manager	-.45	-.30	-.15	-.13	-.58
Mid-Level Manager	-.18	-.14	-.09	.05	-.32
First-Line Manager	-.29	-.15	-.26	-.07	-.33
Professional	-.43	-.26	-.22	-.10	-.62
Total	-.40	-.27	-.24	-.08	-.52

Openness to Experience	Factor	Reflective	Realistic	Self-Reliance
Black-White				
Executive/Senior Manager	.07	.26	-.20	.06
Mid-Level Manager	.06	.30	-.20	.00
First-Line Manager	.07	-.30	-.12	.08
Professional	.14	.10	.00	.11
Total	.07	.18	-.14	.07
Hispanic-White				
Executive/Senior Manager	-.14	-.06	-.09	-.06
Mid-Level Manager	.03	-.01	.00	.05
First-Line Manager	-.11	-.15	.01	-.02
Professional	.01	-.12	.00	.13
Total	-.07	-.10	-.03	.03
Asian-White				
Executive/Senior Manager	-.28	.14	-.32	-.24
Mid-Level Manager	-.06	.34	-.26	-.15
First-Line Manager	-.18	.28	-.24	-.31
Professional	-.20	.18	-.28	-.20
Total	-.21	.22	-.29	-.23

Note. Negative effect sizes indicate scores favoring Whites.

Table 16 (continued)

Summary of Effect Sizes for Personality by Race and Job Level

Conscientiousness	Factor	Need for Task Closure	Fact Based	Structured	Detail Orientation	Work Organization	Self-Control
Black-White							
Executive/Senior Manager	.30	.01	.47	.13	.06	.35	.06
Mid-Level Manager	.21	.01	.32	.12	.11	.25	.00
First-Line Manager	.23	-.02	.26	.15	.07	.24	.17
Professional	.28	.08	.33	.08	.09	.36	.10
Total	.29	.03	.35	.14	.14	.33	-.09
Hispanic-White							
Executive/Senior Manager	.25	.14	.20	.10	.14	.34	.00
Mid-Level Manager	.30	.08	.31	.25	.25	.26	.05
First-Line Manager	.14	-.06	.25	.16	.04	.16	-.04
Professional	.21	.09	.25	.15	.20	.24	-.14
Total	.23	.05	.27	.18	.18	.26	-.17
Asian-White							
Executive/Senior Manager	.20	-.30	.54	.40	.04	.15	-.11
Mid-Level Manager	.20	-.32	.24	.54	.11	.17	.07
First-Line Manager	.05	-.36	.17	.61	-.06	.04	-.20
Professional	.09	-.38	.33	.53	-.14	.13	-.16
Total	.12	-.35	.32	.53	-.02	.12	-.26

Note. Negative effect sizes indicate scores favoring Whites.

Table 17

Descriptive Statistics for Agreeableness and Gender

	Females		Males		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Agreeableness	1236	58.11 (11.83)	3793	57.13 (12.48)	.08
Need to Be Liked		66.43 (24.58)		59.97 (25.84)	.26
Need for Recognition		51.70 (27.14)		56.61 (28.76)	-.18
Need for Freedom		56.22 (27.50)		54.81 (27.68)	.05
Mid-Level Managers					
Agreeableness	1626	56.18 (12.19)	3141	54.45 (12.54)	.14
Need to Be Liked		68.83 (24.01)		61.40 (25.38)	.30
Need for Recognition		49.07 (27.94)		55.05 (29.16)	-.21
Need for Freedom		50.64 (26.19)		46.92 (27.06)	.14
First-Line Managers					
Agreeableness	3342	53.77 (11.90)	4067	51.88 (12.31)	.16
Need to Be Liked		70.23 (24.23)		63.17 (25.35)	.28
Need for Recognition		48.94 (29.90)		52.41 (30.64)	-.11
Need for Freedom		42.15 (26.55)		40.05 (26.90)	.08
Professionals					
Agreeableness	3598	54.82 (11.82)	4241	55.24 (12.39)	-.03
Need to Be Liked		72.13 (23.49)		65.60 (25.24)	.27
Need for Recognition		45.04 (28.78)		53.37 (30.14)	-.28
Need for Freedom		47.30 (26.52)		46.75 (27.76)	.02
Total					
Agreeableness	9802	55.10 (11.99)	15242	54.65 (12.57)	.04
Need to Be Liked		70.21 (24.04)		62.69 (25.54)	.30
Need for Recognition		47.88 (28.92)		54.27 (29.78)	-.22
Need for Freedom		47.22 (26.99)		47.00 (27.87)	.01

Note. Negative effect sizes indicate scores favoring males.

Table 18
Descriptive Statistics for Conscientiousness and Gender

	Females		Males		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Conscientiousness	1236	54.47 (18.18)	3793	57.42 (18.40)	-.16
Need for Task Closure		66.77 (26.32)		66.38 (26.63)	.01
Fact-based		49.17 (29.22)		55.30 (28.54)	-.21
Structured		47.86 (29.47)		56.69 (29.32)	-.30
Detail Orientation		56.27 (30.58)		53.31 (30.95)	.10
Work Organization		58.84 (30.99)		60.25 (31.19)	-.05
Self-Control		47.91 (27.26)		52.58 (27.87)	-.17
Mid-Level Managers					
Conscientiousness	1626	57.98 (17.73)	3141	60.39 (18.27)	-.13
Need for Task Closure		68.08 (26.39)		67.35 (27.10)	.03
Fact-based		53.85 (30.00)		60.14 (28.29)	-.22
Structured		50.24 (29.99)		60.58 (29.81)	-.35
Detail Orientation		63.50 (28.39)		58.11 (30.33)	.18
Work Organization		65.64 (29.93)		64.61 (30.36)	.03
Self-Control		46.59 (27.73)		51.54 (27.82)	-.18
First-Line Managers					
Conscientiousness	3342	62.62 (17.47)	4067	64.87 (17.69)	-.13
Need for Task Closure		71.06 (27.28)		67.58 (28.91)	.12
Fact-based		57.41 (29.90)		65.63 (27.63)	-.29
Structured		57.31 (30.11)		66.48 (28.61)	-.31
Detail Orientation		71.81 (25.95)		68.03 (27.85)	.14
Work Organization		72.49 (27.68)		71.58 (28.47)	.03
Self-Control		45.65 (27.69)		49.92 (27.87)	-.15
Professionals					
Conscientiousness	3598	59.09 (17.55)	4241	61.04 (18.10)	-.11
Need for Task Closure		68.63 (27.14)		66.46 (28.13)	.08
Fact-based		55.10 (29.25)		61.62 (27.87)	-.23
Structured		50.65 (30.56)		61.87 (29.38)	-.37
Detail Orientation		68.24 (27.00)		62.45 (29.55)	.20
Work Organization		67.18 (29.38)		64.77 (30.41)	.08
Self-Control		44.77 (27.31)		49.04 (27.84)	-.15
Total					
Conscientiousness	9802	59.53 (17.83)	15242	61.03 (18.30)	-.08
Need for Task Closure		69.13 (27.00)		66.92 (27.77)	.08
Fact-based		54.93 (29.70)		60.81 (28.31)	-.20
Structured		52.50 (30.38)		61.55 (29.46)	-.30
Detail Orientation		67.16 (27.81)		60.77 (30.13)	.22
Work Organization		67.68 (29.43)		65.43 (30.37)	.08
Self-Control		45.77 (27.52)		50.67 (27.89)	-.18

Note. Negative effect sizes indicated scores favoring males.

Table 19

Descriptive Statistics for Emotional Stability and Gender

	Females		Males		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Emotional Stability	1236	69.39 (19.48)	3793	70.29 (19.91)	-.05
Optimism		65.97 (26.93)		67.84 (27.48)	-.07
Criticism Tolerance		65.93 (28.11)		67.53 (27.51)	-.06
Positive about People		76.28 (21.68)		75.50 (22.82)	.04
Mid-Level Managers					
Emotional Stability	1626	67.28 (20.08)	3141	69.52 (19.94)	-.24
Optimism		63.61 (27.98)		66.59 (27.16)	-.11
Criticism Tolerance		63.79 (28.09)		68.50 (27.67)	-.17
Positive about People		74.45 (23.00)		73.48 (23.99)	.04
First-Line Managers					
Emotional Stability	3342	64.51 (22.48)	4067	65.04 (22.26)	-.02
Optimism		60.43 (29.08)		62.38 (28.40)	-.07
Criticism Tolerance		62.96 (30.14)		64.98 (29.25)	-.07
Positive about People		70.16 (26.11)		67.75 (27.44)	.09
Professionals					
Emotional Stability	3598	66.41 (21.14)	4241	67.42 (21.32)	-.05
Optimism		62.87 (28.44)		64.70 (28.04)	-.06
Criticism Tolerance		63.46 (29.11)		66.80 (28.06)	-.12
Positive about People		72.91 (24.50)		70.74 (26.00)	.09
Total					
Emotional Stability	9802	66.29 (21.29)	15242	67.93 (21.06)	-.08
Optimism		62.55 (28.45)		65.25 (27.89)	-.10
Criticism Tolerance		63.66 (29.19)		66.85 (28.20)	-.11
Positive about People		72.65 (24.57)		71.69 (25.41)	.04

Note. Negative effect sizes indicate scores favoring males.

Table 20

Descriptive Statistics for Extraversion and Gender

	Females		Males		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Extraversion	1236	69.74 (16.22)	3793	67.33 (17.34)	.14
Assertiveness		71.50 (22.83)		75.20 (22.18)	-.16
Work Pace		68.05 (24.22)		66.45 (25.57)	.06
Sociability		69.14 (28.02)		62.73 (29.54)	.22
Multi-tasking		70.29 (25.35)		64.93 (27.65)	.16
Mid-Level Managers					
Extraversion	1626	65.41 (18.27)	3141	65.15 (18.24)	.01
Assertiveness		66.24 (25.15)		71.88 (23.69)	-.23
Work Pace		61.79 (26.28)		64.11 (26.39)	-.09
Sociability		67.89 (29.12)		62.32 (29.60)	.19
Multi-tasking		70.29 (25.35)		64.93 (27.65)	.20
First-Line Managers					
Extraversion	3342	62.61 (19.30)	4067	60.64 (19.96)	.10
Assertiveness		60.58 (27.03)		63.97 (26.88)	-.13
Work Pace		60.07 (27.11)		61.57 (28.07)	-.05
Sociability		68.20 (28.15)		62.72 (29.90)	.19
Multi-tasking		61.58 (27.79)		54.29 (28.60)	.26
Professionals					
Extraversion	3598	60.79 (19.28)	4241	60.77 (20.14)	.00
Assertiveness		58.14 (27.10)		64.58 (26.37)	-.24
Work Pace		57.14 (26.73)		59.04 (27.78)	-.07
Sociability		66.16 (28.94)		62.94 (29.96)	.11
Multi-tasking		61.73 (28.24)		56.53 (29.08)	.18
Total					
Extraversion	9802	63.31 (18.98)	15242	63.27 (19.26)	.00
Assertiveness		62.00 (26.64)		68.57 (25.45)	-.25
Work Pace		60.29 (26.70)		62.60 (27.19)	-.09
Sociability		67.52 (28.60)		62.70 (29.76)	.17
Multi-tasking		63.43 (27.67)		59.20 (28.67)	.15

Note. Negative effect sizes indicate scores favoring males.

Table 21

Descriptive Statistics for Openness to Experience and Gender

	Females		Males		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Openness to Experience	1236	54.68 (14.16)	3793	55.64 (13.51)	-.07
Reflective/Insight		57.90 (27.13)		55.71 (28.30)	.08
Realistic Thinking		57.02 (27.35)		59.47 (28.06)	-.09
Self-Reliance		49.13 (26.31)		51.74 (25.86)	-.10
Mid-Level Managers					
Openness to Experience	1626	54.63 (13.83)	3141	55.32 (13.70)	-.05
Reflective/Insight		58.27 (27.71)		57.09 (28.74)	.04
Realistic Thinking		54.72 (27.66)		56.68 (28.47)	-.07
Self-Reliance		50.89 (26.79)		52.20 (26.51)	-.05
First-Line Managers					
Openness to Experience	3342	52.73 (14.04)	4067	53.82 (14.43)	-.08
Reflective/Insight		57.16 (29.27)		59.46 (29.08)	-.08
Realistic Thinking		50.31 (29.23)		51.57 (30.03)	-.04
Self-Reliance		50.72 (28.72)		50.43 (28.37)	.01
Professionals					
Openness to Experience	3598	53.28 (14.14)	4241	54.82 (14.30)	-.11
Reflective/Insight		55.03 (28.62)		57.41 (29.18)	-.08
Realistic Thinking		53.87 (28.38)		54.47 (29.46)	-.02
Self-Reliance		50.94 (27.98)		52.58 (28.22)	-.06
Total					
Openness to Experience	9802	53.49 (14.08)	15242	54.86 (14.04)	-.10
Reflective/Insight		56.66 (28.54)		57.47 (28.88)	-.03
Realistic Thinking		53.19 (28.52)		55.40 (29.22)	-.08
Self-Reliance		50.63 (27.84)		51.72 (27.35)	-.04

Note. Negative effect sizes indicate scores favoring males.

Table 22

Two-Way ANOVAs for Personality Factors by Gender and Job Level

Source	*SS*	*df*	*MS*	*F*	η_p^2
		Agreeableness			
Job Level	59909.52	3	19969.84	133.62**	.02
Gender	5716.68	1	5716.68	38.25**	.00
Job Level x Gender	5955.73	3	1985.24	13.28**	.00
Error	3741743.86	25036	149.46		
Note: R^2 = .02, adj. R^2 = .02					
		Conscientiousness			
Job Level	163395.81	3	54465.27	169.63**	.02
Gender	29759.29	1	29759.29	92.69**	.00
Job Level x Gender	659.85	3	219.95	.69	.00
Error	8038509.13	25036	321.08		
Note: R^2 = .02, adj. R^2 = .02					
		Emotional Stability			
Job Level	74872.01	3	24957.34	56.22**	.01
Gender	7088.83	1	7088.83	15.97**	.00
Job Level x Gender	2057.08	3	685.69	1.55	.00
Error					
Note: R^2 = .01, adj. R^2 = .01					
		Extraversion			
Job Level	188382.56	3	62794.19	175.19**	.02
Gender	7136.39	1	7136.39	19.91**	.00
Job Level x Gender	6018.65	3	2006.22	5.60**	.00
Error	8973844.12	25036	358.44		
Note: R^2 = .02, adj. R^2 = .02					
		Openness to Experience			
Job Level	12409.47	3	4136.49	21.00**	.00
Gender	5971.60	1	5971.60	30.32**	.00
Job Level x Gender	548.73	3	182.91	.93	.00
Error	4930829.10	25036	196.95		
Note: R^2 = .01, adj. R^2 = .01					

*p <.05, **p <.01

Table 23

Summary of Effect Sizes for Personality by Gender and Job Level

Agreeableness	Factor	Need to Be Liked	Need for Recognition	Need for Freedom
Executive/Senior Manager	.08	.26	-.18	.05
Mid-Level Manager	.14	.30	-.21	.14
First-Line Manager	.16	.28	-.11	.08
Professional	-.03	.27	-28	.02
Total	.04	.30	-.22	.01

Emotional Stability	Factor	Optimism	Criticism Tolerance	Positive about People
Executive/Senior Manager	-.05	-.07	-.06	.04
Mid-Level Manager	-.24	-.11	-.17	.04
First-Line Manager	-.02	-.07	-.07	.09
Professional	-.05	-.06	-.12	.09
Total	-.08	-.10	-.11	.04

Openness to Experience	Factor	Reflective	Realistic	Self-Reliance
Executive/Senior Manager	-.07	.08	-.09	-.10
Mid-Level Manager	-.05	.04	-.07	-.05
First-Line Manager	-.08	-.08	-.04	.01
Professional	-.11	-.08	-.02	-.06
Total	-.10	-.03	-.08	-.04

Note. Negative effect sizes indicate scores favoring males.

Table 23 (continued)

Summary of Effect Sizes for Personality and Gender

Conscientiousness	Factor	Need for Task Closure	Fact Based	Structured	Detail Orientation	Work Organization	Self-Control
Executive/Senior Manager	-.16	.01	-.21	-.30	.10	-.05	-.17
Mid-Level Manager	-.13	.03	-.22	-.35	.18	.03	-.18
First-Line Manager	-.13	.12	-.29	-.31	.14	.03	-.15
Professional	-.11	.08	-.23	-.37	.20	.08	-.15
Total	-.08	.08	-.20	-.30	.22	.08	-.18

Extraversion	Factor	Assertiveness	Work Pace	Sociability	Multi-tasking
Executive/Senior Manager	.14	-.16	.06	.22	.16
Mid-Level Manager	.01	-.23	-.09	.19	.20
First-Line Manager	.10	-.13	-.05	.19	.26
Professional	.00	-.24	-.07	.11	.18
Total	.00	-.25	-.09	.17	.15

Note. Negative effect sizes indicate scores favoring males.

Table 24

Descriptive Statistics for Agreeableness and Age

	Under 40		40 and Older		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Agreeableness	1570	55.73 (12.13)	3181	58.18 (12.43)	.20
Need to Be Liked		59.33 (25.94)		62.61 (25.50)	.13
Need for Recognition		57.45 (28.44)		54.65 (28.45)	-.10
Need for Freedom		50.42 (27.96)		57.29 (27.26)	.25
Mid-Level Managers					
Agreeableness	2221	55.07 (12.63)	2144	55.18 (12.29)	.01
Need to Be Liked		61.87 (25.76)		65.96 (24.48)	.16
Need for Recognition		56.12 (28.94)		51.04 (28.56)	-.18
Need for Freedom		47.24 (27.28)		48.53 (26.54)	.05
First-Line Managers					
Agreeableness	5085	53.43 (12.30)	2042	50.69 (11.75)	-.23
Need to Be Liked		65.26 (25.20)		69.52 (24.26)	.17
Need for Recognition		54.05 (30.23)		42.45 (29.10)	-.39
Need for Freedom		40.98 (27.17)		40.10 (25.39)	-.03
Professionals					
Agreeableness	4417	54.93 (12.13)	2653	55.45 (12.14)	.04
Need to Be Liked		67.20 (24.89)		70.61 (24.15)	.14
Need for Recognition		51.74 (29.87)		46.71 (29.39)	-.17
Need for Freedom		45.85 (27.29)		49.03 (26.92)	.12
Total					
Agreeableness	13293	54.48 (12.31)	10020	55.29 (12.47)	.07
Need to Be Liked		64.64 (25.42)		66.85 (24.90)	.09
Need for Recognition		54.03 (29.75)		49.29 (29.22)	-.16
Need for Freedom		44.76 (27.51)		49.73 (27.34)	.18

Note. Negative effect sizes indicate scores favoring younger applicants.

Table 25
Descriptive Statistics for Conscientiousness and Age

	Under 40		40 and Older		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Conscientiousness	1570	60.52 (17.84)	3181	54.82 (18.42)	-.31
Need for Task Closure		69.37 (26.24)		64.96 (26.78)	-.17
Fact-Based		58.35 (28.52)		51.40 (28.77)	-.24
Structured		58.94 (29.15)		52.45 (29.58)	-.22
Detail Orientation		62.91 (29.75)		49.78 (30.63)	-.43
Work Organization		65.82 (29.89)		57.34 (31.27)	-.28
Self-Control		47.72 (27.40)		52.97 (27.87)	.19
Mid-Level Managers					
Conscientiousness	2221	61.70 (18.09)	2144	57.76 (18.08)	-.22
Need for Task Closure		69.77 (26.42)		65.98 (27.06)	-.14
Fact-Based		59.39 (29.22)		56.30 (28.97)	-.11
Structured		60.41 (29.98)		54.33 (30.46)	-.20
Detail Orientation		65.44 (28.96)		55.24 (29.84)	-.35
Work Organization		67.30 (29.94)		63.57 (30.35)	-.12
Self-Control		47.88 (27.90)		51.13 (27.68)	.12
First-Line Managers					
Conscientiousness	5085	64.46 (17.79)	2042	62.76 (16.89)	-.10
Need for Task Closure		70.33 (28.04)		67.05 (28.21)	-.12
Fact-Based		61.53 (29.57)		63.56 (27.36)	.07
Structured		64.10 (29.48)		58.09 (29.52)	-.20
Detail Orientation		72.00 (26.48)		64.41 (27.69)	-.28
Work Organization		72.27 (28.22)		71.95 (27.39)	-.01
Self-Control		46.55 (27.98)		51.50 (27.13)	.18
Professionals					
Conscientiousness	4417	61.59 (17.68)	2653	57.85 (18.08)	-.21
Need for Task Closure		68.84 (27.50)		65.35 (27.87)	-.13
Fact-Based		59.51 (28.64)		57.51 (28.94)	-.07
Structured		59.65 (30.01)		52.44 (30.73)	-.24
Detail Orientation		68.40 (27.62)		59.42 (29.25)	-.32
Work Organization		67.30 (29.76)		63.68 (30.07)	-.12
Self-Control		45.81 (27.35)		48.69 (27.92)	.10
Total					
Conscientiousness	13293	62.58 (17.87)	10020	57.87 (18.17)	-.26
Need for Task Closure		69.63 (27.39)		65.71 (27.43)	-.14
Fact-Based		60.12 (29.10)		56.54 (28.90)	-.12
Structured		61.39 (29.78)		54.00 (30.14)	-.25
Detail Orientation		68.64 (27.86)		56.48 (30.01)	-.42
Work Organization		69.03 (29.34)		63.33 (30.43)	-.19
Self-Control		46.66 (27.70)		51.15 (27.74)	.16

Note. Negative effect sizes indicate scores favoring younger applicants.

Table 26

Descriptive Statistics for Emotional Stability and Age

	Under 40		40 and Older		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Emotional Stability	1570	67.54 (20.86)	3181	71.09 (19.32)	.18
Optimism		63.70 (27.72)		68.74 (27.17)	.18
Criticism Tolerance		68.58 (28.00)		66.40 (27.61)	-.08
Positive about People		70.35 (25.50)		78.14 (20.66)	.34
Mid-Level Managers					
Emotional Stability	2221	67.84 (20.48)	2144	70.06 (19.49)	.11
Optimism		64.10 (27.58)		67.35 (27.17)	.12
Criticism Tolerance		68.20 (27.88)		66.24 (27.87)	-.07
Positive about People		71.24 (25.18)		76.58 (21.70)	.23
First-Line Managers					
Emotional Stability	5085	64.03 (22.40)	2042	67.50 (21.68)	.16
Optimism		60.38 (28.69)		64.74 (28.19)	.15
Criticism Tolerance		64.43 (29.66)		64.07 (29.45)	-.01
Positive about People		67.27 (27.30)		73.68 (24.47)	.25
Professionals					
Emotional Stability	4417	66.07 (21.57)	2653	68.72 (20.42)	.13
Optimism		62.60 (28.26)		65.84 (27.92)	.12
Criticism Tolerance		66.06 (28.67)		64.78 (28.27)	-.04
Positive about People		69.54 (26.32)		75.52 (23.16)	.24
Total					
Emotional Stability	13293	65.76 (21.68)	10020	69.51 (20.19)	.18
Optimism		62.13 (28.28)		66.86 (27.62)	.17
Criticism Tolerance		66.09 (28.89)		65.46 (28.23)	-.02
Positive about People		69.05 (26.46)		76.20 (22.42)	.29

Note. Negative effect sizes indicate scores favoring younger applicants.

Table 27

Descriptive Statistics for Extraversion and Age

	Under 40		40 and older		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Extraversion	1570	69.82 (16.70)	3181	66.96 (17.27)	-.17
Assertiveness		74.10 (22.83)		74.18 (22.30)	.00
Work Pace		69.61 (24.59)		65.52 (25.55)	-.16
Sociability		69.83 (27.85)		61.72 (29.64)	-.28
Multi-tasking		65.73 (26.53)		66.41 (27.58)	.03
Mid-Level Managers					
Extraversion	2221	67.29 (17.85)	2144	63.74 (18.11)	-.20
Assertiveness		70.35 (24.44)		70.42 (23.64)	.00
Work Pace		65.98 (25.73)		61.23 (26.74)	-.18
Sociability		68.48 (28.88)		60.91 (29.44)	-.26
Multi-tasking		64.36 (27.03)		62.42 (27.86)	-.07
First-Line Managers					
Extraversion	5085	63.03 (19.59)	2042	58.33 (19.30)	-.24
Assertiveness		62.90 (27.26)		61.58 (26.27)	-.05
Work Pace		62.32 (27.38)		58.16 (27.79)	-.15
Sociability		68.67 (28.64)		57.25 (28.92)	-.40
Multi-tasking		58.23 (28.37)		56.34 (28.38)	-.07
Professionals					
Extraversion	4417	62.20 (19.65)	2653	59.03 (19.60)	-.16
Assertiveness		61.49 (27.11)		62.63 (26.26)	.04
Work Pace		60.02 (27.00)		55.93 (27.70)	-.15
Sociability		67.67 (28.81)		59.61 (29.68)	-.28
Multi-tasking		59.61 (28.65)		57.94 (29.04)	-.06
Total					
Extraversion	13293	64.27 (19.19)	10020	62.41 (18.86)	-.10
Assertiveness		65.00 (26.64)		67.75 (25.10)	.11
Work Pace		63.03 (26.85)		60.56 (27.11)	-.09
Sociability		68.44 (28.65)		60.08 (29.50)	-.29
Multi-tasking		60.60 (28.17)		61.26 (28.48)	.02

Note. Negative effect sizes indicate scores favoring younger applicants.

Table 28

Descriptive Statistics for Openness to Experience and Age

	Under 40		40 and Older		
Executives/Senior Managers	*n*	Mean (SD)	*n*	Mean (SD)	*d*
Openness to Experience	1570	54.82 (14.43)	3181	55.63 (13.29)	.06
Reflective/Insight		61.33 (27.64)		54.17 (27.86)	-.26
Realistic Thinking		52.78 (29.36)		61.32 (26.87)	.30
Self-Reliance		50.35 (27.20)		51.41 (25.41)	.04
Mid-Level Managers					
Openness to Experience	2221	54.88 (13.96)	2144	55.48 (13.57)	.04
Reflective/Insight		61.82 (27.90)		53.65 (28.15)	-.29
Realistic Thinking		51.57 (28.69)		60.31 (27.15)	.31
Self-Reliance		51.25 (27.11)		52.49 (26.03)	.05
First-Line Managers					
Openness to Experience	5085	52.58 (14.45)	2042	55.30 (13.61)	.19
Reflective/Insight		61.72 (28.82)		49.74 (28.41)	-.42
Realistic Thinking		47.34 (29.60)		60.65 (27.66)	.46
Self-Reliance		48.69 (28.84)		55.52 (27.14)	.24
Professionals					
Openness to Experience	4417	53.51 (14.42)	2653	55.02 (13.82)	.11
Reflective/Insight		59.69 (28.65)		51.01 (28.56)	-.30
Realistic Thinking		50.09 (29.17)		60.66 (27.34)	.37
Self-Reliance		50.75 (28.59)		53.39 (27.28)	.09
Total					
Openness to Experience	13293	53.54 (14.38)	10020	55.37 (13.56)	.13
Reflective/Insight		61.02 (28.48)		52.32 (28.27)	-.31
Realistic Thinking		49.60 (29.34)		60.79 (27.22)	.40
Self-Reliance		50.00 (28.30)		53.00 (26.44)	.11

Note. Negative effect sizes indicate scores favoring younger applicants.

Table 29

Two-Way ANOVAs for Personality Factors by Age and Job Level

Source	*SS*	*df*	*MS*	*F*	η_p^2
		Agreeableness			
Job Level	64388.06	3	21462.69	143.27**	.02
Age	35.56	1	35.56	.24	.00
Job Level x Age	17638.95	3	5879.65	39.25**	.01
Error	3491201.40	23305	149.81		
Note: R^2 = .02, adj. R^2 = .02					
		Conscientiousness			
Job Level	96547.57	3	32182.52	100.74**	.01
Age	72032.46	1	72032.46	225.48**	.01
Job Level x Age	10040.61	3	3346.87	10.48**	.00
Error	7445203.13	23305	319.47		
Note: R^2 = .03, adj. R^2 = .03					
		Emotional Stability			
Job Level	40236.38	3	13412.13	30.39**	.00
Age	44722.49	1	44722.49	101.34**	.00
Job Level x Age	1525.64	3	508.55	1.15	.00
Error	10284543.10	23305	441.30		
Note: R^2 = .01, adj. R^2 = .01					
		Extraversion			
Job Level	217956.15	3	72652.05	205.77**	.03
Age	64559.93	1	64559.93	182.85**	.00
Job Level x Age	2647.47	3	882.49	2.50	.00
Error	8228558.21	23305	353.08		
Note: R^2 = .03, adj. R^2 = .03					
		Openness to Experience			
Job Level	6327.16	3	2109.05	10.73**	.00
Age	10088.83	1	10088.83	51.35**	.00
Job Level x Age	3545.43	3	1181.81	6.02**	.00
Error	4579000.74	23305	196.48		
Note: R^2 = .01, adj. R^2 = .01					

*p <.05, **p <.01

Table 30

Summary of Effect Sizes for Personality by Age and Job Level

Agreeableness	Factor	Need to Be Liked	Need for Recognition	Need for Freedom
Executive/Senior Manager	.20	.13	-.10	.25
Mid-Level Manager	.01	.16	-.18	.05
First-Line Manager	-.23	.17	-.39	-.03
Professional	.04	.14	-.17	.12
Total	.07	.09	-.16	.18

Emotional Stability	Factor	Optimism	Criticism Tolerance	Positive about People
Executive/Senior Manager	.18	.18	-.08	.34
Mid-Level Manager	.11	.12	-.07	.23
First-Line Manager	.16	.15	-.01	.25
Professional	.13	.12	-.04	.24
Total	.18	.17	-.02	.29

Openness to Experience	Factor	Reflective	Realistic	Self-Reliance
Executive/Senior Manager	.06	-.26	.30	.04
Mid-Level Manager	.04	-.29	.31	.05
First-Line Manager	.19	-.42	.46	.24
Professional	.11	-.30	.37	.09
Total	.13	-.31	.40	.11

Note. Negative effect sizes indicate scores favoring younger applicants.

Table 30 (continued)

Summary of Effect Sizes for Personality by Age and Job Level

Conscientiousness	Factor	Need for Task Closure	Fact Based	Structured	Detail Orientation	Work Organization	Self-Control
Executive/Senior Manager	-.31	-.17	-.24	-.22	-.43	-.28	.19
Mid-Level Manager	-.22	-.14	-.11	-.20	-.35	-.12	.12
First-Line Manager	-.10	-.12	.07	-.20	-.28	-.01	.18
Professional	-.21	-.13	-.07	-.24	-.32	-.12	.10
Total	-.26	-.14	-.12	-.25	-.42	-.19	.16

Extraversion	Factor	Assertiveness	Work Pace	Sociability	Multi-tasking
Executive/Senior Manager	-.17	.00	-.16	-.28	.03
Mid-Level Manager	-.20	.00	-.18	-.26	-.07
First-Line Manager	-.24	-.05	-.15	-.40	-.07
Professional	-.16	.04	-.15	-.28	-.06
Total	-.10	.11	-.09	-.29	.02

Note. Negative effect sizes indicate scores favoring younger applicants.

Table 32

Cognitive Ability-Personality Correlations by Race and Job Level

	Agreeableness			Conscientiousness			Emotional Stability		
Race	*n*	*r*	*z*	*n*	*r*	*z*	*n*	*r*	*z*
White									
Executive/Senior Manager	1534	.08**		785	-.11**		1533	.06*	
Mid-Level Manager	1895	.10**		1137	-.04		1894	.04	
First-Line Manager	2873	.07**		2006	-.01		2872	.06**	
Professional	2572	.05**		1470	.01		2571	.06**	
Total	8874	.09**		5398	-.04**		8870	.06**	
Black									
Executive/Senior Manager	78	.06	-.18	35	-.08	.17	78	.15	.73
Mid-Level Manager	119	.22	1.25	78	-.04	.05	119	.14	1.04
First-Line Manager	394	.13**	1.16	265	.06	1.04	394	.06	.06
Professional	218	-.01	-.92	124	-.07	-.86	217	.05	-.21
Total	809	.10**	.44	502	.00	.81	808	.08*	.49
Hispanic									
Executive/Senior Manager	71	.34**	2.26*	38	-.24	-.78	71	.04	-.15
Mid-Level Manager	156	.19*	1.10	71	-.27	-1.83	156	.27**	2.89**
First-Line Manager	254	-.02	-1.40	178	.18*	2.46**	254	.22**	2.56**
Professional	174	.04	-.19	116	-.02	-.30	174	.01	-.68
Total	655	.10*	.35	403	.01	.87	655	.18**	3.03**
Asian									
Executive/Senior Manager	65	.07	-.02	34	-.16	-.29	65	.22	1.24
Mid-Level Manager	72	.15	.38	52	-.20	-1.10	72	.02	-.11
First-Line Manager	178	.23**	2.05*	148	-.12	-1.22	178	.00	-.75
Professional	347	-.05	-1.81	208	.10	1.23	347	.27**	3.74**
Total	662	.03	-1.29	442	.01	.93	662	.21**	3.71**

Note. z-values reflect pairwise comparisons of correlations for protected racial groups and Whites.
*p <.05, **p ≤.01

Table 32 (continued)

Cognitive Ability-Personality Correlations by Race and Job Level

	Extraversion			Openness to Experience		
Race	*n*	*r*	*z*	*n*	*r*	*z*
White						
Executive/Senior Manager	1517	.00		1534	.01	
Mid-Level Manager	1875	-.04		1895	.04	
First-Line Manager	2856	.00		2873	.04*	
Professional	2557	-.08**		2572	.06**	
Total	8805	-.03**		8874	.04**	
Black						
Executive/Senior Manager	78	.08	.73	78	.18	1.43
Mid-Level Manager	117	.14	1.90	119	.08	.44
First-Line Manager	392	.09	1.78	394	.13*	1.55
Professional	214	-.02	.78	218	.10	.50
Total	801	.07	2.68**	809	.12**	2.05*
Hispanic						
Executive/Senior Manager	71	.03	.23	71	-.01	-.22
Mid-Level Manager	156	.08	1.37	156	.15	1.35
First-Line Manager	254	.25**	3.91**	254	.15*	1.61
Professional	174	-.15	-.89	174	.08	.24
Total	655	.10*	3.19**	655	.13**	2.04*
Asian						
Executive/Senior Manager	65	.12	.93	65	.29*	-.22
Mid-Level Manager	72	.34**	3.17**	72	.07	.29
First-Line Manager	178	-.02	-.26	178	.13	1.05
Professional	347	.15**	3.92**	347	.38**	5.91**
Total	662	.13**	4.11**	662	.31**	6.82**

Note. z-values reflect pairwise comparisons of correlations for protected racial groups and Whites.
*p <.05, **$p \leq$.01

Table 33

Cognitive Ability-Personality Correlations by Gender and Job Level

	Agreeableness			Conscientiousness			Emotional Stability		
Gender	*n*	*r*	*z*	*n*	*r*	*z*	*n*	*r*	*z*
Male									
Executive/Senior Manager	1581	.07**		734	-.09*		1581	.10**	
Mid-Level Manager	1608	.13**		913	-.05		1607	.09**	
First-Line Manager	2105	.14*		1469	-.02		2105	.08**	
Professional	2158	.02		1215	.02		2156	.18**	
Total	7452	.10**		4331	-.04*		7449	.12**	
Female									
Executive/Senior Manager	569	.16**	1.86	255	-.07	.28	568	.07	-.74
Mid-Level Manager	911	.12**	-.17	550	-.11	-1.10	909	.01	-1.83
First-Line Manager	1947	.06**	-2.34*	1344	-.01	.90	1946	.04	-1.53
Professional	1762	.08**	1.93	1086	-.03	-1.22	1761	.03	-4.75**
Total	5189	.09**	-.17	3235	-.04*	-.04	5184	.03*	-4.90**

	Extraversion			Openness to Experience		
Male						
Executive/Senior Manager	1555	.01		1581	.06*	
Mid-Level Manager	1596	-.02		1608	.04	
First-Line Manager	2093	.06**		2105	.07**	
Professional	2150	.01		2158	.16**	
Total	7394	.02		7452	.09**	
Female						
Executive/Senior Manager	558	.09*	1.56	569	.02	-.78
Mid-Level Manager	900	.00	.53	911	.05	.10
First-Line Manager	1940	.00	-1.97	1947	.07**	-.16
Professional	1750	-.06**	-2.27*	1762	.08**	-2.27*
Total	5148	-.01	-1.82	5189	.06**	-1.45

Note. z-values are pairwise comparisons of correlations for females and males.
*p <.05, **p ≤.01

Table 34

Cognitive Ability-Personality Correlations by Age and Job Level

	Agreeableness			Conscientiousness			Emotional Stability		
Age Group	*n*	*r*	*z*	*n*	*r*	*z*	*n*	*r*	*z*
Under 40									
Executive/Senior Manager	602	.07		285	-.04		602	.13**	
Mid-Level Manager	1193	.12**		677	-.17**		1193	.07*	
First-Line Manager	2528	.09**		1788	-.04		2527	.04	
Professional	2222	.06**		1285	.01		2221	.07**	
Total	6545	.09**		4035	-.05**		6543	.06**	
40 and Older									
Executive/Senior Manager	1154	.08**	.20	628	-.10**	-.83	1153	.09**	-.94
Mid-Level Manager	1037	.15*	.50	653	-.03	2.50*	1037	.10**	.85
First-Line Manager	1253	.08**	-.26	890	-.02	.36	1253	.10**	1.77
Professional	1150	.01	-1.35	691	-.01	-.38	1148	.19**	3.42**
Total	4594	.11**	.89	2862	-.06**	-.57	4591	.14**	4.10**
	Extraversion			Openness to Experience					
Under 40									
Executive/Senior Manager	593	.06		602	.06				
Mid-Level Manager	1179	.02		1193	.08**				
First-Line Manager	2516	-.01		2528	.07**				
Professional	2208	-.06**		2222	.11**				
Total	6496	-.02		6545	.08**				
40 and Older									
Executive/Senior Manager	1147	.01	-.97	1154	.04	-.52			
Mid-Level Manager	1031	-.03	-1.10	1037	.04	-1.06			
First-Line Manager	1246	.04	1.27	1253	.06*	-.12			
Professional	1146	.01	1.92	1150	.17**	1.77			
Total	4570	.04**	2.95**	4594	.08**	.10			

Note. z-values are pairwise comparisons of correlations for the 40 and Older group and the Under 40 group.
*p <.05, **p ≤.01

CHAPTER 6

DISCUSSION

The aim of the current study was to examine race, gender, and age differences across job levels on two types of commonly used predictor instruments: cognitive ability (CA) and personality. As discussed earlier in this paper, little previous research has examined group differences at specific job levels. In the present study, hypotheses related to predicted declines in group differences were tested using data from job applicants who participated in an online selection process and represented a variety of jobs and industries. The study intended to determine whether individuals become more similar at higher organizational levels and at what levels the use of certain selection measures might be more or less likely to discriminate against protected groups.

Summary of Findings

Consistent with previous research (Ones & Dilchert, 2009) and my prediction, the findings indicate mean CA test scores consistently increased across the three hierarchical job levels for the TMA and the WG. In contrast, although executives/senior managers scored higher than the lower job levels on RPM, mid-level managers did not score higher than first-line managers. Further, on all three instruments, mid-level managers scored quite similarly to professionals. These findings suggest the application of specific, job level criteria on CA may be particularly useful when applied to the TMA and the WG; however, this approach would have less utility for RPM given the similarities in scores among job levels observed in this study.

Contrary to my prediction, there is inconsistent evidence of diminishing group differences in cognitive ability with increasing hierarchical job levels. Many of the smallest

racial differences were present at the executive/senior manager level, which is consistent with previous findings of greater homogeneity in cognitive ability at the highest ranks in the organization (Ones & Dilchert, 2009). Particularly for RPM and TMA, CA test use at the executive/senior manager level may have less potential adverse impact than at other levels. However, racial differences did not consistently decline with increasing job level as predicted (Hypothesis 2). In some cases, these gaps increased rather than decreased from the first-line to the mid-level (e.g., Blacks and Asians on TMA). Thus, established, deleterious racial differences do not progressively subside across levels. Also, interestingly, although Asians scored higher than other racial groups, their advantage diminished with increasing job level.

Small gender differences were predicted for all three CA tests (Hypothesis 3). Consistent with Hough et al. (2001), generally small differences were indeed found on RPM and the WG, but larger effects were found on the TMA. These small differences tended to favor males. However, female professionals scored notably lower than their male counterparts on the TMA and WG, which could result in adverse impact given the near to medium-size effects (*d* = -.51 and -.43, respectively) observed in this study.

Younger applicants outperformed older applicants on RPM, a measure of fluid intelligence, as expected (Hypothesis 4a), but they were not advantaged on the TMA or WG. Although age differences on RPM did lessen with each upward job level as predicted (Hypothesis 4b), this finding was not found for the WG or the TMA. Subsequent research revealed that TMA and WG are considered measures of crystallized intelligence, which tends to decline less rapidly and advantages older employees and adults in ability tests

(Klein et al., 2015). Therefore, older applicants would be expected to score higher than younger applicants on these two measures.

Hypotheses 5 through 7 predicted racial, gender, and age differences in personality test scores would decline with each hierarchical job level, but this was not found consistently. As previous research has suggested, personality yields very small to near zero group differences (Foldes et al., 2008; Hough et al., 2001). However, the results of this study built on these findings and confirmed these differences largely do not vary across job levels for personality factors or facets. A few exceptions to this general trend were found, as some racial differences worsened with increasing job level. In particular, Black-White differences increased (favoring Whites) with job level for Need for Freedom (an Agreeableness scale) and Positive about People (an Emotional Stability scale) yet facet differences increased in favor of Blacks on Fact-Based (a Conscientiousness scale) and Work Organization (a Conscientiousness scale). Asian-White differences (favoring Whites) appreciably increased with job level on Positive about People (an Emotional Stability scale) and Multi-tasking (an Extraversion scale).

Additionally, consistent with previous research (Goldberg et al., 1998), this study revealed gender differences in personality factors to be generally small and they remained so across job levels. Interestingly, several facets consistently yielded larger differences favoring men than at the factor level across all four job levels. Specifically, facets of Conscientiousness (Structured, Fact Based, Self Control), as well as Assertiveness (Extraversion), and Need for Recognition (Agreeableness) yielded *ds* between -.18 and -.30 while their related factors yielded differences near zero.

For the most part, age differences also were small consistently across job levels with a few exceptions. Specifically, age differences on the Extraversion factor and the Reflective and Realistic scales (part of Openness to Experience) decreased with job level. However, age differences worsened for older applicants on Detail Orientation across all three hierarchical job levels. In light of these results, there is still limited concern for widespread differential adverse impact potential for women and older applicants across job levels.

Comparing the strength of CA-personality correlations across job levels and groups was intended to provide insight into the extent to which personality measures could increment beyond cognitive ability and, subsequently, lessen adverse impact. Consistent with previous research (Ackerman & Heggested, 1997), this study found small CA-personality correlations across job levels and racial, gender, and age groups. Given the substantial literature showing predictive validity for personality measures across a wide range of jobs, this finding suggests personality should add predictive value when added to CA tests. When comparing the strength of the correlations, some significant differences were observed but again, these differences were rather small. For instance, higher CA-personality correlations were observed for racial minority groups (compared to Whites) in Emotional Stability, Extraversion and Openness to Experience. Although correlations were near zero, men appeared to have slightly stronger CA-Emotional Stability and CA-Openness to Experience correlations than women, but no other significant gender differences were observed. Also, CA-Emotional Stability and CA-Extraversion correlations were stronger for older applicants than younger applicants; however, these correlations were also near zero.

Practical Implications

The use of CA tests in personnel selection is a prevalent organizational practice to hire the brightest employees. This study's findings build upon existing considerations for the application of CA tests and what is known about the potential adverse impact associated with their use. First, because CA scores increase and differ with job level on the TMA and WG, normative job level data should be considered when using these tests for an array of jobs, as suggested by Ones and Dilchert (2009). Given the unique mean scores at each level, knowing an applicant scored well on CA is insufficient. His or her results should be compared against job level norms to make appropriate same-level comparisons. Second, organizations should continue their vigilance in identifying and understanding racial differences when using cognitive ability measures for selection. Based on this study, racial differences do not appear to consistently lessen and can even worsen for protected racial groups with increasing job level (e.g., Hispanics on WG). Third, while gender discrimination is less likely to occur at most managerial job levels with the use of CA tests, RPM may be a preferred choice to avoid adverse impact given its smaller gender differences, particularly at the professional level. This study showed that professional women are particularly disadvantaged on the WG and TMA and may offer a potential explanation for why women occupy fewer STEM positions, many of which would likely be categorized as professional due to their specialized nature. This finding may be a particularly important consideration for organizations hiring for non-leadership roles in which a paucity of women are represented.

The findings of this study suggest that while organizations should have little concern for potential age-related adverse impact when choosing CA tests, instruments measuring

fluid intelligence such as TMA and WG are preferred when there are concerns about discriminating against older applicants.

The lack of widespread, large group differences in personality and across job levels should reaffirm the utility of their contribution in selection batteries. In general, there appears to be little potential for adverse impact, which makes these types of measures suitable for most applicants at all levels of organizations. Further, because unique job requirements often dictate the optimal ranges of personality scores applied in selection batteries, the highest scores may not always be an advantage, which may further lessen the impact of the differences uncovered in this study. In many job roles, moderate rather than extremely high or low score ranges on some personality scales are most associated with successful job performance, as more of a trait is not always better (Le et al., 2011). However, in instances where higher scores are valued, organizations should be aware that universal application of some scales could result in varying potential adverse impact across job levels. Specifically, organizations should exercise particular caution when higher scores are optimal on Need for Freedom (Agreeableness) and Positive about People (Emotional Stability) scales due to their adverse impact potential for Blacks with increasing job level. When higher scores are optimal on Positive about People (Emotional Stability) and Multi-tasking (Extraversion), there may be potential for adverse impact against Asians whereby these scales are better used in lower than higher organizational levels. Organizations should have little concern for potential gender discrimination with the use of personality measures, as the factor-level observed differences in this study were quite small and yielded few disadvantages. However, while Conscientiousness, Extraversion and Agreeableness factors may produce little to no gender differences, some

scales underlying these factors such as Assertiveness, Structured and Fact Based, may have a more notable impact disadvantaging women across all job levels when higher scores are optimal on these scales. As such, the use of these scales in making hiring decisions over time and across levels may possibly explain the shortfall of women at upper organizational levels. Furthermore, based on the results in this study, organizations can be confident in using most personality measures across all job levels without great risk of potential age discrimination. However, they should be aware of the potential for adverse impact against older employees at higher job levels when higher scores on Conscientiousness and its facet, Detail Orientation, are optimal.

Limitations and Future Directions

Interpretation of this study's findings must be made in light of several limitations. First, the job levels studied here were self-reported by applicants whose current position and organizational size were unknown. As such, the accuracy and precision of their self-assignments could not be confirmed or controlled for in the study. Similar job titles or roles in organizations of different sizes and in different industries may have widely different complexities and demands, which could have influenced the lack of finding increasing cognitive ability with hierarchical job levels. Further, the first-line manager level consisted of applicants who selected the broader category of entry-level manager, supervisor, or manager trainee. These three job titles could be situated in very different positions in an organizational hierarchy, depending on organizational size and type of work. This could also be a plausible explanation for why differences from the first-line level to mid-level did not diminish. To better understand job level differences in cognitive ability and personality, researchers would benefit from ensuring levels are well defined and without potential

confound. Furthermore, in examining trends across job levels, this study consistently found mid-level managers and professionals performed similarly on cognitive ability. Although similarity in the average age of these groups might be one explanation for this finding, it cannot be ruled out that this finding is simply an artifact of comparing two broad job level categories. Investigating differences in well-defined job levels may extend this work and show whether mid-level managers and professionals are as similar as demonstrated in this study.

Second, because selection procedures often required participants' completion of multiple cognitive ability measures in a single selection process, there was some degree of applicant overlap between the three instruments. This overlap may have masked differences in the comparisons of findings on these instruments. Approximately 41% of applicants took two of the three tests and 33% had results for all three tests. Although the results of the current study were not the same across RPM, the TMA and the WG, the use of more independent applicant samples in future studies may uncover more stark contrasts in cognitive ability group differences.

Third, the current study examined differences on only one personality instrument, the Assess Personality Survey (APS). Thus, the extent to which the results of this study generalize to other personality instruments is unknown and warrants additional query. Examining potential job level group differences in other personality assessments (e.g., Hogan Personality Inventory) may contribute additional knowledge about the potential for bias in personality across job levels. However, the APS demonstrates good fit with the Big Five framework (Assess Systems, 2015), which is a common underpinning of many commercial personality tests.

Further exploration of Asian group differences in personality may be worthwhile given the results found in this study. Although Asians were advantaged in cognitive ability, a few unique personality facets, if used in selection, could prove discriminatory based on the magnitude of effect sizes in the Extraversion factor and the Multi-tasking scale. However, the current study was not unique in its smaller Asian sample relative to Whites and other larger protected groups. Thus, as other researchers have suggested (Hough et al., 2001; Foldes et al., 2008), future research should aim to include larger Asian samples to help draw more definitive conclusions about how this population might differ in personality across job levels. Additionally, although it is unknown to what extent the Asian population in the current study was U.S. born and/or raised, those raised outside the U.S. may demonstrate greater personality differences than those raised within the U.S. based on cultural upbringing. Future research may benefit from more fully exploring these differences within the Asian population.

Finally, many of the group differences in personality found in this study were quite small, according to commonly accepted criteria applied in the behavioral sciences (Cohen, 1988). These small differences would likely have little or no adverse impact potential, especially at higher organizational levels where organizational hiring decisions are likely made using a multiple hurdle rather than rank-order approach. However, research identifying even such small differences is worthy of investigation and should not be overlooked. As noted previously, small standardized mean differences (e.g., d = .20) can still create adverse impact, particularly in selection contexts with small selection ratios such as organizations with large applicant pools (Jacobs, Murphy, & Silva, 2013; Sackett &

Ellingson, 1997). For this reason, future research should continue to investigate even small differences in non-cognitive predictors across job levels.

Conclusion

This dissertation aimed to investigate racial, gender and age differences in cognitive ability and personality across job levels. For the most part, results did not support a predicted linear decrease in these group differences with increasing hierarchical job levels. In cognitive ability, group differences remained fairly stable from the first-line to mid-level, only declining noticeably at the highest level. For personality, small group differences were generally observed and these gaps did not diminish with each progressive level. In many instances and particularly at the higher organizational levels, the group differences found in this study should not result in adverse impact. Additionally, the correlation between cognitive ability and personality observed in this study was weak, suggesting personality will add incremental predictive value when added to CA tests in selection batteries at all job levels.

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VITA

Jodi L. Himelright

EDUCATION

August 2016	The Pennsylvania State University University Park, Pennsylvania Ph.D., Industrial and Organizational Psychology
August 2005	The Pennsylvania State University University Park, Pennsylvania M.S., Industrial and Organizational Psychology
December 1997	The Pennsylvania State University University Park, Pennsylvania B.S., Psychology with Business Option

PROFESSIONAL EXPERIENCE

2002 – present	Owner, J. Himelright Consulting
2009 – 2010	Manager of Professional Development, Penn State Outreach
2002 – 2005	Graduate Teaching and Research Assistant, The Pennsylvania State University, Departments of Psychology and Information Science and Technology
1997 – 2002	Consultant, Landy Jacobs (SHL)

PUBLICATIONS AND PRESENTATIONS

Cleveland, J.N, Himelright, J.L., & McCarthy, A. (2008). Work and family concerns and practices: A cross-national and cultural comparison of Ireland and the U.S. (pp. 235-368). In D. L. Stone & E.G. Stone-Romero (Eds.) *The influence of culture on human resource management processes and practices*. New York, NY: Taylor and Francis Publications.

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