

Lower and Higher Order Facets and Factors of the Interpersonal Traits among the Big  
Five: Specifying, Measuring, and Understanding Extraversion and Agreeableness

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## **Dedication**

This dissertation is dedicated to my loving husband, Joshua, and my sweet little boy,

Logan.

## Abstract

The purpose of this dissertation was to explicate the lower and higher order structure of interpersonal dimensions of personality: Extraversion and Agreeableness. First, measurement reliability and the lower level structure of Extraversion and Agreeableness were examined. Each of these traits have been hypothesized to be part of a different higher order personality factor ( $\alpha$  and  $\beta$ ). I examined how Extraversion and Agreeableness relate to  $\alpha$  and  $\beta$  and ultimately a general factor of personality. Specifically, multiple reliability generalization studies were conducted, divergent relationships with other Big Five traits were analyzed, and relations among facets were examined and subjected to structural equation modeling.

First, multiple meta-analyses focused independently on Agreeableness and the following Agreeableness-related variables: Trusting, Modesty, Cooperation, Not Outspoken, Lack of Aggression, Non-Manipulative, Nurturance, Tolerance, Warmth, and Interpersonal Sensitivity. These studies examined: 1) measurement reliability of global measures and potential facet measures of Agreeableness, and 2) divergent validities to further clarify Agreeableness' facets and structure. Some differences in reliability were found with Global Agreeableness measures having the highest internal consistency reliability and Cooperation and Modesty having lower reliability. Test-retest indicated much stability over time. In the personality domain even though simple structure is not expected or observed, Agreeableness appeared to have the following personality facets: Cooperation, Lack of Aggression, Nurturance, and Modesty, and to a lesser extent Non-Manipulativeness.

Next, multiple meta-analyses focused independently on Extraversion and the following Extraversion-related variables: Positive Emotions, Sociability, Sensation Seeking, Dominance, and Activity. These studies examined: 1) measurement reliability of global measures and potential facet measures of Extraversion and 2) divergent validities to further clarify Extraversion's facets and structure. Some differences in reliability were found with Global Extraversion measures having the highest internal consistency reliability and Sensation Seeking having lower reliability. Test-retest indicated much stability over time. Again, though simple structure is not expected or observed in personality, Extraversion appeared to have the following personality facets: Sociability, Dominance, Positive Emotions, Sensation Seeking, and Activity.

Finally, an additional study aimed to further understand Extraversion and Agreeableness measures in higher order hierarchical models of personality. These meta-analytic studies examined personality relationships in terms of a general factor of personality, specifically, investigating the magnitude of the general factor saturation in measures of personality measures in general. Findings showed that a model with only a single general factor did not fit the data as well as an interfactor (correlated alpha and beta) model or a hierarchical model. Also a moderator of the size of the general factor was whether the data came from within the same inventory or between different inventories. Data that came from within inventories showed a larger general factor than data that came from between inventories. The meta-analytic correlation between Agreeableness and Extraversion was  $\rho = .20$  within inventory and  $\rho = .09$  between

inventory. Agreeableness loaded moderately on Alpha/Stability and Extraversion loaded highly on Beta/Plasticity.

Taken together, these results indicate that while Extraversion and Agreeableness are both interpersonal traits, they each have their own specific facets and belong to different higher order factors of personality. While these higher order factors are positively correlated, the strength of this overlap is moderated by whether the personality measures on which the data is based come from the same inventory or different inventories as well as the specific factor analytic approach utilized.



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LOWER AND HIGHER ORDER FACETS AND FACTORS OF THE  
INTERPERSONAL TRAITS AMONG THE BIG FIVE: SPECIFYING, MEASURING,  
AND UNDERSTANDING EXTRAVERSION AND AGREEABLENESS

**Overview and Objectives**

The purpose of this dissertation is to explicate the lower and higher order structure of interpersonal dimensions of personality, specifically, Extraversion and Agreeableness. First, internal consistency reliability of Extraversion and Agreeableness measures will be examined. Second, meta-analytic approaches will be used to estimate relationships among Extraversion measures and among Agreeableness measures. The resulting meta-analytic intercorrelation matrices will be utilized to assess the lower level facets of Extraversion and Agreeableness respectively. Third, given that each of these traits has been hypothesized to be part of a different higher order personality factor ( $\alpha$  and  $\beta$ ), I will examine how Extraversion and Agreeableness relate to  $\alpha$  and  $\beta$  and ultimately a general factor of personality.

**Importance of Interpersonal Traits**

Extraversion and Agreeableness are widely recognized as the “interpersonal traits” among the Big Five dimensions of personality (McCrae & Costa, 1989; Trapnell & Wiggins, 1990; Goldberg, 1993). Conceptually, Extraversion describes a positive enthusiastic approach toward social interactions and Agreeableness describes a pro-social and communal orientation toward others (John & Srivastava, 1999). Both Extraversion and Agreeableness predict interpersonal behavior. For example, based on meta-analyses

in the work domain, Extraversion is related positively to leader emergence and effectiveness ( $r = .22$ ,  $\rho = .31$ ; Judge, Bono, Ilies, & Gerhardt, 2002) and Agreeableness is related positively to better teamwork ( $r = .20$ ,  $\rho = .33$ ; Mount, Barrick, & Stewart, 1998 and  $r = .17$ ,  $\rho = .27$ ; Barrick, Mount, & Judge, 2001) and negatively to interpersonally deviant behavior ( $r = -.36$ ,  $\rho = -.46$ ; Berry, Ones, & Sackett, 2007). Interpersonal traits also predict other interpersonal behaviors beyond the workplace. For example, Extraversion is not only related to reports of time spent in social activities ( $r = .45$ ), but also reports of sexual behaviors, including accounting for 9% of the variance in lifetime number of sexual partners and having children with more than one partner ( $d = .30$ ) (Nettle, 2005). Agreeableness is related negatively to interpersonal aggression in general, such as aggressive driving ( $r = -.41$ , Jovanovic, Lipovac, Stanojevic, & Stanojevic, 2011) and sexual harassment ( $r = -.46$ , Menard, Shoss, & Pincus, 2010).

Interpersonal traits are also important in Industrial and Organizational Psychology (I/O) because interpersonal behavior is important for particular jobs. Based on information from O\*NET, the following job families contain jobs where establishing and maintaining interpersonal relationships are highly important (> 90 on the Importance Scale): Community and Social Services (e.g., Clergy); Healthcare Practitioners (e.g., Occupational Therapists); Education and Training (e.g., Postsecondary Teachers); Life, Physical, and Social Sciences (e.g., Clinical, Counseling, School, and Industrial-Organizational Psychologists); Management (e.g., Chief Executives and Human Resources Managers); and Sales Occupations (e.g., Sales Agents). In these and similar jobs, developing constructive and cooperative working relationships with others and

maintaining these relationships over time are among the most important work activities individuals engage in. Enthusiastic engagement with others as well as a pro-social, communal orientation toward others are behavioral manifestations of Extraversion and Agreeableness that are likely to be important for these jobs.

In addition to specific jobs, entire industries are rooted in interpersonal interactions. Data from the Bureau of Labor Statistics (January-April 2009), show that approximately 80% of United States industries are service related. The growth of the service industry in the United States in recent years has brought the importance of interpersonal behaviors in ensuring organizational success to the forefront of research. As a result, industrial-organizational psychologists are increasingly turning their attention to the study of interpersonal behavior and personality in the workplace. In an increasingly competitive environment, the interpersonal behaviors displayed by the employees of an organization towards customers can become a source of competitive advantage to the organization. In service organizations, involvement and participation necessitate a behavioral repertoire stemming from Extraversion and Agreeableness. Necessary interpersonal attributes may facilitate the acquisition of interpersonal skills applied in work settings.

Even in non-service jobs and in non-service industries such as manufacturing, interpersonal behaviors are nonetheless important and may be a major aspect of job performance in the form of teamwork, effective communication, avoiding interpersonal conflict and aggression, etc. Interpersonal performance, in essence, refers to how well the individual works with other individuals (customers, subordinates, peers, and supervisors).

Many models of job performance include an interpersonal component. In the Campbell Model of Job Performance (e.g., Campbell, McHenry, & Wise, 1990; Campbell, Gasser, & Oswald, 1996), at least two of the eight factors of job performance clearly involve interpersonal behaviors. “Facilitation of peer and team performance” involves aiding peers with problems on the job and how well a person works in a group setting. The “Supervision/leadership” factor includes how a person interacts with their direct reports. In the managerial performance taxonomy (Borman & Brush, 1993), many of the dimensions include interpersonal behaviors, especially “Maintaining good working relationships” which involves how a person interacts not only with their direct reports, but their peers and boss as well. In a meta-analytic study of the reliability of ratings of job performance dimensions (Viswesvaran, Ones, & Schmidt, 1996), interpersonal aspects are indicated in both the Leadership and Interpersonal Competence dimensions. In another investigation of job performance (Conway, 1999), one of the five dimensions was Interpersonal Facilitation which involves cooperation and building relationships with others. Additionally, as Hogan and Shelton (1998) point out interpersonal behaviors may be important for moving from motivation to do well on the job to actually getting along or getting ahead on the job. These investigations into the dimensions of job performance indicate that interpersonal behaviors are central to understanding and predicting an array of behaviors and outcomes in industrial-organizational psychology.

Directing increased research attention to determinants of interpersonal behavior in work settings could improve workplace interpersonal relations as well as overall job performance. Improving interpersonal behaviors at work can also be expected to decrease

undesirable, negative, counterproductive behaviors at work, such as violence, sabotage, and sexual harassment (Greenberg, 1989); and increase teamwork, customer service, organizational citizenship behaviors, and leadership effectiveness.

Personality is important for predicting and explaining interpersonal behaviors. Several personality inventories (e.g., Hogan, Hogan, & Busch, 1984; Sanchez & Fraser, 1992) have been developed to help organizations predict interpersonal behaviors on the job. Here, the emphasis is on either selecting a workforce with good interpersonal skills or identifying for training purposes current employees who are deficient in interpersonal skills. Though interpersonal traits are important for both predicting and explaining interpersonal behaviors that are an integral part of job performance, our knowledge about the measurement properties and structure of interpersonal personality variables is fragmented.

### **Research Purpose**

In my dissertation, I examined the interpersonal personality traits of the Big Five: Extraversion and Agreeableness. I conducted 5 studies that examined each of these traits' internal consistency reliabilities and test-retest reliabilities, examined their divergent validities to identify likely lower level facets, and investigated the structure of the measures of these traits. I also concentrated on identifying how Extraversion and Agreeableness relate to higher order personality dimensions, namely  $\alpha$ ,  $\beta$ , and a General Factor of Personality (GFP). In other words, this dissertation aims to present a thorough investigation into the measurement and structure of two interpersonal factors of the Big Five: Extraversion and Agreeableness. Large scale meta-analytic datasets were compiled

for each of the studies. The hope is that the knowledge garnered from the findings of this research can be used to improve the prediction and explanation of interpersonal behaviors at work, but also generally.

### **Current Conceptualizations of Personality**

Over the past several decades, research has shown that personality traits form interrelated clusters that are organized hierarchically (see Figure 1). During the last 20 years, the Five Factor Model of Personality (Emotional Stability, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness) has emerged and come into wide acceptance from lexical studies of phenotypic personality traits (e.g., Goldberg, 1993) and from joint factor analyses of personality instruments that assess the FFM and those created based on other theoretical perspectives (e.g., Gough's folk concepts).

At the lowest level of the hierarchy are individual responses to test items. Items that cluster together are indicators of specific attributes that may be referred to as personality sub-dimensions or facets. Facets that share psychological meaning, and most likely similar etiology, combine to define personality factors. For example, Extraversion is a broad factor that is defined by the common variance that is shared across its facets which may include sociability, enthusiasm, dominance, and positive emotions. Though the Big Five are often described as orthogonal, they are not; the Big Five factors correlate with one another, which has implications for the presence of psychologically meaningful higher order factors. Digman (1997) found that two higher factors were supported in factor analyses of 14 matrices reporting intercorrelations among the Big Five factors. The first higher order factor he described was defined by Conscientiousness, Agreeableness,

and Emotional Stability and represented socialization which he referred to as “factor alpha ( $\alpha$ ).” The other higher order factor he described was defined by Extraversion and Openness and represented personal growth which he referred to as “factor beta ( $\beta$ ).” Conceptually, factor alpha represents *stability* of emotions, relationships, and motivation and factor beta represents *plasticity* which involves exploration and novelty (DeYoung, Peterson, & Higgins, 2002). The presence of these two higher order factors have been reconfirmed by recent meta-analytic investigations (Markon, Krueger, & Watson, 2005; Chang, Connelly, & Geeza, 2012) as well as factor analyses of data from multiple personality inventories (DeYoung, 2006). In this dissertation, primary facets of Extraversion and Agreeableness will be identified and used to better specify the lower level structure of each trait. However, the full hierarchy of personality traits will be utilized to better understand both the latent traits of Extraversion and Agreeableness as well as the meaning of scores of measures of the respective constructs. In the next two studies, I take up each construct in turn.



## **Study 1: Reliability, Facets, and Structure of Agreeableness**

### **Literature Review**

Agreeableness is a commonly measured personality trait, as it is part of the Big Five. It has been described as “a prosocial and communal orientation toward others” (John & Srivastava, 1999). The global trait of Agreeableness has been given many names including friendly compliance vs. hostile non-compliance, likeability, love-hate, and social adaptability (Graziano & Eisenberg, 1997; John & Srivastava, 1999). Antagonism or unfriendliness describes the negative pole of the Agreeableness trait. Other researchers (e.g., Jensen-Campbell, Rosselli, Workman, Santisi, Rios, & Bojan, 2002) also note that Agreeableness is closely related to controlling negative affect and to self-control in interpersonal settings.

Some research has also been conducted on the biology and genetics of Agreeableness in efforts to answer the questions of where Agreeableness “comes from” and why some individuals are more agreeable than others. Twin research shows that between 33% to 52% of the variance in Global Agreeableness is heritable (Bouchard & McGue, 2003) and some of the proposed Agreeableness facets have heritability estimates ranging from Trust  $h^2=.30$  to Straightforwardness  $h^2=.47$  (Jang, McCrae, Angleitner, Riemann, & Livesley, 1998). More recent research by DeYoung et al. (2010) makes the link between brain functioning and personality. They hypothesized that since Agreeableness seems to involve traits that focus on the needs of others, variance in Agreeableness should be related to brain structures that have to do with understanding the emotions, intentions, and state of mind of others. They found that Agreeableness was

significantly associated with an area of the brain that is involved in the interpretation of the actions and intentions of others (posterior left superior temporal sulcus) and an area that is involved in understanding the beliefs of others (posterior cingulate cortex). Additionally, research on the neurotransmitters and hormones involved with Agreeable behavior implicate serotonin and oxytocin. Research attempting to parse apart personality domains has shown that up to 10% of the variance between Neuroticism and Agreeableness is directly related to variation in the serotonin transporter gene (Jang et al., 2001). Research has also shown that oxytocin is involved in social interactions such as mother-infant bonding (Lim & Young, 2006) and trusting others. Experiments have shown that males given nasal oxytocin (vs. a placebo) show higher levels of trust in others (Kosfeld et al., 2005). These lines of research taken together point to the fact that Agreeableness and the Big Five in general are not merely descriptors but that they are caused by how our bodies physically, genetically, and chemically work.

Focusing external correlates of Agreeableness, we see efforts have been made to assess the importance of Agreeableness to many outcomes across many areas of psychology. Table 1 summarizes the bivariate meta-analytic relationships that have been reported for Agreeableness. For example, in the work domain, Agreeableness is positively related to teamwork ( $\rho = .27$ , Barrick, Mount, & Judge, 2001 and  $\rho = .33$ , Mount, Barrick, & Stewart, 1998) and customer service ( $\rho = .19$ , Hurtz & Donovan, 2000), and negatively related to both interpersonal and organizational counterproductive work behaviors ( $\rho = -0.46$  and  $-0.32$  respectively, Berry, Ones, & Sackett, 2007). More broadly, Agreeableness is related to Mental Health outcomes including negative

relationships with paranoia and antisocial diagnoses ( $\rho = -0.34$  and  $-0.35$  respectively, Saulsman & Page, 2004). Additionally, Agreeableness is related to increased marriage and life satisfaction ( $\rho = 0.29$  and  $0.35$  respectively, Heller, Watson, & Ilies, 2004). From these results, themes involving getting along and interpersonal relationships emerge (working in teams, not engaging in counterproductive work behaviors, not being antisocial). Despite the use of agreeableness to describe individuals in everyday life and in personality research, our knowledge of how different measures and indicators of Agreeableness are related to one another is limited and little is known about the sub-dimensions of the trait. This state of affairs has led Graziano and Tobin (2002) to note that Agreeableness is arguably one of the least understood traits in the Big Five. Hough and Ones (2001) taxonomy of personality traits also shows that agreeableness is one of the smallest traits in the Big Five. In their taxonomy only 21 scales were identified as Agreeableness-related. In contrast, there were 79 Emotional Stability-related scales, 70 Extraversion-related scales, 66 Conscientiousness-related scales and 37 Openness-related scales.

### **Dimensions of Agreeableness**

Perhaps reflecting the limited consensus regarding the lower order structure of traits, taxonomies vary in the content and number of sub-facets of Agreeableness they identify. For example, A six facet conceptualization of Agreeableness is offered by Costa and McCrae (1995). These facets included in the Revised NEO Personality Inventory (NEO-PI-R) are: trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness. Mount, Barrick, and Stewart (1998) described Agreeableness with the terms

good-natured, flexible, cooperative, caring, trusting, and tolerant. Mount and Barrick's definition of Agreeableness is "The tendency to be courteous, helpful, trusting, good-natured, cooperative, tolerant, and forgiving." (PCI; Mount & Barrick, 1995, pp.1-2).

Yet, they hypothesize that two facets underlie these Agreeableness constructs:

Cooperation and Consideration. John and Srivastava's (1999) review of facets of agreeableness (i.e., altruism, tender-mindedness, trust, and modesty) overlap considerably with Costa and McCrae's conceptualization of the trait. Hough and Ones' (2001) working taxonomy of personality measures stands in contrast to extant conceptualizations of Agreeableness. In particular, Hough and Ones list only nurturance as a facet of Agreeableness and combine altruism and tender-mindedness to define nurturance. Other Agreeableness related constructs identified as facets in others' conceptualizations of the Agreeableness domain are listed as compound traits, or traits that include more than one aspect of the Big Five. For example, trust is considered a compound of emotional stability and agreeableness; modesty is considered a compound of introversion and agreeableness; while compliance is seen as compounds of agreeableness and conscientiousness. It is evident that the Agreeableness domain is in need of research aimed at determining its dimensionality.

Though different authors have different numbers of Agreeableness facets with varying names, there is some overlap and communality among the classifications. Turning to Table 2, roughly 12 categories emerge as possibilities for lower-level Agreeableness facets: Trust (trust others, believes others are good intentioned), Modesty (humble, does not talk about personal successes), Cooperation (getting along with

others), Not Outspoken (tends not to voice own opinion or criticize others), Lack of Aggression (does not express anger against others), Non-Manipulative (honest, sincere, not deceiving others), Nurturance (helpful and responsive to others needs), Tolerance (open and accepting of others), Warmth (affectionate, outwardly friendly), Tenderness (sensitive, kind), Sympathy (feeling *for* the person), and Empathy (feeling the thoughts, feeling, or attitudes of another as your own; feeling *with* the person). It appears that most agree that Modesty, Cooperation, and Nurturance/Altruism are sub-dimensions of Agreeableness. Tenderness also appears in many of the conceptualizations. Two main themes that emerge are traits involving getting along with others being compassionate.

Along these lines, DeYoung, Quilty, and Petersen (2007) suggest that there are two mid-level Agreeableness Aspects that are at a level between facets and the Global trait in the Agreeableness hierarchy. Their factor analytic groupings show the first aspect, Compassion, encompasses caring traits such as warmth, sympathy, understanding, empathy, and tenderness. It represents a “compassionate affiliation with others” (p. 885) while the second aspect, Politeness, includes traits such as cooperation, compliance, and straightforwardness. Politeness is “a more reasoned (or at least cognitively influenced) consideration of and respect for others’ needs and desires” (p. 885). As is evident in Table 2, it appears that the 12 Agreeableness categories can be grouped according to DeYoung, e al.’s two Agreeableness aspects. Lower level constructs that fall under the Compassion aspect include: Nurturance, Tolerance, Warmth, Tenderness, Sympathy, and Empathy. Those who are Nurturing/Altruistic tend to help others and engage in pro-social behaviors. An example of this could be caring for someone when they are ill or

volunteering at a homeless shelter. Individuals high on the Tolerance trait are flexible with and accepting of others while those low on the trait are rigid with others and may not be accepting of ideas or behaviors contrary to their own. Individuals who are warm are outwardly friendly and affectionate, while those who score low on the trait are seen as cold and unfriendly. Individuals that score high on tenderness are more likely to be gentle, kind, and sentimental. Individuals high on sympathy and empathy consider the feelings of others; they are more likely to understand what others are feeling (sympathy) and they may actually feel what the other person is feeling (empathy). Overall, individuals that score high on the Compassion aspect are seen as kind, caring, and friendly. The second aspect, Politeness, includes Modesty, Cooperation, Not Outspoken, lack of Aggression, and Non-Manipulative. Modest individuals are humble and may defer to others to maintain harmony. Narcissists fall on the opposite end of this spectrum. Cooperative individuals prefer to work together instead of being competitive. They strive for harmony and are good team players. In accordance with this individuals who are not outspoken tend not to voice their opinions or criticize others. Individuals who lack Aggression are unwilling or unable to express anger against others. It is important to note that this trait's main element is whether anger is directed at another person. Someone may feel angry often but still score low on hostility as long as they do not direct their anger at another person. The next lower-level trait that may be subsumed by the Politeness aspect is being Non-Manipulative. Individuals who score high on this trait are sincere and forthcoming when dealing with other people. Those that score low on the trait are more likely to use deception and manipulation, and to exploit others. An additional

trait that may belong to the Politeness aspect is Trusting. Individuals who score highly on this trait believe in the good intentions of others, while those with low scores believe that others are dishonest and acting with ill-will. The groupings described above are based on substantive considerations, qualitative analyses, overlapping terminology by different authors, and factor analyses. The series of meta-analytic analyses presented here are needed to determine which of these Agreeableness traits are actual facets of Agreeableness and to clarify the structure of the Agreeableness trait.

While delineating the factor structure of Agreeableness is a worthy goal in its own right, knowledge of Agreeableness' facets is also important to refine our knowledge of the trait's relationships to other variables (e.g., predictor-criterion relationships) and to better explicate theoretical explanations where agreeableness is called upon. Although Table 1 shows meta-analytic relationships of a broad spectrum of variables with Agreeableness, a shortcoming of this literature is that researchers may have been pooling data from Agreeableness scales at the Global, Aspect, or Facet levels or may have been including traits that were a mixture of Agreeableness and some other Big Five trait/s (i.e., Compound Traits). Delineating the facets of Agreeableness and identifying lower level structure of the Agreeableness trait can help to more clearly and precisely estimate the relationships between Agreeableness constructs and other variables, including behaviors and outcomes. Simply put, the magnitude of the relationships in Table 1 may differ for different facets of Agreeableness.

Similarly, attention to the lower level facets of Agreeableness is important because it is at this level that important mechanisms for Agreeableness' relationships

with criteria may be found. For example, in the work domain (as stated earlier), Agreeableness is important for teamwork and customer service. The reason that individuals who score higher on Agreeableness (generally defined) also tend to perform better in team situations may be due to certain lower level categories of the “Politeness” Agreeableness aspect, most notably here, Cooperation and Lack of Hostility. Working together in a non-competitive manner makes for better team dynamics and less process losses such as energy spent on arguing with one another. Less process loss can therefore translate into more productive time and better team performance. Similarly, Agreeableness may be related to better customer service because of lower level categories from the “Compassion” aspect. Here, the reason that employees who score high on Agreeableness also tend to have better customer service performance may be due to traits such as Warmth and Interpersonal Sensitivity (e.g., Sympathy). Imagine a server at a restaurant. Who would be rated higher on customer service: a cold, unfriendly server or one who greets the customer warmly with a smile? Likewise, employees who regularly deal with customer complaints (e.g., helpdesk call centers) would be expected to have higher ratings of customer service performance if they are inclined to listen and be sympathetic to the customers’ needs. Other important outcomes at work that can be explained by lower-level categories of Agreeableness are Counterproductive Work Behaviors. As stated earlier, employees who score higher on Agreeableness tend to also exhibit less interpersonal and organizational deviance. Employees that are Honest/Non-manipulative and lack Hostility are not likely to engage in behaviors such as spreading vicious rumors about coworkers (interpersonal deviance) or displaying hostility to the



organization they work for (i.e., their larger work community) stealing from the company (organizational deviance).

More broadly, Agreeableness is related to Mental Health outcomes including less paranoia and narcissism (Saulsman & Page, 2004). Here again it is probably not all of the lower-level categories of Agreeableness-related traits that have important relationships with these criteria but rather certain lower-level Agreeableness traits. For example, Paranoia is probably most strongly related to the Trusting category of Agreeableness with those that are trusting being less likely to think that others have ill intentions and are “out to get them”. The reason that individuals who score highly on Agreeableness tend not to be diagnosed as Narcissistic is likely due to their standing on the lower-level Agreeableness construct of Modesty.

Finally, some criteria such as Agreeableness’ relationship with Marriage Satisfaction may best be explained by a multitude of Agreeableness categories. Partners who are Warm, Sympathetic, Tolerant, Nurturing, Cooperative, Non-Hostile, Honest, and Trusting would be expected to report being more satisfied with their marriage. Since many facets are implicated as mechanisms here, Global Agreeableness may therefore be the appropriate level at which to analyze this personality-criteria relationship. Better attention to predictor-criteria matches will result in more accurate, less variable relationships. However, before researchers and practitioners can select the most appropriate level of Agreeableness for predicting a certain criteria, they first need to know what the specific facets of Agreeableness are, which my studies help to clarify.

## **Method**

To further clarify which scales assess Agreeableness related constructs, I first conducted a qualitative content analysis of scales described as having Agreeableness related aspects to identify a working taxonomy of Agreeableness constructs. Then, two meta-analytic studies were conducted. The first study was a reliability generalization study. The second study examined the divergent validities of Agreeableness constructs with other Global Big Five measures to quantitatively determine the facets. I also analyzed the meta-analytic intercorrelations among the identified Agreeableness facets to investigate the structure of Agreeableness.

### **Databases**

I gathered the information for my meta-analytic databases by first searching over 200 psychological test manuals. Test manuals are ideal sources of data for these meta-analyses because they tend to offer more detailed information regarding the test in question such as reliabilities, correlations with other psychological tests, and in-depth descriptions and definitions of the scales used to measure the psychological construct than typical sources such as research studies. Test manuals also tend to use more representative samples such as normative or community samples which may lessen the effects of range restriction or enhancement that can occur with samples of convenience. Additionally I supplemented the manuals data with data from peer reviewed sources. Articles' reporting intercorrelations among personality traits is spotty, with few clues available in indexing web pages about whether articles present intercorrelations among Agreeableness facets. This presents a scenario unlike many other meta-analyses that

might examine the relationship between an independent and dependent variable (e.g., the relationship between Agreeableness and Counterproductive Work Behavior) in which database searches are likely to narrow down the scope of potential data. My approach to searching for articles to supplement the data from manuals differed accordingly, and I adopted four strategies. First, I conducted a hand search of all articles published in the *Journal of Personality and Social Psychology*, the *Journal of Applied Psychology* (two top-tier journals frequently publishing large-sample personality data), and *Personality and Individual Differences* (a personality journal frequently reporting full intercorrelation matrices for measured variables) between 2004 and 2010. Second, I used Web of Science to search within these three journals using facet names as search terms. Third, I searched for Agreeableness facets (e.g., “cooperation”, “modesty”, etc.) across all journals in Web of Science for articles that had been cited more than 50 times.

As the purpose of my investigation was to examine Agreeableness in self-reports of personality, I excluded data that was obtained by methods other than self-report (e.g., peer reports). I also excluded data from purely ipsative measures since ipsative measures contain dependencies within the data and limit the correlations between traits. Since I was interested in the range of normal personality and not the extremes, I also excluded data from inventories (e.g., MMPI, BDI, etc) and samples (e.g., psychiatric patients, prisoners, etc.) that were clinical in nature.

**Reliabilities.** Viswesvaran and Ones (2000) have presented an internal consistency reliability distribution for Agreeableness measures. However, they did not distinguish among facet versus global measures of the trait. To update the reliability data

from Viswesvaran & Ones (2000), I compiled internal consistency compiled and test-retest reliabilities of Agreeableness-related scales. The reliability data recorded includes: Scale names, test-retest reliabilities and internal consistency reliabilities (coefficient alphas) of Agreeableness relevant scales, the number of scale items, and the number of participants on which the reliability estimate was based.

**Intercorrelations.** Two types of information were obtained from both the psychological test manuals and the journals: correlations between Agreeableness scales and measures of Global Big Five traits (to identify facets), and correlations among Agreeableness scales measuring different Agreeableness constructs (for structural analyses).

### **Agreeableness Analyses**

**Content analysis.** Conceptual, psycho-biological, and empirical literature around Agreeableness is weaker than for other personality traits such as Extraversion. Therefore instead of starting from a pre-determined list of likely facets, I identified potential Agreeableness measures by conducting a content analysis of existing personality scales. A collection of over 200 psychological test manuals was reviewed to identify scales conceptually related to Agreeableness and from this, 208 scales were initially identified as being related to Agreeableness to some degree. For each scale, all descriptive information possible was recorded that was presented in the test manual, including the scale's name, the scale's description, descriptions of high/low scorers, adjectival correlates, and sample items. Each scale along with its descriptive information was treated as a "critical incident" to be sorted.

Definitions and descriptions of personality scales from test manuals were provided to 3 subject matter experts (a personality expert with over 20 years experience researching personality and over 60 published peer-reviewed articles on personality, an assistant professor with expertise in personality measurement, and me). These scale descriptions were independently sorted into relatively homogeneous categories. We independently sorted the scales into categories that each represented a homogenous cluster of scales within categories. We then independently named each of our categories and wrote brief descriptions of the defining features of each category. Then, the 3 independent sets of Agreeableness taxonomies were compared and the 3 sorters participated in a consensus meeting to discuss categories and scale assignments that did not perfectly overlap. Once we came to an agreement on the 12 Agreeableness related categories, a separate set of 4 subject matter experts or “re-sorters” (all graduate-level psychology students) conducted a retranslation sort by classifying the Agreeableness measures back into the categories from the original 3 sorters. The re-sorters were given all of the same information about each of the scales that the original sorters had (scale names, definitions, adjectives, example items, etc.) plus the names and definitions of the 12 categories that the original sorters had decided upon. If 3 or more re-sorters placed a measure in the same category, it was assigned to that category. 3 or more sorters agreed on the classification of 159 of the scales (76% agreement). Of these, 126 scales were assigned to Agreeableness categories since the remaining scales had been classified as not related to Agreeableness.

**Data coding.** I coded each scale in my database as measuring Global Agreeableness, one of the other 12 Agreeableness categories that came out of the content analysis, one of the remaining global Big Five traits (as classified by Hough and Ones, 2001), or as none of the above. Table 3 lists each of the Agreeableness categories obtained from the content analysis and a working definition of that category. The following list summarizes the Agreeableness category descriptions: a. Global Agreeableness (likeable, gets along with others), b. Trusting (believes others are well-intentioned), c. Modesty (tendency to be humble), d. Cooperation (being a team player, not competitive), e. Not Outspoken (voices opinions, willing to criticize others), f. Lack of Aggression (is not willing and/or able to express anger against others), g. Non-manipulative (honest and forthcoming), h. Nurturance (tendency to be helpful and responsive to the needs of others), i. Tolerance (open and accepting of others), j. Warmth (affectionate, outwardly friendly), and k. Interpersonal sensitivity (sensitive to others moods and emotions, empathetic & sympathetic). Appendix A lists all of the scale classifications.

**Meta-analytic procedures.** After the scales in my database were appropriately coded, the meta-analytic procedures of Hunter & Schmidt (2004) were used to analyze the database. Hunter and Schmidt's approach to meta-analysis involves statistically pooling data across studies to minimize the impact of sampling error on study findings. In addition, attenuating influences of measurement error are controlled for through corrections for attenuation. To compute unreliability corrected, true score correlations between constructs, I used the internal consistency reliability estimates I recorded from

the test manuals and journals to create separate reliability distributions for global Agreeableness, other global Big Five traits, and each of the hypothesized Agreeableness facets. I made no corrections for range restriction or enhancement in my analyses. Previous research (Connelly & Ones, 2007) found that range restriction is unlikely to have substantial effects on meta-analytic estimates involving personality data culled from test manuals: the average range restriction ratio of sample standard deviation to population standard deviation was  $\bar{u} = .98$  ( $SD_u = .06$ ). This finding is consistent with my earlier assertion that samples in test manuals are unlikely to show much range restriction. Additionally, evidence from Ones and Viswesvaran (2003), show that when comparing personality norm data against personality data in job applicant samples, the job applicant samples are not terribly range restricted on the personality variables.

An additional data consideration is that correlations need to come from independent samples to avoid artificially inflating the sample size. Therefore, within a meta-analysis (e.g., Cooperation-Modesty) if the same group of individuals provided more than 1 correlation, those correlations were averaged. In addition, single inventories can contain multiple measures of the same big five trait. For example, the Buss Perry Aggression Questionnaire contains both the scale “Physical Aggression” and the scale “Verbal Aggression” which are both indicators of Lack of Aggression (reverse coded). Because this inventory “splits” the Aggression domain between the two measures, correlations of each of these scales with other inventories’ scales would likely be underestimates of the true correlations (Nunnally, 1978). Therefore, composite correlations were computed in cases in which a single inventory contained multiple

measures of the same personality construct. This composite correlation estimates the correlation for the sum of the component measures (Hunter & Schmidt, 2004).

**Reliability generalization.** The purpose of this study was to examine reliabilities of measures of Agreeableness constructs. I examined the degree to which Agreeableness scales yield reliable measurements of the construct domains and whether Global Agreeableness and potential Agreeableness facets show differential internal consistency. Test score reliability serves as a prerequisite for construct validity (Cronbach, 1951) and as a measure of the proportion of error variance in scores (Nunnally, 1967). Internal consistency reliability is assessed for virtually all psychological measures and my interest in internal consistency reliability is as an index of scores' repeatability with alternate items sampling the assessed domain. The unique sampling distribution of reliabilities were appropriately estimated by taking in to account the sample size, number of items in the scale, and the observed reliability of scores (Rodriguez & Maeda, 2006).

**Divergent validity of Agreeableness scales.** I conducted meta-analyses to ascertain the relationships between the proposed Agreeableness categories and global measures of all of the Big Five personality traits to determine which of the proposed categories appear to be actual facets of Agreeableness and which do not. If measures of a proposed category were most strongly correlated with measures of global Agreeableness but not with other global measures of the Big Five, that category was considered an actual facet of Agreeableness. If measures of a proposed facet were not most strongly correlated with measures of global Agreeableness they were not considered a facet of Agreeableness. If measures of a category were most strongly related to both global Agreeableness measures



and measures of other Big Five traits, the proposed facet was recognized as a compound trait and was not considered a pure facet of Agreeableness.

**Intercorrelations between Agreeableness facets and structural analyses.** To address the structure of Agreeableness, separate meta-analyses were conducted for each of the Agreeableness facets, decided on above, correlated with each of the other Agreeableness facets. For example, one meta-analysis estimated the relationship between global Agreeableness measures and cooperation measures. Another meta-analysis focused on the relationships between cooperation measures and modesty measures. These meta-analytic estimations proceeded until all interrelationships among the Agreeableness facets were estimated. Next, the meta-analytic intercorrelations between measures of Global Agreeableness and measures of actual Agreeableness facets were submitted to confirmatory factor analyses (CFA) using AMOS software to assess the factor structure of the personality trait of Agreeableness. Viswesvaran & Ones (1995) presented an overview of the method of combining psychometric meta-analysis with factor analysis and an example of this approach includes recent research examining the dimensionality of job performance (Viswesvaran, Schmidt, & Ones, 2005). CFAs were used instead of exploratory factor analyses (EFA) because I had a priori expectations about the lower structure of Agreeableness facets. Three models were tested: an independent/null model where none of the Agreeableness facets were allowed to correlate, a General Factor only model with Agreeableness facets loading only on the global Agreeableness construct, and a model attempting to group facets according to the aspects Compassion and Politeness that were identified by DeYoung, Quilty, and Peterson (2007). Using CFA, I determined

which of the models fit or best represented the data. The general factor model is the most parsimonious and implies that the facets are directly influenced by a person's standing on the underlying Agreeableness trait. If a more complex model is chosen then it should have superior fit statistics to the simpler model.

## Results

The following Agreeableness findings are based on a large amount of data that was meta-analyzed including over 1,500 separate data points and over 565,000 individuals. These analyses included 22 reliability generalization meta-analyses, 100 divergent validity meta-analyses, 5 meta-analytic, hierarchical regression analyses, 30 meta-analyses of facet intercorrelations, and 6 confirmatory factor analyses based on the resulting meta-analytic intercorrelation matrix.

### Reliability Generalization

**Internal consistency reliability.** First, internal consistency reliability artifact distributions were compiled for measures of agreeableness-related constructs (see Table 4). The average internal consistency reliability ranged from  $r_{xx} = .56$  for Not Outspoken to  $r_{xx} = .77$  for Global Agreeableness. When correcting for the artifact of measurement error due to internal consistency unreliability the square roots of the reliabilities are used. The mean of the square root of the internal consistency reliability coefficients ranged from  $\sqrt{r_{xx}} = .75$  for Not Outspoken to  $\sqrt{r_{xx}} = .88$  for Global Agreeableness. These estimates represent the estimated average correlation between the observed Agreeableness-related variable and the underlying construct level Agreeableness-related trait. For example, measures of Not Outspoken on average correlate .75 with the

underlying Not Outspoken construct we are trying to measure. (It should be noted though that there was only one study reporting internal consistency for this trait.) However, measures of Global Agreeableness correlate on average more highly at .88 with its underlying Agreeableness construct. Even after setting aside Not Outspoken since it was only based on 1 study, the results of this reliability generalization study show that the remaining Agreeableness-related traits are not measured with a very high level of precision. Since reliability is a prerequisite for validity, this would suppress the observed relationships we see between Agreeableness and criteria. Additionally, some of the traits appear to be measured much more reliably on average than others (Modesty  $r_{xx} = .67$  while Nurturance  $r_{xx} = .75$ ). These figures are based on frequency weighted internal consistency reliability coefficients. However, the standard meta-analytic techniques do not take into account the unique sampling distribution of reliabilities. Techniques laid out by Rodriguez & Maeda, (2006) take into account not only the reliability coefficient but also the number of items in the scales and the number of individuals contributing to each reliability estimate. These more refined techniques resulted in the reliability coefficients presented in the last column of Table 4. These transformed reliabilities result in slightly higher estimates of internal consistency but a range is still evident with Interpersonal Sensitivity having lower reliability ( $\rho_{\alpha} = .67$ ) than Warmth ( $\rho_{\alpha} = .80$ ) for example. Table 4 also shows differences in the average number of items used to assess each of the Agreeableness constructs. The results show that Tolerance has the most items on average with 20 items and Cooperation has the least with 8 items on average per scale. The standard deviations in the average number of items shows that there is quite a bit of

variation in the number of items used to measure Agreeableness constructs, ranging from SD = 1 for Cooperation to SD = 13 for Lack of Aggression. In addition to providing information on the precision with which each of the Agreeableness constructs is measured with on average, the internal consistency reliabilities were also used in the current meta-analyses to correct for measurement artifacts.

**Test re-test reliability.** Additionally, internal consistency reliabilities deal with error as it applies to alternate items sampling the assessed domain. Other sources of error are also present, including instability or unreliability over time. To examine the stability of each of the Agreeableness constructs, test-retest coefficients were compiled (see Table 5 and Figures 2-3). The results show that while the different variables have varying test-retest reliability, ranging from .61 for Tolerance to .78 for Lack of Aggression, there is much stability over time. Global Agreeableness' test-retest coefficient is .72 which is larger than the test-retest coefficient (.54) reported in Roberts and DelVecchio (2000).

### **Divergent Validity and Factor Structure**

Next, to help determine which of the Agreeableness-related traits are facets of Agreeableness, I meta-analyzed the correlations of each of the Agreeableness traits with Global Big Five measures (see Table 6 for details and Table 7 for summary). In doing so, the moderator of between vs. within inventory was taken into account. The Tables presented in Appendix B meta-analyzed only correlations that came from between different inventories. Results including both within and between inventory data can be found in Appendix D. In most cases, when within inventory correlations were included, the meta-analytic correlations were larger. When only between inventory correlations

were utilized, the magnitude of the correlation decreased as did the standard deviations. For example, the meta-analytic estimate of the relationship between Modesty and Global Agreeableness was  $\rho = .33$  when only between inventory correlations were used, but increased to  $\rho = .66$  when both within and between correlations were used. I chose to report only the between inventory results since I believe they represent the construct relationships more accurately. I excluded data where the variables being correlated came from the same inventory since same inventory correlations can be affected by common method variance factors including measurement related response format (e.g., both variables in yes/no format, both in likert format, etc.), item format (e.g., both variables using sentence prompts, or both using adjectives, etc.), and importantly, the scale developer would be common to both scales if the data point came from the same inventory and the developer's mindset about Agreeableness traits "flavors" the way they write the personality items which would could inflate their intercorrelations.

**Agreeableness relationship with Extraversion (interpersonal traits and factor Beta).** As noted earlier, Extraversion and Agreeableness belong to different higher order facets (alpha and beta), and in Table 6 we can see that even though both Extraversion and Agreeableness are interpersonal traits, the meta-analytic correlation between Global Extraversion and Global Agreeableness from between inventories is rather low ( $\rho = .09$ ). Even when including within inventory correlations (Appendix D. Table 31), the meta-analytic relationship between the interpersonal traits is low ( $\rho = .18$ ). It is also interesting to note that this relationship has the highest number of between inventory studies contributing to it ( $k = 54$ ).

### **Agreeableness relationship with Conscientiousness and Emotional Stability**

**(factor Alpha).** Agreeableness, Conscientiousness, and Emotional Stability are the traits thought to make up the higher order factor alpha. Accordingly, Table 6 shows that Global Agreeableness is moderately correlated with Emotional Stability ( $\rho = .32$ ) and Conscientiousness ( $\rho = .26$ ).

**Agreeableness relationship with Openness (factor Beta).** Openness is part of factor beta and thus should not share a large correlation with Agreeableness as it is part of factor beta. Accordingly, the relationship between Agreeableness and Openness is minimal ( $\rho = .02$ ).

### **Correlations between Agreeableness-related traits and global Big Five**

**measures.** To empirically determine which of the Agreeableness-related traits should be considered Agreeableness facets, 50 separate meta-analyses were conducted, 1 meta-analysis for each trait pair (e.g., Trusting with Global Agreeableness, then with Global Emotional Stability, etc.) Table 6 (detailed) and Table 7 (summary) show both the observed and internal consistency corrected between inventory meta-analytic correlations between measures of Agreeableness-related traits and global measures of each of the Big Five personality traits. Two of the Agreeableness categories had higher correlations with Global Extraversion than with Global Agreeableness and were therefore eliminated from consideration as Agreeableness facets: Warmth correlated more highly with Global Extraversion ( $\rho = .47$ ) than Global Agreeableness ( $\rho = .15$ ), as did Interpersonal Sensitivity (Extraversion  $\rho = .56$ , Agreeableness  $\rho = .16$ ). Likewise, Tolerance correlated more highly with Emotional Stability ( $\rho = .45$ ) than with Agreeableness ( $\rho = .34$ ) and was

therefore excluded from consideration as a facet of Agreeableness. The other 7 agreeableness-related traits had their highest correlations with Global Agreeableness, ranging from Cooperation and Lack of Aggression (in the  $\rho = .60$ 's) to Non-Manipulative ( $\rho = .19$ ). While the results were not expected to show simple structure (and indeed they do not), not all of the 7 categories should be considered Agreeableness facets. For example, while Trusting correlates most strongly with Global Agreeableness ( $\rho = .37$ ), it also has similar correlations with Global Emotional Stability ( $\rho = .34$ ) and was therefore considered to be a trait compound (ES+A+). Not Outspoken was excluded from consideration since the number of studies contributing to its correlation with Global Agreeableness was less than 5 studies and thus the findings there were not considered to be stable. The trait that appears to be the cleanest facet of Agreeableness is Cooperation since it correlates highly with Global Agreeableness ( $\rho = .61$ ) and minimally with the rest of the Big Five. Another strong facet of Agreeableness appears to be Lack of Aggression since it correlates highly with Global Agreeableness ( $\rho = .64$ ) though it's cross loading with Emotional Stability ( $\rho = .31$ ) is somewhat larger than in the case of Cooperation. Non-Manipulative, Nurturance and Modesty appear to be possible facets of Agreeableness, though weaker than Cooperation and Lack of Aggression.

This preliminary analysis implicated Cooperation, Lack of Aggression, Modesty, Nurturance, and Non-Manipulative as possible facets of Agreeableness. Next, to verify these facet decisions, I ran meta-analytic hierarchical regression analyses predicting each of the possible Agreeableness facets from Global Agreeableness, the remaining possible Agreeableness facets, and then finally the rest of the Big Five as a set. To determine how

much of the variance in the possible Agreeableness facet was due to Global Agreeableness, Agreeableness facets, and the rest of the Big Five, I calculated the change in R-squared for each Agreeableness facet at each step of the model. Figure 4 shows that Agreeableness (Global Agreeableness measures + Agreeableness facet measures) accounts for a much greater portion of the variance in the likely facets than the rest of the Big Five as a set. Lack of Aggression is confirmed as a clean facet of Agreeableness with 68% of its variation accounted for by Agreeableness and only 7% accounted for by the rest of the Big Five. Cooperation is also confirmed as a clean facet of Agreeableness with 67% of its variation accounted for by Agreeableness and only 6% accounted for by the rest of the Big Five. Modesty is a third facet of Agreeableness with 31% of its variation explained by Agreeableness, and only 6% accounted for by the rest of the Big Five as a set. Nurturance is also a likely facet since 18% of its variance is accounted for by Agreeableness while only 6% was accounted for by the rest of the Big Five. Finally, these results also illustrate that Non-Manipulativeness may be a possible facet though it is weaker than the rest of the facets with Agreeableness accounting for 12% of the variance while the rest of the Big Five combined accounts for 2%, yet there is still much variance unaccounted for (87%). Non-manipulative is retained as a possible weak facet of Agreeableness and it should be noted that Non-Manipulativeness/Straightforwardness had the highest heritability of the Agreeableness traits in previous research (Jang, McCrae, Angleitner, Riemann, & Livesley, 1998).

**Intercorrelations of Agreeableness facets.** To investigate how the Agreeableness facets relate to one another, 15 meta-analyses were conducted, one for



each trait pair (e.g., Cooperation-Nurturance). It should be noted that, using between inventory correlations, that the number of studies contributing to each meta-analysis was small, ranging from  $k = 1$  to  $k = 12$ . Intercorrelations between the Agreeableness facets ranged from Non-manipulative-Cooperation on the low end ( $\rho = -.03$ ) to Lack of Aggression-Cooperation on the higher end ( $\rho = .78$ ) (see Table 8 for a detailed report and Table 9 for a summary).

**Factor analytic results.** To assess the factor structure of Agreeableness using its likely facets, the meta-analytic intercorrelation matrix from Table 9 was submitted to confirmatory factor analyses using AMOS 7. Viswesvaran & Ones (1995) present an overview of the method of combining psychometric meta-analysis with factor analysis. An example of this approach can be seen in recent research examining the dimensionality of job performance (Viswesvaran, Schmidt, & Ones, 2005).

Given that the results for Non-Manipulativeness were tentative, the models were run both with and without Non-Manipulativeness as a facet. I verified that Global Agreeableness measures did indeed have the highest correlations with the Global Agreeableness construct by calculating a composite correlation with the possible facets. This correlation (.66 with Non-Manipulativeness included, and .65 without Non-Manipulativeness) was larger than any of the individual facet correlations with Global Agreeableness measures. First, a model specifying the Agreeableness facets as independent (not correlated) was run. Of course this was not expected to model the data well, and it was indeed a poor representation of the data (with Non-Manipulativeness TLI = .000, RMSEA = .384; without Non-Manipulativeness TLI = .000, RMSEA = .481). To

see if I could improve the model, next general Agreeableness factor models were run (Figure 5). These models fit the data much better than the independence model, and also fit the data moderately well in terms of typical standards for fit statistics in the case without Non-Manipulativeness (TLI = .956, RMSEA = .101). Focusing on the model with Non-Manipulativeness, the factor loading for that variable is very low at .07 supporting the idea that if Non-Manipulativeness is a facet of Agreeableness it is a very weak one. In the model without Non-Manipulativeness, the individual factor loadings of the facets on the latent Agreeableness factor ranged in magnitude from .89 for Cooperation to .32 for Nurturance. A final model (see Figure 6) was run to try to map onto the DeYoung aspects. In that model, there are 2 aspects, Compassion and Politeness. While Politeness seems to incorporate 3 of the Agreeableness facets (Cooperation, Lack of Aggression, Modesty, and Non-Manipulative), Nurturance/Altruism is more evenly split between the aspects. Many of the traits that DeYoung et al. (2007) identified as belonging to the Compassion aspect did not appear as exclusive Agreeableness facets so I did not test an exact 2 aspect model for the Agreeableness facets. I did however run the model with Cooperation, Lack of Aggression, Modesty, and Non-Manipulative loading on a latent Politeness factor that then loaded on a latent Agreeableness factor and Nurturance loaded directly on the Agreeableness factor since it seemed to span the two aspects. This model has the same fit as the simpler 1 latent factor model, so the simpler model is therefore preferred. All model fit statistics can be found in Table 10.

## Discussion

Agreeableness is an important yet undervalued trait for both research and practice. It has positive relationships with important criteria including both performance at work (especially in teams) and counterproductive work behaviors, as well as life in general (e.g., life satisfaction). However, many other criteria have only negligible relationships with Agreeableness defined at the Global level. It is possible and also probable that we could harness more of the predictive power of Agreeableness if we pay more attention to the match between our predictors and criteria (Hough, 1992). We should focus on the specific trait facets that should matter for the specific criteria we are interested in. For example, if we are trying to predict life satisfaction it would be reasonable to focus on the Global Agreeableness trait since it is at a similar level of breadth and generality. However, if I am trying to predict Volunteering Behavior it may make more sense to focus on a more specific trait, that of Nurturance, than the Global Agreeableness trait. To make these distinctions however we need to know what the facets of Agreeableness entail and much less research has been done on this personality trait than other traits such as Emotional Stability and Extraversion. Thus, Agreeableness was in much need of a rigorous, empirically based taxonomy delineating not only what the facets of the trait are but also how reliably these traits are currently being measured, and also how the Agreeableness facets intercorrelate with one another which was used to investigate the factor structure of the trait.

## **Reliability Generalization**

This research extends the important work by Viswesvaran and Ones (2000) since in addition to reporting reliabilities for Global Agreeableness, my research also examines the reliability of more specific Agreeableness-related traits and possible facets. My results for Global Agreeableness ( $r_{xx} = .77$ ,  $SD = .07$ ) confirm the findings of these authors ( $r_{xx} = .75$ ,  $SD = .11$ ). My estimates were slightly less variable than theirs, most likely due to the fact that I made the separate trait distinctions while their analyses collapsed across these categories and as we saw, the sub-dimensions do vary quite bit in their reliability estimates. While my results inform on the average levels of internal consistency reliability for the separate traits, it is important to bear in mind that one cannot use these results to assert that any measure of, for example, Trust, would be reliable. Reliability is not an inherent property of a test but rather it has to do with the scores of the specific individuals being measured. While my results are important in quantifying how reliably, and differentially reliable the traits are being measured, *on average*, researchers and test users still need to analyze and report the reliability on the individual measure they are using for that specific sample. Test-retest reliabilities also showed that the relative rank order consistency of Agreeableness-related traits stays relatively stable from one testing to another.

## **Divergent Validity and Structural Analyses**

Focusing on the meta-analytic correlations of the Agreeableness-related traits with the rest of the Big Five traits, it is evident that simple structure does not describe the Agreeableness traits, nor did I expect it to as it has long been known that personality does

not have simple structure. Many of the categories have moderate loadings on Big Five traits other than Agreeableness. However, I was able to see that 5 of the categories had their highest correlations with Global Agreeableness and were not strongly correlated with other Big Five traits. The facets of Agreeableness based on existing personality measures are therefore Cooperation, Lack of Aggression, Modesty, Nurturance, and to a lesser extent Non-Manipulativeness. These facets were further analyzed to quantify their intercorrelations with one another and these results were used in the structural analyses. The single latent General Agreeableness model fit the data the best (and moderately well by typical fit statistic standards). Inspecting the individual factor loadings of the facets on the single latent Agreeableness factor, it is evident that Cooperation and Lack of Aggression are the strongest of the facets. It is recommended that any measure of Agreeableness that is purported to be a Global Measure of Agreeableness should be sure to include items that measure the strongest four of the facets including Nurturance, Modesty, , and especially Cooperation and Lack of Aggression since these are central to the core of Agreeableness.

### **Limitations, Future Research, and Conclusions**

While the identification and clarification of the dimensionality of Agreeableness is important and has wide ranging impact on all research and practice involving Agreeableness, limitations of the current research should be noted. First the amount of data available for the some of the Agreeableness traits was not large (e.g., Not Outspoken), so it is possible that with greater attention to Agreeableness facets and subsequently more data, more facets may be added to the Agreeableness taxonomy.

Second, the standard deviations for many of the relationships ( $SD_{\rho}$ ) are rather large. This suggests that there is some variability around these estimates. Taking into account the within vs. between inventory moderator reduced the variation in relationships and as additional data allows for consideration of more potential moderators, further research should explore factors that increase or decrease the relationships. For example, personality inventories use different item response formats (Likert-type, true/false, etc.), and it is possible that consistency vs. inconsistency in response format may explain some variability in estimates. Such further research would help explain and understand the nature of this idiosyncratic measure variance. This research is also based on currently existing measures of personality. Therefore if certain traits have not been measured by existing personality instruments, this research would not tap into them.

Of the Big Five traits, Agreeableness has been studied to a much lesser degree than traits such as Extraversion, Emotional Stability, and Conscientiousness. The lack of data and a compelling framework from which to study the trait has made it difficult to accumulate information on clear trait-criterion relationships. Now that an empirically founded taxonomy exists, researchers should more systematically amass data to analyze these relationships. Doing so may result in additional predictive power, greater applicability, and should help expand Agreeableness' relevance to other criterion domains while highlighting where the predictive power for certain criteria is coming from: Global Agreeableness, Agreeableness facets, or Agreeableness compounds.

## **Study 2: Reliability, Facets, and Structure of Extraversion**

### **Literature Review**

Extraversion is a personality trait that appears in almost every taxonomy of personality (Watson & Clark, 1997). Extraverts tend to be talkative, assertive, and active and they tend to enjoy being around other people. Extraversion is associated with many important life outcomes and behaviors including behaviors and outcomes relevant to social interactions (e.g., marriage satisfaction), to effectiveness at work (e.g., leadership and work motivation), to mental health (e.g., clinical disorders) and ultimately to life satisfaction (see Table 11). In addition, the etiology of extraversion has also been the subject of many studies with research exploring the heritability of the trait and possible genetic links among extraversion, psychophysiology and neurobiology. There are also evolutionary hypotheses relating to the trait.

Initial conceptualizations of Extraversion by Eysenck (Eysenck, 1967, 1971, 1973, 1990; Eysenck & Levey, 1972; Eysenck & Eysenck, 1985) focused on differential resting levels of arousal in the brain where extraverts were seen as chronically under-aroused and therefore more likely to partake in exciting and arousing activities in attempts to raise their level of arousal to an “optimal level.” Sporadic support was found for this theory and Eysenck revised it to state that it was not differences in base levels of arousal that differed between introverts and extraverts but rather it was their reaction to stimuli that differed. In this revision, extraverts do not respond as strongly to stimuli as introverts do and thus greater stimulation is sought. Gray (1970, 1972, 1981), modified Eysenck’s theory with research from the animal literature involving motivation systems.

Gray's model involves a system called the behavioral approach or activation system (BAS) which is responsive to potential rewards and causes one to be motivated to seek those rewards. The BAS has been likened to a gas pedal (i.e., the behavioral "go" system or the approach motivation system). Extraverts with their strong BAS would be more likely to respond to (approach) situations involving potential rewards than introverts would be and this has been supported by research that found Extraversion was related to brain reactivity to positive stimuli (Canli, Zhao, Desmond, Kang, Gross, & Gabrieli, 2001). The current conceptualization of the etiology of Extraversion has been elucidated by Depue and Collins (1999) who have incorporated the reward sensitivity portion of Gray's model into their more extensive treatment of the neurobiology of extraversion. Dopamine is considered a key factor in the approach process and animal studies (e.g., Le Moal & Simon, 1991) have shown that if dopamine levels are altered the animals will not engage in approach behaviors such as food acquisition. They conclude that without dopamine, incentive motivation is lost. It takes a much more enticing stimulus to motivate action in a person with low dopamine activation (introvert) person than in a person with high dopamine activation (extravert). Research has shown some support for this model, in that dopamine activity is related to extraversion measured by assessing positive emotionality (Depue, Luciana, Arbisi, Collins, & Leon, 1994). More recent research shows additional confirmation of the role of dopamine in Extraversion (Wacker, Chavanon, & Stemmler, 2006).

Since it appears that differences in Extraversion are rooted in the brain (DeYoung, Hirsh, Shane, Papademetris, Rajeevan, & Gray, 2010), then it is logical that



genes/heritability would also play a part in the trait. Bouchard and Loehlin (2001) reviewed five heritability studies and found that the heritability of extraversion ranges from  $h^2 = .49$  to  $.57$ . Additionally, research by Jang, McCrae, Angleitner, Riemann, & Livesley (1998) shows the heritability of more specific extraversion facets as measured by the NEO personality inventory to range from  $h^2 = .38$  for warmth to  $.52$  for excitement seeking.

In addition, evolutionary hypotheses have been forwarded for why there is variation in personality traits. Buss (1995) describes three broad classes of motives, desires, or directional tendencies in humans: survival, reproduction, and genetic investment (e.g., caring for offspring). He posits that being able to perceive, attend to, and act upon personality differences in other people was and is crucial to solving adaptive problems. He describes the Big Five personality traits as five “basic dimensions of the social adaptive landscape”. Extraversion answers the question “who is good company?” Research on extraversion and evolution has been conducted by Nettle (2005). He relates Extraversion to aspects of reproductive success, finding that more extraverted individuals create and take more mating opportunities. He found a positive relationship between Extraversion and the number of lifetime sexual partners, and in men this tended to be achieved by extra-pair coupling (i.e., infidelity), while women tended to end relationships with one partner and begin relationships with another partner resulting in a greater number of children from more than one partner.

However, despite the key role that Extraversion plays, our knowledge of how different measures of Extraversion are related to one another is limited and little has been

established about the sub-dimensions of the trait. As Lucas, Diener, Grob, Suh, and Shao (2000) lamented after almost a century of study, psychologists are still not clear on the key characteristics of the Extraversion personality dimension.

This state of affairs needs to be addressed. Without a clear understanding of the structure of Extraversion, it is difficult to measure the trait with adequate construct validity, to minimize construct deficiency/contamination, and to maximize its predictive power. Consider two researchers examining the etiology of Extraversion. Each uses an Extraversion measure that focuses on a different facet unbeknownst to them (e.g., sociability vs. activity) and then correlates scores on their measure with fMRI measures of brain activity. While both researchers assume they are measuring “Extraversion”, without a clear understanding of the facet structure, completely different conclusions about the etiology of Extraversion may be reached. In the applied realm, if organizations intend to assess applicants on global Extraversion but select an instrument that in reality measures only a specific Extraversion facet, there may be a loss of predictive power due to construct deficiency. Alternately, failure to correctly match a facet level Extraversion predictor to behaviors and outcomes may contribute to prediction errors.

**Dimensions of Extraversion.** Despite the importance of Extraversion, different emphases exist in the conceptualization of the core trait and its facets. Our knowledge of the sub-dimensions (facets) of extraversion and the relationships between those constructs (structure) is limited. Perhaps reflecting the limited consensus regarding the lower order structure of Extraversion, taxonomies vary in the content and number of facets of Extraversion they identify. The earliest mention of the term “extroversion”

appears in Jung's (1921) conceptualization of the trait. From a Freudian perspective, he focused on a person's orientation to the world with introverts being oriented inward (concerned with their own thoughts, feelings, etc.) and extroverts being oriented outward (concerned with people and things in the world around them). Conceptualizations have included two Extraversion constructs such as Hogan and Hogan's (1995) sociability and surgency aspects; three constructs as in Hough and Ones' (2001) sociability, dominance, and activity/energy facets; four part conceptualizations such as Watson and Clark's (1997) that includes affiliation, positive emotionality, ascendance, and energy (though they also add two more tentative facets of venturesome and ambition); five part descriptions like Cattell's (1980), and six part conceptualizations like Costa and McCrae's (1992). Still others (DeYoung, et al., 2007) have conceptualized Extraversion as being hierarchically structured with the two main parts of Extraversion being enthusiasm and assertiveness that are each composed of lower level facets. In addition, there is disagreement on which of the facets composes the core of Extraversion. Some (Costa & McCrae) believe Extraversion is primarily concerned with sociability, while others (e.g., Tellegen, Watson & Clark) believe that positive emotionality is at the core of Extraversion. More specifically, Watson and Clark (1997) reviewed the litany of Extraversion conceptualizations and concluded that the core of Extraversion is positive emotionality which is a "state of pleasurable arousal and reflects feelings of being actively and effectively engaged" (p. 772). They cite evidence that Extraversion and positive affectivity are highly correlated and that both traits have similar correlations with interpersonal behavior criteria. Relatedly, positive emotions appear in recent explorations

of Extraversion's structure (DeYoung et al., 2007). These authors find that there are two constructs that they call aspects in between the facets and global factor of Extraversion. The 2 mid-level aspects of Extraversion are Enthusiasm and Assertiveness. Enthusiasm includes positive emotions as well as sociability.

Table 12 presents an overview of Extraversion aspects and facets identified by various authors. This table indicates that while there are varying conceptualizations of the Extraversion trait, each with slightly different names and numbers of Extraversion constructs, there is considerable overlap in the constructs put forth as facets of Extraversion. Almost every conceptualization of the trait includes a term for sociability and most include terms for dominance. Positive emotions, activity, and sensation-seeking/impulsivity also are included in many conceptualizations of Extraversion. These trends can also be seen in Depue and Collins' (1999) summarization of the characteristics of Extraversion. Though many traits have been offered as facets of Extraversion, we believe that they generally cluster around five characteristics: (a) dominance (being assertive, controlling, ascendant), (b) sociability (liking to be around others), (c) activity/energy level (energetic, active, vigorous), (d) sensation seeking (thrill seeking, venturesome), and (e) positive emotionality (happy, joyful, cheerful). These five are repeatedly encountered in conceptualizations of Extraversion and in measuring the construct. Table 13 lists these constructs and their working definitions along with example scales.

Throughout all of this history and research on the trait, Extraversion has been hampered by lack of precision in specifying what is meant by Extraversion and how it is

measured. Table 11 shows a compilation of meta-analytic relationships between Extraversion constructs and a wide range of criteria. A review of this table makes it plainly obvious that facet level meta-analytic investigations involving Extraversion are lacking. However, it is worth noting that what some researchers may have included in “global” Extraversion could in fact have been facet level measures such as those for dominance. Therefore, psychology’s knowledge of the magnitudes of relationships between Extraversion and various behaviors and outcomes is not precise. Attention needs to be paid to the dimensionality of Extraversion since differential relationships can be seen for different Extraversion constructs. There is some empirical evidence in support of this point. For example, meta-analyses show that Dominance is negatively related to Interpersonal Dependency ( $r = -.28$ ) but is unrelated to Sociability ( $r = .03$ ) (Bornstein & Cecero, 2000). Another study found that Dominance is positively related to Creativity ( $r = .21$ ) but is negatively related to Sociability ( $r = -.25$ ) (Hough, 1992). Importantly, a study by Depue (1995) shows that the relationship between Extraversion and dopamine activity seems to vary depending on what measure of Extraversion is used. The correlation between the MPQ’s Extraversion measure and dopamine activity was  $r = .60$  while using Eysenck’s EPQ measure of Extraversion the relationship was only  $r = .31$ . Depue and Collins (1999) make the following statement, “We have not found a dopamine relation with all measures of extraversion. Can this be? Isn’t Extraversion the same on any scale?” This statement along with Watson and Clark’s (1997) recommendation that future research on Extraversion should investigate relations among the basic components of Extraversion supports the necessity of my Extraversion studies.

## **Method**

Two meta-analytic studies were conducted for Extraversion. The first study was a reliability generalization study, and the second study examined the divergent validities of Extraversion constructs with the other Global Big Five measures to verify that those traits identified as Extraversion facets in the literature are in fact facets of Extraversion and also to examine Extraversion traits interrelationships to ascertain the structure of Extraversion and to shed light on the core of the trait.

### **Databases**

I gathered the information for my meta-analytic databases by first searching over 200 psychological test manuals. Test manuals are ideal sources of data for these meta-analyses because they tend to offer more detailed information regarding the test in question such as reliabilities, correlations with other psychological tests, and in-depth descriptions and definitions of the scales used to measure the psychological construct than typical sources such as research studies. Test manuals also tend to use more representative samples such as normative or community samples which may lessen the effects of range restriction or enhancement that can occur with samples of convenience. Additionally I supplemented the manuals data with data from peer reviewed sources. Although a large body of work has studied Extraversion-related traits (a PsychInfo search returns 5,000+ articles when searching for "Extraversion", "Extroversion", or "Introversion"), articles' reporting intercorrelations among these traits is spotty, with few clues available in indexing webpages about whether articles present intercorrelations among Extraversion facets. This presents a scenario unlike many other meta-analyses that

might examine the relationship between an independent and dependent variable (e.g., the relationship between Extraversion and Leadership) in which database searches are likely to narrow down the scope of potential data. My approach to searching for articles to supplement the data from manuals differed accordingly, and I adopted four strategies. First, I conducted a hand search of all articles published in the *Journal of Personality and Social Psychology*, the *Journal of Applied Psychology* (two top-tier journals frequently publishing large-sample personality data), and *Personality and Individual Differences* (a personality journal frequently reporting full intercorrelation matrices for measured variables) between 2004 and 2010. Second, I used Web of Science to search within these three journals using facet names as search terms. Third, I searched for Extraversion facets (e.g., “dominance”, “sociability”, etc.) across all journals in Web of Science for articles that had been cited more than 50 times.

As the purpose of my investigation was to examine Extraversion in self-reports of personality, I excluded data that was obtained by methods other than self-report (e.g., peer reports). I also excluded data from purely ipsative measures since ipsative measures contain dependencies within the data and limit the correlations between traits. Since I was interested in the range of normal personality, I also excluded data from inventories (e.g., MMPI, BDI, etc) and samples (e.g., psychiatric patients, prisoners, etc.) that are clinical in nature.

**Reliabilities.** Viswesvaran and Ones (2000) have presented an internal consistency reliability distribution for Extraversion measures. However, they did not distinguish among facet versus global measures of the trait. To update the reliability data

from Viswesvaran and Ones (2000), I compiled test-retest and internal consistency reliabilities of Extraversion-related scales. The reliability data recorded includes: Scale names, test-retest reliabilities and internal consistency reliabilities (coefficient alphas) of Extraversion relevant scales, the number of scale items, and the number of participants on which the reliability estimate was based.

**Intercorrelations.** Two types of information were obtained from both the psychological test manuals and the journals: correlations between Extraversion scales and measures of Global Big Five traits (to identify facets), and correlations among Extraversion scales measuring different Extraversion constructs (for structural analyses).

### **Extraversion Analyses**

**Data coding.** I coded relevant scales in my database as measuring global Extraversion, one of the remaining global Big Five traits (classified by Hough and Ones, 2001), one of the five hypothesized Extraversion facets: (a) dominance, (b) sociability, (c) activity, (d) positive emotions, or (e) sensation seeking. Where possible, Extraversion related scales were coded according to Hough and Ones' (2001) mapping of scales from commonly used inventories to global Extraversion and three facets (dominance, sociability, and activity/energy level). For scales not classified by Hough and Ones, scales were independently coded by me and a personality expert with over 20 years experience researching personality and over 60 published, peer-reviewed articles on personality. Scale classifications were based on the scale descriptions, definitions, and items in the test manuals. The following list summarizes general facet descriptions: dominance (assertive, controlling, domineering, etc.), sociability (liking to be around



others), activity (energetic, active, involved in many activities, vigorous, etc.), positive emotions (happy, joyful, cheerful, etc.), or sensation seeking (thrill or excitement seeking, venturesome, etc). Scales were assigned to one of these facets if they clearly involved only that facet. If a scale involved multiple extraversion facets, it was coded as global Extraversion. Any classification disagreements between the 2 coders were classified by an assistant professor with expertise in personality measurement. The final classification list can be found in Appendix A.

**Meta-analytic procedures.** The meta-analytic procedures of (Hunter & Schmidt, 2004) were used to analyze the database. Hunter and Schmidt's approach to meta-analysis involves statistically pooling data across studies to minimize the impact of sampling error on study findings. In addition, attenuating influences of measurement error are controlled for through corrections for attenuation. To compute unreliability corrected, true score correlations between constructs, I used the internal consistency reliability estimates I recorded from the test manuals and journals to create separate reliability distributions for global Extraversion, other global Big Five traits, and each of the hypothesized Extraversion facets. Previous research (Connelly & Ones, 2007) found that range restriction is unlikely to have substantial effects on meta-analytic estimates involving personality data culled from test manuals: the average range restriction ratio of sample standard deviation to population standard deviation was  $\bar{u} = .98$  ( $SD_u = .06$ ). This finding is consistent with my earlier assertion that samples in test manuals are unlikely to show much range restriction. Additionally, evidence from Ones and Viswesvaran (2003), show that when comparing personality norm data against personality data in job applicant

samples, the job applicant samples are not terribly range restricted on the personality variables.

An additional data consideration is that correlations need to come from independent samples to avoid artificially inflating the sample size. Therefore, within a meta-analysis (e.g., Dominance-Sociability) if the same group of individuals provided more than 1 correlation, those correlations were averaged. In addition, single inventories can contain multiple measures of the same big five trait. For example, the normative version of the Occupational Personality Questionnaire (OPQ) contains both the scale “Controlling” and the scale “Persuasive” which are both indicators of dominance. Because this inventory “splits” the dominance domain between the two measures, correlations of each of these scales with other inventories’ Extraversion scales would likely be underestimates of the true correlations (Nunnally, 1978). Therefore, composite correlations were computed in cases in which a single inventory contained multiple measures of the same Extraversion construct. This composite correlation estimates the correlation for the sum of the component measures (Hunter & Schmidt, 2004).

**Reliability generalization.** The purpose of this study was to examine reliabilities of measures of Extraversion constructs. I examined the degree to which Extraversion scales yield reliable measurements of the construct domains and whether Global Extraversion and potential Extraversion facets show differential internal consistency. Test score reliability serves as a prerequisite for construct validity (Cronbach, 1951) and as a measure of the proportion of error variance in scores (Nunnally, 1967). Internal consistency reliability is assessed for virtually all psychological measures and my interest

in internal consistency reliability is as an index of scores' repeatability with alternate items sampling the assessed domain. The unique sampling distribution of reliabilities were appropriately estimated by taking in to account the sample size, number of items in the scale, and the observed reliability of scores (Rodriguez & Maeda, 2006).

**Divergent validity of Extraversion scales.** I conducted meta-analyses to ascertain the relationships between the proposed Extraversion categories and global measures of all of the Big Five personality traits to determine which of the proposed categories appear to be actual facets of Extraversion and which do not. If measures of a proposed category were most strongly correlated with measures of global Extraversion but not with other global measures of the Big Five, that category was considered an actual facet of Extraversion. If measures of a proposed facet were not most strongly correlated with measures of global Extraversion they were not considered a facet of Extraversion. If measures of a category were most strongly related to both global Extraversion measures and measures of other Big Five traits, the proposed facet was recognized as a compound trait and was not considered an actual facet of Extraversion.

**Intercorrelations between Extraversion facets and structural analyses.** To address the structure of Extraversion, separate meta-analyses were conducted for each of the Extraversion constructs correlated with each of the other Extraversion constructs. For example, one meta-analysis estimated the relationship between global Extraversion measures and Dominance measures. Another meta-analysis focused on the relationships between Dominance measures and Sociability measures. These meta-analytic estimations proceeded until all interrelationships among Extraversion facets had been estimated.

Next, the meta-analytic intercorrelation matrix was submitted to confirmatory factor analyses (CFA) using AMOS software to assess the factor structure of the personality trait of Extraversion. Viswesvaran and Ones (1995) presented an overview of the method of combining psychometric meta-analysis with factor analysis and an example of this approach includes recent research examining the dimensionality of job performance (Viswesvaran, Schmidt, & Ones, 2005). CFAs were used instead of exploratory factor analyses (EFA) because I had a priori expectations of about the lower structure of Extraversion facets. Four models were tested: an independent/null model where none of the Extraversion facets were allowed to correlate, a General Factor only model with Extraversion facets loading only on the global Extraversion construct, and three versions of a hierarchical model with facets loading on the aspects Enthusiasm and Assertiveness that were identified by DeYoung et al. (2007) that then loaded on the global Extraversion construct. Comparing the fit statistics from these CFAs, I determined which of these models represented the meta-analytic data most adequately. The general factor model is the most parsimonious and implies that the facets are directly influenced by a person's standing on the underlying Extraversion trait. The hierarchical model is more complex and stipulates that individual's scores on Extraversion facet measures are influenced their standing on underlying aspect-level traits of Enthusiasm and Assertiveness which are each influenced by the overall Extraversion trait.

## **Results**

The following Extraversion findings are based on a large amount of data that was meta-analyzed including over 2,000 separate data points and over 719,000 individuals.

These analyses included 12 reliability generalization meta-analyses, 50 divergent validity meta-analyses, 5 meta-analytic, hierarchical regression analyses, 30 meta-analyses of facet intercorrelations, and 6 confirmatory factor analyses based on the resulting meta-analytic intercorrelation matrix.

### **Reliability Generalization**

**Internal consistency reliability.** First, internal consistency reliability artifact distributions were compiled for measures of Extraversion facets (see Table 14). The average internal consistency reliability ranged from  $r_{xx} = .81$  for Global Agreeableness and Positive Emotions to  $r_{xx} = .71$  for Sensation Seeking. When correcting for the artifact of measurement error due to internal consistency unreliability the square roots of the reliabilities are used. The mean of the square root of the internal consistency reliability coefficients ranged from  $\sqrt{r_{xx}} = .90$  for Global Agreeableness and Positive Emotions to  $\sqrt{r_{xx}} = .84$  for Sensation Seeking. These estimates represent the estimated average correlation between the observed Extraversion variable and the underlying construct level Extraversion trait. For example, measures of Sensation Seeking on average correlate .84 with the underlying Sensation Seeking construct we are trying to measure. However, measures of Global Extraversion correlate on average more highly at .90 with its underlying Extraversion construct. The results of this reliability generalization study show that the Extraversion traits are measured with a moderately high level of reliability. Additionally, some of the traits appear to be measured more reliably on average than others. These figures are based on frequency weighted internal consistency reliability coefficients. However, the standard meta-analytic techniques do not take into account the

unique sampling distribution of reliabilities. Techniques laid out by Rodriguez and Maeda, (2006) take into account not only the reliability coefficient but also the number of items in the scales and the number of individuals contributing to each reliability estimate. These more refined techniques resulted in the reliability coefficients presented in the last column of Table 14. These transformed reliabilities result in slightly higher estimates of internal consistency but a range is still evident with Sensation Seeking having lower reliability ( $\rho_{\alpha} = .73$ ) than Positive Emotions ( $\rho_{\alpha} = .85$ ) for example. Table 14 also shows differences in the average number of items used to assess each of the Extraversion constructs. The results show that Global Extraversion and Sociability have the most items on average with 18 items and Sensation Seeking has the least with 8 items on average per scale. The standard deviations in the average number of items shows that there is quite a bit of variation in the number of items used to measure Extraversion constructs, ranging from  $SD = 4$  for Sensation Seeking to  $SD = 12$  for Global Extraversion. In addition to providing information on the precision with which each of the Extraversion constructs is measured with on average, the internal consistency reliabilities were also used in the current meta-analyses to correct for measurement artifacts.

**Test re-test reliability.** Additionally, internal consistency reliabilities deal with error as it applies to alternate items sampling the assessed domain. Other sources of error are also present, including instability or unreliability over time. To examine the stability of each of the Extraversion constructs, test-retest coefficients were compiled (see Table 15 and Figures 7-8). The results show that while the different variables have varying test-

retest reliability, ranging from .59 for Positive Emotions to .82 for Global Extraversion, there is much stability over time. .

### **Divergent Validity and Factor Structure**

Next, to verify the Extraversion facets suggested by the literature, I meta-analyzed the correlations of each of the Extraversion traits with Global Big Five measures (see Table 16 for details and Table 17 for summary). In doing so, the moderator of between vs. within inventory was taken into account. The Tables presented in Appendix B only meta-analyzed correlations that came from between different inventories. Results including both within and between inventory data can be found in Appendix D. In most cases, when within inventory correlations were included, the meta-analytic correlations were somewhat greater. When only between inventories correlations were utilized, the magnitude of the correlation decreased as did the standard deviations in general. Positive Emotions is the one facet where the correlations got larger when removing the within inventory correlations (e.g., within and between Positive Emotions-Openness  $\rho = .11$ , but using between inventories  $\rho = .29$ ). I chose to report only the between inventory results since I believe they represent the construct relationships more accurately. I excluded data where the variables being correlated came from the same inventory since same inventory correlations can be affected by common method variance factors including measurement related response format (e.g., both variables in yes/no format, both in likert format, etc.), item format (e.g., both variables using sentence prompts, or both using adjectives, etc.), and importantly, the scale developer would be common to both scales if the data point came from the same inventory and the developer's mindset about Extraversion traits

“flavors” the way they write the personality items which would could inflate their intercorrelations

**Extraversion relationship with Agreeableness (interpersonal traits and factor Alpha).** As noted earlier, Extraversion and Agreeableness belong to different higher order facets (alpha and beta), and in Table 16 we can see that even though both Extraversion and Agreeableness are interpersonal traits, the meta-analytic correlation between Global Extraversion and Global Agreeableness from between inventories is rather low ( $\rho = .09$ ).

**Extraversion relationship with Openness (factor Beta).** Extraversion and Openness are the traits thought to make up the higher order factor beta. Accordingly, Table 16 shows that the correlation between Global Extraversion and Openness is moderate ( $\rho = .18$ ).

**Extraversion relationship with Conscientiousness and Emotional Stability.** Conscientiousness and Emotional Stability are parts of factor alpha and thus should not share large correlations with Extraversion as it is part of factor beta. Accordingly, the relationship between Extraversion and Conscientiousness is minimal ( $\rho = .09$ ). However, the correlation between Extraversion and Emotional Stability is higher than expected ( $\rho = .28$ ) surpassing that of Openness which belongs to the same higher order factor as Extraversion.

**Correlations between Extraversion Facets and Global Big Five measures.** All of the proposed facets had their highest correlations with Global Extraversion, ranging from Sensation Seeking ( $\rho = .39$ ) to Sociability ( $\rho = .75$ ). The results do not show



perfect simple structure however since some facets have moderate correlations with Big Five traits other than Extraversion. For example, while Positive Emotions correlates well with Global Extraversion ( $\rho = .54$ ) it also has moderate correlations with Global Emotional Stability ( $\rho = .33$ ) Global Conscientiousness ( $\rho = .33$ ). To determine whether the proposed Extraversion facets should remain with Extraversion and not be excluded or considered compound traits, regression analyses were conducted predicting each extraversion facet from Global Extraversion, Extraversion facets, and the rest of the Big Five traits as a set (i.e., Global Emotional Stability, Openness, Agreeableness, and Conscientiousness). To calculate the percent of variance in the Extraversion facet accounted for by different sources, I calculated the change in R-squared at each step in the model for each facet. The results shown in Figure 9 show that while each of the proposed Extraversion facets have variance unaccounted for, Extraversion does account for more variance in each of the proposed facets than the rest of the Big Five combined. Based on these regression results, the extant literature, and the fact that all of the hypothesized facets had their greatest correlation with Global Extraversion, all of the hypothesized facets were retained as probable Extraversion facets.

**Intercorrelations of Extraversion facets.** To investigate how the Extraversion facets relate to one another, 15 meta-analyses were conducted, one for each trait pair (e.g., Sociability-Dominance). Intercorrelations between the Extraversion facets ranged from Sensation Seeking- Dominance on the low end ( $\rho = .10$ ) to Sociability-Global Extraversion on the high end ( $\rho = .75$ ) (see Table 18 for a detailed report and Table 19 for a summary).

**Factor analytic results.** To assess the factor structure of extraversion and its facets, the meta-analytic intercorrelation matrix from Table 19 was submitted to confirmatory factor analyses using AMOS 7. Viswesvaran and Ones (1995) present an overview of the method of combining psychometric meta-analysis with factor analysis. An example of this approach can be seen in recent research examining the dimensionality of job performance (Viswesvaran, Schmidt, & Ones, 2005).

First a model specifying the extraversion facets as independent (not correlated) was run. This model was a poor representation of the data (TLI = .000, RMSEA = .266). Next a single general extraversion factor model was run (Figure 10). While this model fit the data better than the independence model, it still did not adequately model the data (TLI = .743, RMSEA = .135). The individual factor loadings of the facets on the general extraversion factor load similarly around .50 except for Sociability which loaded .69 on the general factor. Next, 4 hierarchical models using the DeYoung aspects were run. Positive Emotions and Sociability were to load on Enthusiasm while Dominance and Activity were to load on Assertiveness. However, from the paper by DeYoung et al. (2007) it appeared that Sensation Seeking could belong to either aspect since it had the same moderate loading on each. First a model was run where Sensation Seeking loaded on Assertiveness (Figure 11). This modeled the data better than the one general factor (TLI = .852, RMSEA = .102). The same model was run again but this time with Sensation Seeking loading on Enthusiasm (Figure 12). This modeled the data better than either of the previous models (TLI = .866, RMSEA = .097). The same model was run again but this time with Sensation Seeking loading on both Enthusiasm and Assertiveness

(Figure 13). This modeled the data slightly better than the previous models (TLI = .870, RMSEA = .096). Finally the model was run with Sensation Seeking loading directly on Global Extraversion (Figure 14). This model fit the data the best, though there is still room for improvement (TLI = .873, RMSEA = .095). A comparison of all of the models fit statistics can be found in Table 20.

## **Discussion**

Extraversion is an important trait for both research and practice. It has strong relationships with many life variables we care about including work, mental health, and life satisfaction. There is also great interest in the etiology of extraversion as evidenced by the large amount of research exploring topics such as psychophysiology, neurobiology, heritability and genetics, and evolution. Despite the importance of extraversion, researchers to date have not agreed on the dimensionality of extraversion including its facets and structure.

### **Reliability Generalization**

This research extends the important work by Viswesvaran and Ones (2000) since in addition to reporting reliabilities for Global Extraversion, my research also examines the reliability of more specific extraversion facets. My results for Global Extraversion ( $r_{xx} = .81$ ,  $SD = .06$ ) are slightly higher and less variable than the previous findings of these authors ( $r_{xx} = .78$ ,  $SD = .11$ ). My estimate was slightly less variable than theirs most likely due to the fact that I made the separate trait distinctions while their analyses collapsed across these categories. My facet results showed that some traits are measured on average more reliably than others. Sensation seeking had the lowest reliability ( $r_{xx} = .71$ ) while

Positive Emotions and Global Extraversion had the highest ( $r_{xx} = .81$ ) While my results inform on the average levels of internal consistency reliability for the separate traits, it is important to bear in mind that one cannot use these results to state that any measure of for example, Sociability, would be reliable. Reliability is not an inherent property of a test but rather it has to do with the scores on the specific individuals being measured. While my results are important in quantifying how reliably, and differentially reliable the traits are being measured, *on average*, researchers and test users still need to analyze and report the reliability on the individual measure they are using for that specific sample.

### **Divergent Validity and Structural Analyses**

Focusing on the meta-analytic correlations of the hypothesized Extraversion facets with the rest of the Big Five traits, it is evident that simple structure does not describe the Extraversion traits, nor was it expected to. The facets have moderate loadings on Big Five traits other than Extraversion. However, all of the facets do have their strongest correlations with Extraversion and were thus retained in the structural analyses. Examining the individual factor loadings of the facets on the single general extraversion factor, it is not evident that there is a core extraversion trait, since they all load similarly around .50 on the general factor. A combination of theory and the factor loadings with fit statistics in Table 20 suggest that the Extraversion trait is not as simple as one general factor of Extraversion however. The trait appears to have two mid-level traits, Enthusiasm and Assertiveness, that influence individual's standing on the facets of Positive Emotions and Sociability, and then Dominance, Activity, respectively with the placement of Sensation Seeking up for debate. Both Enthusiasm and Assertiveness load

highly on the higher order Extraversion factor. In turn the facets load highly on their respective Enthusiasm or Assertiveness trait.

### **Limitations, Future Research, and Conclusions**

While the clarification of the dimensionality of Extraversion is important and has wide ranging impact on all research and practice involving extraversion, limitations of the current research should be noted. First the amount of data available for the facets positive emotions, sensation seeking, and activity are not as large as that for global extraversion, dominance, and sociability. More data needs to be collected on those facets to be more certain of the findings involving these facets. Second, the standard deviations of the estimates ( $SD_{\rho}$ ) leave room for moderators to operate. Taking into account the within vs. between inventory moderator reduced the variation in relationships and as additional data allows for consideration of more potential moderators, further research should explore factors that increase or decrease the relationships. For example, personality inventories use different item response formats (Likert-type, true/false, etc.), and it is possible that consistency vs. inconsistency in response format may explain some discrepancies in convergent validity estimates. Such further research would help explain and understand the nature of this idiosyncratic measure variance. This research is also based on currently existing measures of personality. Therefore if certain traits have not been measured by existing personality instruments, this research would not tap into them.

Past research findings on the extraversion trait have been muddled by the lack of a compelling framework from which to study extraversion. Research on the etiology of Extraversion, that essentially is trying to the answer the questions of “Where does

extraversion come from?” and “Why do individuals vary in their level of Extraversion?” are very exciting. However, these questions will be difficult to answer if care is not taken in the selection and usage of the personality instruments. Too often the decision of which personality measure to use is often made by what is easily accessible or inexpensive to use rather than selecting a test based on what the content of the scale actually measures. In addition to taking care in the selection of personality measures, my results also provide an empirically derived framework of Extraversion facets. It supports a hierarchy of Extraversion traits that vary in their level of specificity. At the apex is the latent trait of Extraversion which affects individual’s standing on De Young’s two meso-level traits, Enthusiasm and Assertiveness. These traits in turn affect individual’s standing on Positive Emotions and Sociability (for Enthusiasm) and Dominance and Activity (for Assertiveness) with Sensation Seeking more questionable in its placement. If more care is taken on matching the predictor to the criterion, paying attention to which facets we wish to measure, and selecting and developing personality manuals in a detailed and thorough manner we will likely see less variable and stronger relationships for Extraversion, and applying these same principles to the rest of the Big Five, for Personality as a whole.

### **Study 3: Higher Order Factors of Personality: GFP, $\alpha$ , and $\beta$**

#### **Literature Review**

The field of personality is enjoying an era of much empirical research and this research has included examining higher order factor structures of personality traits. Previous research has found that the Big Five personality traits are not orthogonal and that these traits form higher order latent factors that have been named as either  $\alpha$  and  $\beta$  (Digman, 1997) or Stability and Plasticity (DeYoung, 2006).  $\alpha$  or Stability is thought to represent the shared variance between Conscientiousness, Agreeableness, and Emotional Stability. Individuals who score highly on  $\alpha$  are dependable, calm, and are easy to get along with. Some consider this trait to represent the latent trait of socialization.  $\beta$  or Plasticity is thought to represent the shared variance among Extraversion and Openness. Individuals who score highly on  $\beta$  tend to be drawn to and explore both situations involving other people and also idea, sensations, and emotions.

In the past few years, hierarchical conceptualizations of personality measures have also included a general factor of personality (GFP). Musek (2007) concluded that there was a general factor of personality above alpha and beta and he interpreted it as a basic personality tendency. Rushton and Irwing (2008; 2009a; 2009b; 2009c; 2009d) have also found a general factor of personality in various investigations of individual personality inventories. These inventories included Big Five measures of normal personality (e.g., NEO, BFI, TDA), non-Big Five measures of normal personality (e.g., CPS, MPQ, CPI, GZTS, TCI), and clinical inventories (e.g., MMPI-2, MCMI-III, DAPP-BQ, PAI). Other researchers have also investigated the GFP in personality inventories

such as the HEXACO-PI, PRF, Quick Big Five, and FFPI to name a few. While a GFP has been found in most of these individual studies, there is much variation in the “strength” of this general factor as the percent of variance accounted for by the general factor (i.e., GFP saturation) in various studies have varied to a large degree. Table 21 provides a summary of GFP investigations. In addition to the authors and inventories studied, the GFP saturation(s) reported in the articles are also listed. Researchers have different methods for reporting the amount of variance the GFP accounts for. The majority of the authors reported the GFP saturation as the amount of variance accounted for by the 1<sup>st</sup> factor from an EFA. These reported GFPs range from 22%-79% (mean = 41.55, sd = 11.35). The other popular method used is to conduct a hierarchical CFA with the observed variables (often the Big Five traits) at the first level, then first order latent factors (often  $\alpha$  and  $\beta$ ) at the next level, and finally the latent GFP factor at the top of the hierarchy. Researchers have calculated the GFP saturation from these CFA models by multiplying the paths directly extending from the GFP factor. In the 2 first order factor case (e.g.,  $\alpha$  and  $\beta$ ), this GFP is essentially the correlation between the first order factors. For example Rushton and Irwing (2008) show the latent factors  $\alpha$  and  $\beta$  loading .67 on the GFP and report the GFP saturation as 45%. Again, these reported GFP saturations are quite varied ranging from 25%-65% ( $M = 45.32$ ,  $SD = 11.03$ ). One of these studies was a recent meta-analysis (van der Linden, te Nijenhuis, & Bakker, 2010) that was conducted to arrive at more stable estimates of the GFP. This meta-analysis searched journals for Big Five and Five Factor measures of personality and reported that it supported a personality trait hierarchy with the Big Five at a lower level, Alpha and Beta (or Stability



and Plasticity) at a middle level, and a general factor of personality at the apex. The overall GFP saturation from this study was 45% and moderator analyses included separate analyses by inventory (e.g., NEO-PI-R vs. BFI vs. IPIP, etc.) and by sample type (e.g., students vs. employees). The individual inventory with the largest GFP that was studied was the NEO-PI-R (55%) and the sample with the largest GFP was primary or high school children (62%).

Some researchers contend that the GFP merely represents social desirability or statistical artifacts (e.g., Bäckström, Björklund, & Larsson, 2009; Ashton, Lee, Goldberg, & de Vries, 2009), while others assert the GFP is substantive in nature. Those arguing for GFP arising due to evaluation bias and desirability suggest that although GFP may exist in self-report measures of personality, its latent value is questionable. Interestingly van der Linden et al. (2010) report that in employment settings, where one might expect to see a larger GFP due to the greater impetus to present oneself positively, the GFP saturation was similar or somewhat smaller (42%) than the other samples examined (42% - 62%).

On the other hand, substantive interpretations have also been suggested for GFP. For example, the general factor of personality has been described as being akin to social efficiency or a “a suite of traits genetically organized to meet the trials of life—survival, growth, and reproduction” (Rushton, Bons, & Hur, 2008, p. 1173). Individuals high on the general factor of personality can be described as altruistic, emotionally stable, agreeable, conscientious, and extraverted (Rushton, Bons, Ando, Hur, Irwing, & Vernon,

2009). These traits taken together may assess an individual's suitability to survive and thrive as part of the human society.

Genetic bases for the general factor of personality have also been proposed (Veselka, Schermer, Petrides, & Vernon, 2009). Data using monozygotic and dizygotic twins show 50 percent of the variance in the general factor of personality can be attributed to non-additive genetic influences (Rushton, Bons, & Hur, 2008). These researchers have also proposed that a general factor of personality has an evolutionary basis in that the traits linked to it may have been subject to natural selection providing individuals with those personality traits such as agreeableness, emotional stability and extraversion that allowed them to interact with others beneficially to solve problems in their environment. Previous research has linked Alpha or Stability and Beta or Plasticity to neurophysiological bases, such as the ascending rostral serotonergic system and the central dopaminergic system respectively (DeYoung, Peterson, & Higgins, 2002) and research of this type on the general factor of personality is also needed. Most recently, a meta-analytic study (van der Linden, te Nijenhuis, & Bakker, 2010) showed that the GFP from employee self-reported personality is correlated with supervisor rated job performance and thus has utility in applied settings. Another paper (van der Linden, Scholte, Cillessen, Nijenhuis, & Segers, 2010) also reported that the GFP explained 10% of the variance in the dependent variable, Likeability and that the Big Five variables explained another 4% of the variability. However it should be noted that in both of the van der Linden criterion-related validity studies, the hierarchical regression analyses both first put in the GFP and then saw what the incremental validity of the Big Five factors

were instead of the more appropriate analysis of first including the Big Five and seeing if the GFP offers any increment in predicting the criterion above and beyond the variables themselves. de Vries (2011) did the more appropriate analysis of the van der Linden, Scholte, et al. (2010) data, first entering the Big Five and then entering the GFP second, and found that the GFP did not add to the prediction of any (0%) additional variance in likeability above and beyond the Big Five variables themselves.

While the moderators of interest have focused on which inventories were used (Big Five vs. non-Big Five, normal vs. clinical) and samples (children vs. adults, students vs. employees) it is rarely noted that the GFP saturations vary depending on what method of analysis is used. In an unpublished paper, Revelle and Wilt (2009) report on the different methods that have been used to calculate the GFP saturation. Their analyses report what was noted above that researchers have largely used Method 1 (1<sup>st</sup> factor EFA) and Method 2 (Hierarchical/Interfactor CFA) but that the more appropriate analysis is Method 3 ( $\omega_{\text{hierarchical}}$ ). Conceptually,  $\omega_{\text{hierarchical}}$  focuses on the effect of the GFP on the variables themselves rather than the effect of the GFP on the first order latent factors. In CFA terms, instead of running a hierarchical model where the Big Five observed variables load on the first order latent variables of  $\alpha$  and  $\beta$ , which then load on the latent GFP factor, a Bifactor model is examined. The Bifactor model has 3 separate latent factors (GFP,  $\alpha$ , and  $\beta$ ) which are orthogonal (correlations between factors are constrained to zero). Analyzing the data in this way allows us to see the direct effect of the GFP on the observed personality variables, controlling for the effects of  $\alpha$  and  $\beta$ . To arrive at the GFP saturation percent, one squares the sum of the general factor loadings

and divides by the sum of the total correlation matrix. Using simulations, Revelle and Wilt (2009) show that Methods 1 and 2 either over or under estimate the GFP and that Method 3 more appropriately reflects the original correlations. In their re-analysis of some of Rushton's data, they find that using  $\omega_{\text{hierarchical}}$  results in smaller GFP saturation values than were reported in the original articles.

It is clear from both the van der Linden et al. (2010) meta-analysis and the Revelle and Wilt (2009) paper that the size of the GFP varies depending on various moderators. One potentially important methodological moderator that has not been examined is whether the size of the GFP varies depending on whether the correlations it is based on come from within the same inventories or from different inventories. In other words, I will investigate a moderator that previous meta-analyses have not examined, namely a method effect differentiating whether the correlation came from within the same inventories (e.g., NEO-NEO, BFI-BFI, CPI-CPI, etc.) versus coming from different inventories (e.g., NEO-BFI, NEO-CPI, BFI-CPI, etc.). A meta-analysis can be based solely on correlations that come from within the same inventories vs. a meta-analysis of correlations that solely come from between different inventories. To illustrate, the within inventory meta-analysis for the correlation between Emotional Stability and Conscientiousness could include the correlations NEO Emotional Stability correlated with NEO Conscientiousness and BFI Emotional Stability correlated with BFI Conscientiousness. However, the between different inventories meta-analysis correlations would come from groups of individuals that took more than 1 inventory and where the correlations between the inventories were reported. In this case the correlations to be

meta-analyzed might include NEO Emotional Stability correlated with BFI Conscientiousness and BFI Emotional Stability correlated with NEO Conscientiousness. (Of course in both cases proper averaging and compositing methods will be undertaken to ensure the final correlations contributing to the meta-analysis are from independent groups of individuals. See the Methods section below for more detail). The reason within vs. between inventories is an important distinction is that if the GFP is largely substantive in nature, it should not matter if the correlations contributing to the meta-analysis come from within the same inventories or from between different inventories. If the size of the GFP and/or the fit of the GFP models appears the same in both analyses, then that would lend support to the idea that the GFP is a single underlying trait that affects individual's standing on lower level personality traits. However, if the results for the GFP appear substantially different based on whether the correlations came from within or between inventories, then that suggests that the GFP is at least in part due to method variance. One might hypothesize that since an inventory creator would likely attempt to create factors that were distinct from one another, the GFP might appear smaller using correlations that come from within inventories. However, one might also hypothesize that response sets within an inventory could make the GFP larger than when using correlations between inventories. Response sets might be influenced by the same item types (True/False, Likert format) or respondents (likely unconsciously) trying to present themselves consistently in their responses within a particular inventory (e.g., "I reported I was Agreeable which is a good trait so I should probably also report I am Conscientious since that is a positive trait as well.").

Another difference between my meta-analysis and that of van der Linden, is that their meta-analysis used only correlations from only explicit Big 5 or Five Factor Model measures. My meta-analysis includes all types of personality inventories whose scales were classified according to the Big Five. In other words, my meta-analysis includes a broader sampling of personality inventories as it includes both explicit-Big Five measures (NEO, BFI, etc.) and non-explicit Big Five measures (e.g., CPI, GZTS, etc.). If the GFP is a substantive and pervasive underlying trait that influences individual's personalities in general, then one would think that a substantially sized GFP should also be found if the scope of the data is extended to also include measures that are not from strictly Big Five or FFM inventories. Additionally, I will offer a comparison of the different GFP saturation estimates using the 3 Methods described by Revelle and Wilt. There is mounting evidence (see Ferguson et al., 2011) that many of the GFP studies have flaws that need to be addressed. One main problem pointed out is also methodological in nature: the CFA analyses used to show evidence of the GFP are done haphazardly instead of in a logical order. To address this criticism, I will present the results for each CFA model from orthogonal five factors up through the hierarchical GFP and bifactor models.

My series of investigations will therefore add to the growing knowledge base investigating whether a general factor of personality can be found by a) using a more inclusive sample of personality inventories rather than just focusing on explicit-Big Five measures, b) teasing out the possible moderating effects of within vs. between inventories correlations, c) showing if the GFP saturation results vary by calculation method, and d) presenting a complete set of CFA models from orthogonal through bifactor. These results

will help clarify the structure of Big Five personality and add to the evidence for the GFP as a substantive construct or influenced by method.

### **Method**

Using the intercorrelations among Global Big Five traits, I examined the relationships of the lower order big five traits to both alpha and beta and a general factor of personality. I used EFAs and CFAs to estimate the general factor saturation (i.e., strength of the general factor) and used CFAs to assess the fit of models to the meta-analytic intercorrelation data. To assess a previously uninvestigated potential moderator, all of these analyses were done twice, once for correlations within inventories and once for correlations between inventories. Additionally, 3 methods of calculating the GFP saturation are presented.

### **Higher Order Models of Personality Databases**

**Three data sources.** The first data source is Ones (1993) who searched journal articles for personality trait intercorrelations. This resulted in a meta-analytic intercorrelation matrix for Big 5 traits. While a tremendously helpful first step, her classifications did not differentiate between global and facet measures. For example, Extraversion, dominance, and sociability were all considered “Extraversion”. To refine these meta-analytic intercorrelation estimates, I created a new database that uses correlations from both manuals and journals paying careful attention to the classification of measures.

First, I gathered the information for my meta-analytic databases by searching over 200 psychological test manuals. Test manuals are ideal sources of data for these meta-

analyses because they tend to offer more detailed information regarding the test in question such as reliabilities and in-depth descriptions and definitions of the scales used to measure the psychological construct than typical sources such as research studies. In addition to within inventory correlations they also tend to offer correlations with other psychological tests which I needed for between inventory analyses. Test manuals also tend to use more representative samples such as normative or community samples which may lessen the effects of range restriction or enhancement that can occur with samples of convenience. Then, I manually searched the journals *Personality and Individual Differences*, the *Journal of Personality and Social Psychology*, and the *Journal of Applied Psychology* for the years 2004-2010 to include data from peer reviewed sources. While this offers a wealth of information, I also included correlations from articles collected as part of Studies 1 and 2 of my dissertation (i.e., articles with personality facets that were cited over 50 times from any year and all articles with personality facets in PAID, JPSP, and JAP from any year). After classifying each of the measures to appropriate big five traits, this data collection effort for GFP analyses resulted in 3,113 correlations. Of these, 950 correlations were from manuals and 2,163 from journals. Further breaking this down, 1,960 correlations came from within inventories while 1,153 correlations came from between inventories.

As the purpose of my investigation was to examine the GFP in self-reports of personality, I excluded data that were obtained by methods other than self-report (e.g., peer reports). I also excluded data from purely ipsative measures since ipsative measures contain dependencies within the data and limit the correlations between traits. Since I was



interested in the range of normal personality, I also excluded data from inventories (e.g., MMPI, BDI, etc) and samples (e.g., psychiatric patients, prisoners, etc.) that are clinical in nature.

**Reliabilities.** To correct correlations for unreliability, I compiled internal consistency reliabilities of the big-five classified scales. The reliability data that was recorded included: Scale names, internal consistency reliabilities (coefficient alphas) of big five relevant scales, and the number of participants on which the reliability estimate is based.**GFP Analyses**

**Data coding.** I coded each scale in the database as measuring one of the big five traits or not. Where possible, scales were coded according to Hough and Ones' (2001) mapping of scales from commonly used inventories. For scales not classified by Hough and Ones, scales were independently coded by me and a personality expert with over 20 years experience researching personality and over 60 published, peer-reviewed articles on personality. Scale classifications were based on the scale descriptions, definitions, and items. Any classification disagreements between the 2 coders were discussed until consensus was reached or if consensus was not reached that measure was classified by an assistant professor with expertise in personality measurement. If consensus still was not reached, the scale was excluded from further analyses. Appendix A includes the scales and their Big Five classifications.

**Meta-analytic procedures.** The meta-analytic procedures of (Hunter & Schmidt, 2004) were used to analyze the database. Hunter and Schmidt's approach to meta-analysis involves statistically pooling data across studies to minimize the impact of

sampling error on study findings. In addition, attenuating influences of measurement error are controlled for through corrections for attenuation. To compute unreliability corrected, true score correlations between constructs, I used the internal consistency reliability estimates I recorded from the test manuals and journals to create separate reliability distributions for each of the big five traits. Previous research (Connelly & Ones, 2007) found that range restriction is unlikely to have substantial effects on meta-analytic estimates involving personality data culled from test manuals: the average range restriction ratio of sample standard deviation to population standard deviation was  $\bar{u} = .98$  ( $SD_u = .06$ ). This finding is consistent with my earlier assertion that samples in test manuals are unlikely to show much range restriction. Thus, I will make no corrections for range restriction or enhancement in my analyses.

Correlations need to come from independent samples to avoid artificially inflating sample size. Therefore, within a meta-analysis (e.g., Agreeableness-Conscientiousness) if the same group of individuals provided more than 1 correlation, those correlations were averaged. In addition, single inventories can contain multiple measures of the same big five trait. For example, the 16 PF contains both the scale “apprehension” and the scale “tension” which are both classified as global emotional stability. Because this inventory “splits” the emotional stability domain between the two measures, correlations of each of these scales with other inventories’ big five scales would likely be underestimates of the true correlations (Nunnally, 1978). Therefore, composite correlations were computed in cases in which a single inventory contained multiple measures of the same big five

construct. This composite correlation estimates the correlation for the sum of the component measures (Hunter & Schmidt, 2004).

**Relationships between Big Five traits and structural analyses.** To address the structure of the big five traits, separate meta-analyses were conducted for each of the big five constructs correlated with each of the other big five constructs. For example, one meta-analysis estimated the relationship between global Extraversion measures and global Emotional Stability measures. Another meta-analysis focused on the relationships between global Agreeableness measures and global Openness measures. These meta-analyses proceeded until all interrelationships among big five traits were estimated. These procedures were done separately for correlations coming from within inventories and those coming from between inventories. This produced 2 meta-analytic intercorrelation matrices, each comprised of 10 meta-analytic correlations between the big five traits.

Next, each of the meta-analytic matrices were separately submitted to confirmatory factor analyses (CFA) using AMOS software to assess the factor structure of the big five personality traits. Viswesvaran and Ones (1995) presented an overview of the method of combining psychometric meta-analysis with factor analysis and an example of this approach includes recent research examining the dimensionality of job performance (Viswesvaran, Schmidt, & Ones, 2005). CFAs were used instead of exploratory factor analyses (EFA) since I had a priori expectations about the structure of the big five personality traits based on previous research (e.g., Digman, Rushton, etc.). EFAs were only used as a comparison of the analytic methods other authors have used to show GFP saturation. Five CFA models were sequentially tested an orthogonal big five

traits model, a General Factor model with big five traits loading only on the GFP directly, a correlated factor model with big five traits loading on either alpha or beta as specified by Digman, DeYoung, etc., a (mathematically identical) hierarchical model with big five traits loading on their respective alpha and beta factors which then load on the GFP, and finally a bifactor model where big five traits load on the GFP and also load on their respective alpha and beta factors but those factors do not correlate with the GFP. This last step is done to assess the GFP independently of alpha and beta. Modeling in this way allows me to partition the variance in big five traits that is due to the GFP, due to alpha or beta, and due to big five trait uniqueness. All of these models were run using the observed meta-analytic estimates. Running the bifactor model with internal-consistency corrected meta-analytic estimates allowed me to further partition the variance due to internal-consistency unreliability from the rest of the big five trait uniqueness. Using CFA, I can determine which of the models fits or represents each of the datasets the best. The general factor model is the most parsimonious and implies that the big five traits are directly influenced by a person's standing on the underlying GFP trait. Both the interfactor and hierarchical models stipulate that individual's scores on big five traits are influenced by their standing on the underlying alpha or beta traits. The correlated factor and the hierarchical models will have the same CFA fit statistics but they imply different things. The difference is one of interpretation. The correlated factor model conceptualizes alpha and beta as merely correlated with one another without the influence of a general global latent personality construct. On the other hand, the hierarchical model suggests that alpha and beta correlate for a substantive reason – individual's standing on the

underlying, latent GFP trait. Finally, the bifactor model conceptualizes scores big five traits as arising from their standing on the underlying GFP trait and separately and independently, by their standing on either alpha or beta. Although I will be testing five alternate models to mirror analyses done in the literature, I expect that models that include alpha and beta will have the best fit. I also expect that the GFP will appear different depending on whether I analyze within inventory correlation or between inventory correlations. I expect within inventory correlations to be stronger due to similar response sets for an inventory. Therefore, I expect a stronger GFP that is at least partially composed of method variance in within inventory correlations than between inventory correlations.

## **Results**

The following GFP findings are based on a large amount of data that was meta-analyzed including over 3,100 separate data points and over 1,445,000 individuals. These analyses included 5 reliability generalization meta-analyses, 20 meta-analyses of Big Five intercorrelations, and 10 confirmatory factor analyses based on the resulting meta-analytic intercorrelation matrix.

### **Ones (1993) Data**

Table 22 gives the artifact distributions provided by Viswesvaran and Ones (2000) that were used to correct the Ones (1993) observed meta-analytic correlations for internal consistency unreliability. Internal consistency reliabilities ranged from  $\bar{r}_{xx} = .73$  for Openness and  $\bar{r}_{xx} = .78$  for Emotional Stability, Extraversion, and Conscientiousness. The meta-analytic intercorrelation matrix for the Global Big Five can be seen in Table

23. Each cell is the result of an individual meta-analysis Ones ran for each of the Big Five combinations (e.g., ES-EX, ES-O, etc.). The average observed, K-weighted meta-analytic intercorrelation of the Big Five was  $r = .12$ . The CFA models run were a null model where the big five were orthogonal, a model where the latent GFP factor loads directly on the Big Five (Figure 15), a model with correlated  $\alpha$  and  $\beta$  but no higher order GFP (Figure 16), a hierarchical model with a second order latent GFP factor that is statistically equivalent to previous interfactor correlation model (Figure 17), and finally a bifactor model that parses out the variance in the Big Five that is due to orthogonal GFP,  $\alpha$ , and  $\beta$  factors (Figure 18). (An uncorrelated alpha and beta model without a GFP was also run for completeness and this did not show good fit according to both TLI = .493 and RMSEA = .099) The Bifactor model did not have enough degrees of freedom to run unless certain constraints were imposed on the model. I could either set all of the GFP loadings to be equal or set each of the 3 alpha loadings equal to each other and correspondingly both of the beta loadings to be equal to each other. I chose to constrain the alpha and beta loadings and leave free the GFP loadings since I was mainly interested in the effect of the GFP.) The fit statistics for each of these models can be found in Table 24. Examining the fit statistics for GFI, TLI, CFI, and RMSEA, the bifactor model shows the best fit to the Ones (1993) data. Using RMSEA (.067) this model adequately fits Ones' data. This bifactor model implies that individual's standing on the big five traits of Emotional Stability, Agreeableness, and Conscientiousness is due partly to the effect of the latent trait  $\alpha$ , and the variance in Extraversion and Openness is due partly to the effect of the latent trait  $\beta$ , and that standing on all of the big five traits is due to some common

latent factor (e.g., GFP? Method variance? Self-Evaluation? Combination of these factors?) that is neither  $\alpha$  nor  $\beta$ . Table 30 shows the percent of the variance in the Big Five that are due to GFP, alpha, and beta. Using the Ones (1993) dataset, it appears that the GFP and  $\alpha$  each account for some variance in each of the traits of Emotional Stability (GFP = 9%,  $\alpha$  = 18%), Agreeableness (GFP = 4%,  $\alpha$  = 18%), and Conscientiousness (GFP = 0%,  $\alpha$  = 19%). However, for the traits Extraversion (GFP = 21%,  $\beta$  = 0%) and Openness (GFP = 13%,  $\beta$  = 0%) only the GFP accounts for variance and not  $\beta$ . This table also shows the variance in the Big Five that is due to unique trait variance (1-variance accounted for by GFP,  $\alpha$ , and  $\beta$ ). These unique variances are large, ranging from 73% for Emotional Stability to 87% for Openness.

The GFP saturations using each of the 3 methods identified by Revelle and Wilt (2009) can be found in Table 21 along with the results from other authors. Method 1 uses the first factor from an EFA and shows this factor accounts for 30% of the variance. Method 2 uses the interfactor correlation between  $\alpha$  and  $\beta$  and shows the GFP saturation to be 49%. Method 3 using  $\omega_{\text{hierarchical}}$  shows the GFP saturation to be 23%.

### **Within vs. Between Inventory Correlations**

**Davies (within inventory correlations).** Table 25 gives the artifact distributions that were constructed from the internal consistency reliabilities I collected. I used these distributions to correct the observed meta-analytic within inventory correlations for internal consistency unreliability. Internal consistency reliabilities ranged from  $\bar{r}_{xx} = .75$  for Openness and  $\bar{r}_{xx} = .82$  for Emotional Stability. The detailed meta-analytic within inventory intercorrelation matrix for the Global Big Five can be seen in Table 26 and are

summarized in a matrix in Table 28. Each cell is the result of an individual meta-analysis I ran for each of the Big Five combinations (e.g., ES-EX, ES-O, etc.). The average observed, K-weighted meta-analytic intercorrelation of the Big Five was  $r = .20$ . The CFA models run were a null model where the big five were orthogonal, a model where the latent GFP factor loads directly on the Big Five (Figure 19), a model with correlated  $\alpha$  and  $\beta$  but no higher order GFP (Figure 20), a hierarchical model with a second order latent GFP factor that is statistically equivalent to previous interfactor correlation model (Figure 21), and finally a bifactor model that parses out the variance in the Big Five that is due to orthogonal GFP,  $\alpha$ , and  $\beta$  factors (Figure 22). (An uncorrelated alpha and beta model without a GFP was also run for completeness and this did not show good fit according to both  $TLI = .629$  and  $RMSEA = .116$ ) The Bifactor model did not have enough degrees of freedom to run unless certain constraints were imposed on the model. I could either set all of the GFP loadings to be equal or set each of the 3 alpha loadings equal to each other and correspondingly both of the beta loadings to be equal to each other. I chose to constrain the alpha and beta loadings and leave free the GFP loadings since I was mainly interested in the effect of the GFP.) The fit statistics for each of these models can be found in Table 29. Inspecting the fit statistics for TLI and RMSEA, the interfactor and equivalently the hierarchical model shows the best fit to the within inventory data. Using RMSEA (.061) these models adequately fit the data. The Bifactor model also has similar fit ( $RMSEA = .070$ ). Table 30 shows the percent of the variance in the Big Five that are due to GFP, alpha, and beta. In the within inventory dataset, it appears that the GFP accounts for some variance in each of the traits of Emotional



Stability (GFP = 23%,  $\alpha$  = 0%), Agreeableness (GFP = 29%,  $\alpha$  = 0%), and Conscientiousness (GFP = 31%,  $\alpha$  = 0%). The GFP and Beta account for some variance in each of the traits of Extraversion (GFP = 11%,  $\beta$  = 19%), Openness (GFP = 4%,  $\beta$  = 19%). This table also shows the variance in the Big Five that is due to unique trait variance (1-variance accounted for by GFP,  $\alpha$ , and  $\beta$ ). These unique variances are large, ranging from 69% for Conscientiousness to 77% for Emotional Stability and Openness.

The GFP saturations using each of the 3 methods identified by Revelle and Wilt (2009) can be found in Table 21 along with the results from other authors. Method 1 uses the first factor from an EFA and shows this factor accounts for 36% of the variance. Method 2 uses the interfactor correlation between  $\alpha$  and  $\beta$  and shows the GFP saturation to be 50%. Method 3 using  $\omega_{\text{hierarchical}}$  shows the GFP saturation to also be 50%.

**Davies (between inventory correlations).** The detailed meta-analytic between inventory intercorrelation matrix for the Global Big Five can be seen in Table 27 and summarized in Table 28. The average observed, K-weighted meta-analytic intercorrelation of the Big Five was  $r = .14$ . The CFA models run were a null model where the big five were orthogonal, a model where the latent GFP factor loads directly on the Big Five (Figure 23), a model with correlated  $\alpha$  and  $\beta$  but no higher order GFP (Figure 24), a hierarchical model with a second order latent GFP factor that is statistically equivalent to previous interfactor correlation model (Figure 25), and finally a bifactor model that parses out the variance in the Big Five that is due to orthogonal GFP,  $\alpha$ , and  $\beta$  factors (Figure 26). (An uncorrelated alpha and beta model without a GFP was also run for completeness and this did not show good fit according to both TLI = .607 and

RMSEA = .096) The Bifactor model did not have enough degrees of freedom to run unless certain constraints were imposed on the model. I could either set all of the GFP loadings to be equal or set each of the 3 alpha loadings equal to each other and correspondingly both of the beta loadings to be equal to each other. I chose to constrain the alpha and beta loadings and leave free the GFP loadings since I was mainly interested in the effect of the GFP.) The fit statistics for each of these models can be found in Table 29. Turning to the fit statistics for GFI, TLI, CFI, and RMSEA, the bifactor model shows the best fit to the between inventory data. The bifactor model fits the between factor data very well (TLI = .996 and RMSEA = .010) Table 30 shows the percent of the variance in the Big Five that are due to GFP, alpha, and beta. In the between inventory dataset, it appears that the GFP and  $\alpha$  account for some variance in each of the traits of Emotional Stability (GFP = 28%,  $\alpha$  = 17%), Agreeableness (GFP = 2%,  $\alpha$  = 17%), and Conscientiousness (GFP = 3%,  $\alpha$  = 17%). The GFP and Beta account for some variance in each of the traits of Extraversion (GFP = 19%,  $\beta$  = 9%), Openness (GFP = 1%,  $\beta$  = 9%). This table also shows the variance in the Big Five that is due to unique trait variance (1-variance accounted for by GFP,  $\alpha$ , and  $\beta$ ). These unique variances are large, ranging from 90% for Openness to 55% for Emotional Stability.

The GFP saturations using each of the 3 methods identified by Revelle and Wilt (unpublished) can be found in Table 21 along with the results from other authors. Method 1 uses the first factor from an EFA and shows this factor accounts for 32% of the variance. Method 2 uses the interfactor correlation between  $\alpha$  and  $\beta$  and shows the GFP saturation to be 38%. Method 3 using  $\omega_{\text{hierarchical}}$  shows the GFP saturation to be 26%.

## Discussion

While previous research has explored the GFP meta-analytically (van der Linden et al., 2010), the present study served to extend the meta-analytic findings on the GFP using a wide variety of personality inventories (both explicitly Big Five measures and non) and sources (both manuals and journals) to explore the potential moderator of within vs. between inventory correlations. Different methods of calculating the amount of variance in the Big Five that the GFP accounts for (GFP saturation) were also conducted.

The results of these analyses confirm the findings by Revelle and Wilt (unpublished) that the GFP saturations differ based on the methods used to compute it. If one simply steps back and inspects the intercorrelations in each of the datasets it would be expected that the GFP would account for a small amount of variance in the variables (Ones avg  $r = .12$ , Davies Within Inventories avg  $r = .20$ , Davies Between Inventories avg  $r = .14$ ). Calculating the GFP saturation using the interfactor correlation method (as Rushton and others do) the GFP appears rather large (in the Ones data the GFP accounts for 49% of the variance, in the Within Inventory data it accounts for 50% of the variance and in the Between Inventory data it accounts for 38% of the variance). Using the 1<sup>st</sup> factor from an EFA the GFP saturations are more in line with what would be expected (Ones = 30%, Within = 36%, Between = 32%). If one uses the appropriate  $\omega_{\text{hierarchical}}$  statistic, the GFP appears smaller still for Ones (23%) and Between inventory data (26%) as expected based on the average intercorrelations among the Big Five. An interesting thing happens with the Within inventory dataset however. When the bifactor model is run, Alpha is basically subsumed by the GFP where the loadings for alpha on ES, A, and

C drop to .00. This could be interpreted as alpha not having an effect on ES, A, and C but the more likely interpretation is that the GFP is essentially Alpha in this dataset.

Examining the loadings of the five variables on just a GFP (Figure 19) ES, A, and C have the highest loadings on GFP all around .50 while EX and O have smaller loadings.

In any case, inspecting the GFP saturations, it is evident that the GFP varies depending on the method used to calculate it. It is also evident from Table 21 that the between inventory data has smaller GFP saturation than the within inventory data. This speaks to whether the GFP is substantive, a methodological artifact, or a mixture of the two. In general, the creator of an inventory generally makes a concerted effort to measure traits that are distinct from one another within their inventory (discriminant validity) so it could be hypothesized that a smaller GFP would have been evident in the within inventory data. However this was not the case; the GFP saturations were larger in the within inventory data than the between inventory data. A probable reason for this finding is likely due to response sets while taking a particular inventory (either due to item type, presenting oneself consistently within an inventory, etc.), or the same test author's conceptualizations of the traits. This points to the GFP being partially a methodological artifact since the results vary based on a methodological moderator. However, even in the between inventory data, using the more appropriate  $\omega_{\text{hierarchical}}$  statistic, the GFP still accounts for 26% of the variance in the data that is not due to either alpha or beta.

This leaves room for more exploration; is this 26% a substantive underlying trait that causes individual's standings on the lower level personality traits or is this simply an artifact caused by self-evaluation? This research does not provide a definitive answer to

that question but does show that at least some of the variance the GFP accounts for is due to methodology and it is not purely substantive. More illustration of the variability of the GFP can be seen in the nature of the GFPs provided in Table 30 that shows the partitioning of the variance of the Big Five. In the Ones data the GFP appears to be Beta (specifically, Extraversion), in the Within Inventory data the GFP appears to be Alpha (equally ES, A, and C), and in the Between inventory data the GFP is mostly Emotional Stability and Extraversion. If the GFP is largely a substantive underlying trait, it seems odd that the nature of the GFP would be so different simply due to a methodological moderator such as using mixed vs. within vs. between inventory data. The GFP acts differently depending on what dataset is used so it cannot be entirely substantive as some authors imply.

Another point that is made evident in Table 30 is that most of the variance in the Big Five is not accounted for by GFP, Alpha, and Beta. Most of the variance is unique to each of the Big Five traits which highlights the importance of these factor level personality traits.

### **Limitations and Future Directions**

Since this research was interested in the GFP in normal, self-report data, these meta-analyses only included self-report data and did not include clinical inventories or samples. A methodological limitation is that the Bifactor model did not have enough degrees of freedom to run unless certain constraints were imposed on the model. I chose to constrain the alpha and beta loadings and leave free the GFP loadings since I was mainly interested in the effect of the GFP. It would be more informative if I had been

able to free the alpha and beta parameters to be freely estimated as well. This is a trade off since using meta-analytic data provides more stable estimates but there are 10 data points which limits the degrees of freedom available.

It is obvious from this and previous research that a GFP can be found in a variety of personality datasets. However, more research should be conducted focusing on the importance of this GFP, looking beyond just the strength of the GFP in terms of percent of variance accounted for. More criterion-related validity studies need to be conducted in the vein of de Vries, though it should be sure to examine the importance of the GFP beyond the prediction from the Big Five traits themselves. Additionally more research should be done parsing the GFP into substance vs. artifact. Promising research is being conducted in this area using MTMM. For example, Chang, Connelly, and Geeza (2012) show that when method variance due to rater (self, other) is accounted for, the GFP is negligible. Additional studies could also examine other moderators such as item format (sentence, phrase, adjectives), response type (likert, t/f, y/n), and whether the inventories were created by the same author.

### **Conclusion**

While a GFP can be found by meta-analytically using a variety of personality inventories, the extent to which this GFP accounts for the variance in the big five personality traits varies by both the method chosen to calculate GFP saturation and also whether the correlations come from within the same inventories vs. between different inventories, supporting the idea that the GFP is at least in part due to method variance. Additionally, researchers need to not only evaluate the GFP in terms of the percentage of

variance accounted for, but also need to examine the loadings of the Big Five on the GFP to see if the GFP is truly general or if the bulk of the GFP is comprised of a certain trait or traits. Finally this research highlights the importance of Alpha and Beta and the Big Five traits themselves since only models that included alpha and beta fit the data well since most of the variance in the Big Five was unique variance not accounted for by the GFP, alpha, or beta.

## GENERAL DISCUSSION

At the outset I stated the need to focus on Extraversion and Agreeableness because interpersonal traits are important and are related to a whole host of behaviors and outcomes we care about. Specifically, I called out the interpersonal traits' relationships with jobs, stating that entire industries are service based and even in those that are not service based, interpersonal traits are still important as many models of job performance include an interpersonal component. In addition to increasing job performance, focusing on interpersonal behavior can also decrease counterproductive work behaviors. By identifying the likely facets of Extraversion and Agreeableness in Studies 1 and 2, this gives practitioners a more specific level of personality at which to focus on for prediction and also gives researchers a data-based organizing taxonomy with which to cumulate predictor-criterion relationships to enable further meta-analytic research into the importance of interpersonal traits for criteria of interest.

In addition to investigating their lower level facets, Extraversion and Agreeableness each belong to different higher order facets (Alpha and Beta). Taken together, my studies show that while Extraversion and Agreeableness are both interpersonal traits, they are not strongly correlated with one another ( $\rho = .09$ ). Being high on one trait does not imply the individual is necessarily high on the other. This has implications for selection purposes in that one cannot simply measure Extraversion and hope to also divine someone's level of Agreeableness and vice versa. Both are interpersonal traits dealing with how people interact with others but they are distinctly



different traits and as such both should be measured to get a true read on how a person is likely to interact with others.

Study 3 also addresses the notion that the Big Five traits are highly correlated and comprise a general factor of personality. My results show that the average intercorrelation among the Big Five traits is not large and the size of the general factor (or the amount of variance shared among the Big Five) varies due to methodological moderators such as within vs. between inventories and also depends on the analytic strategy undertaken. This variation suggests that the general factor is perhaps not as large as others have made it out to be and that it cannot be purely substantive.

### **Limitations and Future Directions**

One limitation is that my dissertation focuses on the lower level facets of only two of the big five personality traits: Extraversion and Agreeableness. Work by Birkland et al. (in progress) focuses on the facets of emotional stability, and Connelly et al. (2007; in press) focused on the facets of Conscientiousness and Openness. Future research should endeavor to combine all of this meta-analytic data to map the Big Five personality traits jointly. This should allow greater clarity into the relationships among the likely facets, perhaps identifying some of them more clearly as compound traits and further bolstering others as pure facets. Doing so will help to identify personality traits, that while not pure facets, are important to more than one Big Five factor (e.g., Warmth as a compound trait that is important to the interpersonal traits of both Extraversion *and* Agreeableness).

Another limitation is that this was all self-report data, so while this dissertation sheds light on the structure of self report personality it remains to be seen whether these

structures hold up in different contexts using other reports of personality. For example, in the GFP case some have reported that the general factor disappears when using other reports of personality, suggesting the GFP is a methodological artifact and not a substantive underlying personality disposition (Chang, Connelly, & Geeza, 2012).

### **Conclusion**

There are many levels at which to examine personality from the facets, to the meso-level facets, to the big five, to alpha/beta, to some type of general factor. Each level has its own degree of specificity and we would do well to match our criterion's specificity level with the predictor specificity level. If we wish to build the nomological net of personality with other criteria (e.g., job performance criteria) then we need to know what categories of personality to use and at which levels of specificity to organize and accumulate data. The results from these three studies provide a good start.

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APPENDIX A

Full Listing of Personality Scale Classifications

Inventory Name	Scale Name
<b>Global Emotional Stability</b>	
15fq: Fifteen Factor Questionnaire	Fc: Stable
15fq: Fifteen Factor Questionnaire	Fo: Self-Doubting
15fq: Fifteen Factor Questionnaire	Fq4: Tense Driven
16 Pf	Factor C (Emotionally Stability, Mature)
16 Pf	Factor O (Apprehensive, Insecure)
16 Pf	Factor Q4 (Tense, Frustrated)
Abbreviated 15 Item Big Five Questionnaire	Neuroticism
Able	Emotional Stability
Adjective Checklist (Acl)-1983 Edition	Ideal Self
Adjective Checklist (Acl)-1983 Edition	Personal Adjustment
Adjective Self-Description Questionnaire	Neuroticism
Bars Bipolar Adjective Rating Scale	Neuroticism
Bell's Adjustment Inventory	Total
Bentler Psychological Inventory	Invulnerability
Bentler Psychological Inventory	Stability
Bernreuter Personality Inventory	Neurotic
Bfi: Big Five Inventory	Neuroticism
Bfms: Big Five Marker Scales	Neuroticism
Bfq: Big Five Questionnaire	Neuroticism
Big Five	Emotional Stability
Big Five Adjectives	Neuroticism
Big Five Aspects Scales	Neuroticism
Big Five Factor Markers	Emotional Stability
Business Personality Indicator	Stamina
California Psychological Inventory (Cpi)	Leventhal Scale For Anxiety
Comrey Personality Scales	Emotional Stability
Dsi Daily Stress Inventory	Total Stress
Easi	Emotionality
Emotional Health Questionnaire (Emo Questionnaire)	External Adjustment (Ke)- Adjustment Factors
Emotional Health Questionnaire (Emo Questionnaire)	General Adjustment (Kg)- Adjustment Factors

Emotional Health Questionnaire (Emo Questionnaire)	Internal Adjustment (Ki)- Adjustment Factors
Emotional Health Questionnaire (Emo Questionnaire)	Organic Reaction (O) - Diagnostic Dimensions
Emotional Health Questionnaire (Emo Questionnaire)	Somatic Adjustment (Ks)- Adjustment Factors
Emotional Health Questionnaire (Emo Questionnaire)	Unreality (U) - Diagnostic Dimensions
Epp Eysenck Personality Profiler	Neuroticism
Eysenck Maudsley Personality Inventory	Neuroticism
Eysenck Personality Inventory	Neuroticism
Eysenck Personality Questionnaire (Epq-R)	Neuroticism (N)
Ffpi	Emotional Stability
Global Personality Inventory	Neuroticism
Goldberg 1983	Neuroticism
Goldberg 1999	Emotional Stability
Goldberg's 50 Bipolar Adjectives	Emotional Stability
Goldberg's Adjectival Big-Five Markers	Emotional Stability
Goldberg's Broad-Bandwidth Scales	Neuroticism
Goldberg's Unipolar Markers For The Big-Five Factor Structure	Emotional Stability
Hexaco-Pi	Emotionality
Hogan Personality Inventory	Adjustment
Hogan Personality Inventory	No Guilt
Hogan Personality Inventory	No Somatic Complaints
Interpersonal Style Inventory	Stable
Ipip International Personality Item Pool	Emotional Stability
Ipip-Hexaco	Emotionality
Masq: Mood And Anxiety Symptom Questionnaire	General Distress
Maudsley Personality Inventory	Neuroticism
Midlife Development Inventory Big Five Personality Scale	Neuroticism
Mini-Ipip	Neuroticism
Mowen's Personality Scale	Neuroticism
Mpq: Multicultural Personality Questionnaire	Emotional Stability

Multidimensional Personality Questionnaire Mpq	Stress Reaction
Neo-Pi-R	Neuroticism
Neo-Pi-R	Vulnerability
Norman's (1963) Bipolar Adjective Checklist	Stability
Occupational Personality Profile	Emotional-Phlegmatic
Occupational Personality Questionnaire (Opq32n)	Worrying (Fe2)
Orpheus	Emotion
Personal Audit	Stability-Instability
Personal Audit	Steadiness-Emotionality
Personal Style Inventory (Lounsbury)	Neuroticism
Personality Characteristics Inventory	Emotional Stability
Rossi (2001)	Neuroticism
Sales Achievement Predictor	Relaxed Style
Saucier's Mini-Markers	Emotional Stability
Taylor-Johnson Temperament Analysis	Nervous (A)
Tda	Emotional Stability
Thurstone Temperament Schedule	Stable
Tipi: Ten Item Personality Inventory	Emotional Stability
Tpque	Neuroticism
Transparent Bipolar Inventory	Stability/Neuroticism
Tsdi: Trait Self-Description Inventory	Neuroticism
Work Behavior Inventory	Emotional Stability

#### **Global Extraversion**

15fq: Fifteen Factor Questionnaire	Ff: Enthusiastic
16 Pf, 5th Edition--Global Factor	Extraversion
16 Pf, 5th Edition--Primary Factor Scale	Factor F: Liveliness
Abbreviated 15 Item Big Five Questionnaire	Extraversion
Adjective Check List	Exhibition
Adjective Self-Description Questionnaire	Extraversion
Bars Bipolar Adjective Rating Scale	Extraversion
Bentler Psychological Inventory	Extraversion
Bfi: Big Five Inventory	Extraversion
Bfms: Big Five Marker Scales	Extraversion

Bfq: Big Five Questionnaire	Extraversion
Big Five	Extraversion
Big Five Adjective Scale	Extraversion
Big Five Aspects Scales	Extraversion
Big Five Factor Markers	Extraversion
Business Personality Indicator	Extraversion
Business Personality Indicator	Limelight Seeking
California Psychological Inventory (Cpi)	V.1 Internality
Comrey Personality Scales (Cps)	Extraversion Vs. Introversion
Epp Eysenck Personality Profiler	Extraversion
Eysenck Maudsley Personality Inventory	Extraversion
Eysenck Personality Inventory	Extraversion
Eysenck Personality Questionnaire (Eppq-R)	Extraversion (E)
Ffpi	Extraversion
Global Personality Inventory	Extroversion
Goldberg 1983	Extraversion
Goldberg 1999	Extraversion
Goldberg's 50 Bipolar Adjectvies	Surgency
Goldberg's Adjectival Big-Five Markers	Extraversion/Surgency
Goldberg's Unipolar Markers For The Big-Five Factor Structure	Extraversion
Guilford Inventory Of Factors Stdcr	Social Introversion
Hexaco-Pi	Extraversion
Hogan Personality Inventory	Exhibitionistic
Interpersonal Adjectives Scale	Aloof-Introverted (Fg)
Ipip International Personality Item Pool	Extraversion
Ipip-Hexaco	Extraversion
Jungian Type Survey	Extraversion Vs. Introversion
Maudsley Personality Inventory	Extroversion
Midlife Development Inventory Big Five Personality Scale	Extraversion
Millon Index Of Personality Styles	Introversing
Millon Index Of Personality Styles	Outgoing
Mini-Ipip	Extraversion
Mowen's Personality Scale	Extraversion
Myers-Briggs Type Indicator	Extraversion-Introversion
Neo-Pi-R	Extraversion

Norman's (1963) Bipolar Adjective Checklist	Surgency/Extraversion
Personal Characteristics Inventory	Extraversion
Personal Style Inventory (Lounsbury)	Extraversion
Personality Research Form	Exhibition
Prevue Assessment	Extraversion
Prevue Assessment	Extraversion 2
Quintax Personality Questionnaire	Extraversion
Rossi (2001)	Extraversion
Sales Achievement Predictor	Extroversion
Saucier's Mini-Markers	Extraversion
Self-Description Inventory	Reserved-Outgoing
Self-Monitoring Scale	Extraversion
Six Factor Personality Questionnaire	Exhibition
Six Factor Personality Questionnaire	Extraversion
Taylor-Johnson Temperament Analysis	Active-Social (C)
Tda: Trait Descriptive Adjectives	Surgency
Tipi: Ten Item Personality Inventory	Extraversion
Tpque	Extraversion
Transparent Bipolar Inventory	Surgency/Extraversion
Tsdi: Trait Self-Description Inventory	Extraversion
Work Behavior Inventory	Extraversion

*Sociability*

Adjective Check List	Affiliation
Assess Expert System (Version 6.0)	Sociability
Bernreuter Personality Inventory	Lack Of Sociability
Business Personality Indicator	Outgoing
California Psychological Inventory (Cpi)	Sociability (Sy)
Cheek-Buss Shyness Scale	Shyness
Eysenck Personality Profiler (Epp)	Sociability
Fundamental Interpersonal Relations Orientation - Behavior (Firo-B)	Expressed Behavior Inclusion (Ei)
Fundamental Interpersonal Relations Orientation - Behavior (Firo-B)	Total Need For Human Interaction
Guilford-Zimmerman Temperament Survey (Gzts)	Sociability
Heist And Yonge Omnibus Personality Inventory (Opi)	Social Extraversion



Hexaco-Pi	Sociability
Hogan Personality Inventory	Entertaining
Hogan Personality Inventory	Likes Crowds
Hogan Personality Inventory	Likes Parties
Hogan Personality Inventory	Likes People
Hogan Personality Inventory	Sociability
Interpersonal Adjective Checklist Revised (Ias-R)	Gregarious-Extraverted
Interpersonal Style Inventory	Sociable
Jackson Personality Inventory--Revised	Sociability
Millon Index Of Personality Styles	Extraversing
Neo-Pi-R	Gregariousness
Occupational Personality Profile	Reserved-Gregarious
Occupational Personality Questionnaire (Opq32n)	Affiliative (Rp6)
Occupational Personality Questionnaire (Opq32n)	Outgoing (Rp5)
Omnibus Personality Inventory	Social Extroversion
Orientation And Motivation Inventory	Person Oriented
Personality Research Form (Prf)	Affiliation
Personality Research Inventory	Gregariousness
Personality Research Inventory	Talkativeness
Prevue Assessment	Extraversion 1
Sales Achievement Predictor	Initiative-Cold Calling
Shl Motivation Questionnaire	Affiliation (S1)
Six Factor Personality Questionnaire	Affiliation
Social Skills Inventory	Social Expressivity
Thurstone Temperament Schedule	Sociable
Zkpq-Iii-R	Sociability

*Sensation Seeking*

Arnet Sensation Seeking Scale	Intensity
Carver And White's Bis/Bas	Fun Seeking
Eysenck Personality Profiler (Epp)	Sensation-Seeking
Eysenck's Impulsivity, Venturesomeness, And Empathy Questionnaire	Venturesomeness
Hogan Personality Inventory	Thrill-Seeking
I7 Eysenck	Venturesomeness

Multiple Affect Adjective Check List-Revised	Sensation Seeking (Trait)
Neo-Pi-R	Excitement Seeking
Orientation And Motivation Inventory	Adventure Seeking
Sensation Seeking Scale	Thrill And Adventure Seeking
Six Factor Personality Questionnaire	Seriousness
Upps	Sensation Seeking
Zkpq	Sensation Seeking
Zuckerman Sensation-Seeking Scale (Sss)	Thrill And Adventure Seeking (Tas)

*Dominance*

15fq: Fifteen Factor Questionnaire	Fe: Assertive
16 Pf, 5th Edition	Factor E (Dominance, Aka Humble/Assertive)
Able	Dominance
Allport Ascendance-Submission Scale	Ascendance-Submission
Assess Expert System (Version 6.0) (The)	Assertiveness
Bentler Psychological Inventory	Leadership
Bernreuter Personality Inventory	Dominant
Big Five Aspects Scales	Assertiveness
California Psychological Inventory (Cpi) And Cpi 260	Social Presence (Sp)
Eysenck Personality Profiler (Epp)	Assertive-Submissive
Fundamental Interpersonal Relations Orientation - Behavior (Firo-B)	Expressed Behavior Control (Ec)
Guilford-Zimmerman Temperament Survey (Gzts)	Ascendance
Hexaco-Pi	Social Boldness
Hogan Personality Inventory	Leadership
Ilt: Self Perceived Competencies	Being Assertive
Interpersonal Adjectives Scale	Assured-Dominant (Pa)
Interpersonal Style Inventory	Directive
Millon Index Of Personality Styles	Asserting
Mpq: Multicultural Personality Questionnaire	Social Initiative
Multidimensional Personality Questionnaire Mpq (Previously Differential Personality Questionnaire Dpq)-Primary Scales	Social Potency
Multidimensional Self-Esteem Inventory	Personal Power

Neo-Pi-R	Assertiveness
Npi	Authority
Occupational Personality Questionnaire (Opq32n)	Controlling (Rp2)
Occupational Personality Questionnaire (Opq32n)	Persuasive (Rp1)
Orientation And Motivation Inventory	Power Seeking
Personality Research Form - Form A	Dominance
Prevue Assessment - Sub-Scales	Independence 2
Sales Achievement Predictor	Assertiveness
Sales Achievement Predictor	Sales Closing
Self-Description Inventory	Soft-Spoken-Forceful
Shl Motivation Questionnaire	Power (E5)
Six Factor Personality Questionnaire	Dominance
Social Skills Inventory	Social Control
Taylor-Johnson Temperament Analysis	Dominant (G)
Thurstone Temperament Schedule	Dominant

*Activity*

Able	Energy Level
Assess Expert System (Version 6.0) (The)	Energy Level
Business Personality Indicator	Dynamic
Comrey Personality Scales (Cps)	Activity Vs. Lack Of Energy (A)
Easi	Activity
Eysenck Personality Profiler (Epp)	Activity
Guilford-Zimmerman Temperament Survey (Gzts)	General Activity
Jackson Personality Inventory--Revised	Energy Level
Multidimensional Self-Esteem Inventory	Body Functioning
Neo-Pi-R	Activity
Occupational Personality Questionnaire (Opq32n)	Vigorous (Fe7)
Shl Motivation Questionnaire	Level Of Activity (E1)
Thurstone Temperament Schedule	Vigorous (Now Called Active)
Zkpq-Iii-R	Activity

*Positive Emotions*

Affect Intensity Measure	Positive
Bentler Psychological Inventory	Cheerfulness
Bradburn Affect Balance Scale	Positive Affect
Brief Measures Of Positive And Negative Affect Scales	Positive Affect
Hexaco-Pi	Liveliness

Multidimensional Personality Questionnaire MPQ (Previously Differential Personality Questionnaire DPQ)-Primary Scales	Wellbeing
Multiple Affect Adjective Check List-Revised	Positive Affect (Trait)
Neo-Pi-R	Positive Emotions
PANAS (Positive And Negative Affect Scales)	Positive Affect
Personality Research Form	Play
State-Trait Cheerfulness Inventory	Cheerfulness

#### Global Openness

15fq: Fifteen Factor Questionnaire	Fm: Conceptual
16 Pf	Factor M: Abstractedness
16 Pf	Openness
Abbreviated 15 Item Big Five Questionnaire Adjective Check List	Openness Creative Personality
Adjective Self-Description Questionnaire	Openness
Bars Bipolar Adjective Rating Scale	Openness
Bfi: Big Five Inventory	Openness
Bfms: Big Five Marker Scales	Openness To Experience
Bfq: Big Five Questionnaire	Openness
Big Five	Openness To Experience
Big Five Adjectives	Openness
Big Five Aspects Scales	Openness
Ffpi	Autonomy
Global Personality Inventory	Openness To Experience
Goldberg 1983	Openness
Goldberg 1999	Openness
Goldberg's 50 Bipolar Adjectives	Intellect
Goldberg's Adjectival Big-Five Markers	Intellect
Goldberg's Unipolar Markers For The Big-Five Factor Structure	Openness
Guilford Personality Schedules	T
Hexaco-Pi	Openness To Experience
Hogan Personality Inventory	Intellectance
Hogan Personality Inventory	Science Ability
Ipip International Personality Item Pool	Openness
Ipip-Hexaco	Openness To Experience
Mini-Ipip	Intellect
Mowen's Personality Scale	Openness

Mpq: Multicultural Personality Questionnaire	Open-Mindedness
Multidimensional Personality Questionnaire Mpq	Absorption
Neo-Pi-R	Actions
Neo-Pi-R	Ideas
Neo-Pi-R	Openness
Norman's (1963) Bipolar Adjective Checklist	Culture/Openness
Occupational Personality Profile	Abstract-Pragmatic
Omnibus Personality Inventory	Complexity
Omnibus Personality Inventory	Theoretical Orientation
Omnibus Personality Inventory	Thinking Introversion
Personal Characteristics Inventory	Openness
Personal Style Inventory (Lounsbury)	Openness
Personality Research Form	Understanding
Rossi (2001)	Openness
Saucier's Mini-Markers	Openness To Experience
Self-Description Inventory	Conventional-Imaginative
Self-Description Inventory	I-Investigative
Six Factor Personality Questionnaire	Breadth Of Interest
Six Factor Personality Questionnaire	Openness To Experience
Six Factor Personality Questionnaire	Understanding
Tda	Intellect
Tipi: Ten Item Personality Inventory	Openness
Tpque	Openness
Transparent Bipolar Inventory	Intellect/Openness
Tsdi: Trait Self-Description Inventory	Openness

#### **Global Agreeableness**

16pfi	Agreeableness
Abbreviated 15 Item Big Five Questionnaire	Agreeableness
Able	Cooperativeness
Acl	Nurturance
Adjective Checklist (Acl)-1983 Edition	Feminine Attributes
Adjective Checklist (Acl)-1983 Edition	Nurturance
Adjective Self-Description Questionnaire	Agreeableness
Bars Bipolar Adjective Rating Scale	Agreeableness
Bfi: Big Five Inventory	Agreeableness
Bfms: Big Five Marker Scales	Agreeableness
Bfq: Big Five Questionnaire	Agreeableness

Big Five	Agreeableness
Big Five Adjective Scale	Agreeableness
Big Five Aspects Scales	Agreeableness
Big Five Personality Inventory	Agreeableness
California Psychological Inventory (Cpi) & Cpi 260	Amicability
Ffpi	Agreeableness
Global Personality Inventory	Agreeableness
Goldberg 1983	Agreeableness
Goldberg 1999	Agreeableness
Goldberg's 100 Unipolar Markers	Agreeableness
Goldberg's 50 Bipolar Adjectives	Agreeableness
Goldberg's Adjectival Big-Five Markers	Agreeableness
Goldberg's Broad-Bandwidth Scales	Agreeableness
Goldberg's Unipolar Markers For The Big-Five Factor Structure	Agreeableness
Hexaco-Pi	Altruism
Hogan Personality Inventory	Likeability
Hpi-R	Easy To Live With
Interpersonal Adjective Checklist Revised (Ias-R)	Cold Hearted
Ipip International Personality Item Pool	Agreeableness
Ipip International Personality Item Pool	Pleasantness
Millon Index Of Personality Styles	Agreeing
Mini-Ipip	Agreeableness
Mowen's Personality Scale	Agreeableness
Multidimensional Self-Esteem Inventory	Likability
Neo-Pi-R	Agreeableness
Norman's (1963) Bipolar Adjective Checklist	Agreeableness
Personal Characteristics Inventory	Agreeableness
Personal Style Inventory (Lounsbury)	Agreeableness
Rossi (2001)	Agreeableness
Saucier's Mini-Markers	Agreeableness
Six Factor Personality Questionnaire	Agreeableness
Taylor-Johnson Temperament Analysis	Sympathetic (E)
Tda	Agreeableness
Tipi: Ten Item Personality Inventory	Agreeableness
Tpque	Agreeableness
Tsdi: Trait Self-Description Inventory	Agreeableness
Work Behavior Inventory	Agreeableness

<i>Trust</i>	
15fq: Fifteen Factor Questionnaire	Fl: Suspicious
16 Pf	Factor L (Vigilance, Suspicious, Wary)
Bentler Psychological Inventory	Trustfulness
Buss-Durkee Hostility Inventory (Bdhi)	Suspicion
Comrey Personality Scales	Trust Vs. Defensiveness (T)
General Belief In A Just World Scale	Bjw
Hogan Personality Inventory	Trusting
Interpersonal Style Inventory	Trusting
Neo-Pi-R	Trust
Occupational Personality Profile	Cynical-Trusting
Occupational Personality Questionnaire (Opq32n)	Trusting (Fe5)
Personal Orientation Dimensions	Trust In Humanity
Personal Orientation Inventory	Nature Of Man

<i>Modesty</i>	
Adjective Check List	Deference
Hexaco-Pi	Modesty
Neo-Pi-R	Modesty
Occupational Personality Questionnaire (Opq32n)	Modest (Rp8)
Personality Research Form (Prf)	Abasement
Six Factor Personality Questionnaire	Abasement

<i>Cooperation</i>	
Neo-Pi-R	Compliance
Occupational Personality Questionnaire (Opq32n)	Democratic (Rp9)
Prevue Assessment - Sub-Scales	Independence 1
Sales Achievement Predictor	Cooperativeness
Sales Achievement Predictor	Team Player
Self-Construal Scale	Interdependence

<i>Not Outspoken</i>	
Dogmatism Scale	Dogmatism
Eysenck Personality Profiler (Epp)	Dogmatism
Occupational Personality Questionnaire (Opq32n)	Outspoken (Rp3)
Rokeach Dogmatism Scale	Dogmatism

*Lack Of Aggression*

Adjective Check List	Aggression
Aggression Questionnaire	Physical Aggression
Aggression Questionnaire	Verbal Aggression
Anger Consequences Questionnaire (Acq)	Aggression
Angry Behavior Questionnaire	Physical Aggression
Angry Behavior Questionnaire	Verbal Aggression
Barq	Direct Anger Out (Dao)
Buss And Perry Trait Anger Scale	Physical Aggression
Buss And Perry Trait Anger Scale	Verbal Aggression
Buss Perry Aggression Questionnaire	Physical Aggression
Buss Perry Aggression Questionnaire	Verbal Aggression
Buss Warren Aggression Questionnaire (Bwaq)	Physical Aggression
Buss Warren Aggression Questionnaire (Bwaq)	Verbal Aggression
Buss-Durkee Hostility Inventory (Bdhi)	Assault
Buss-Durkee Hostility Inventory (Bdhi)	Verbal Hostility
Ecq	Aggression Control
Emotional Health Questionnaire (Emo Questionnaire)	Hostility (H) - Diagnostic Dimensions
Guilford-Zimmerman Temperament Survey (Gzts)	Friendliness
Hogan Personality Inventory	No Hostility
Hp5i	Antagonism
Interpersonal Style Inventory	Tolerant
Multidimensional Personality Questionnaire Mpq (Previously Differential Personality Questionnaire Dpq)-Primary Scales	Aggression
Multiple Affect Adjective Check List-Revised	Hostility (Trait)
Personality Research Form	Aggression
State Trait Anger Expression Inventory (Staxi)	Anger Expression Out (Ax-O)
Zkpq-Iii-R	Aggression-Hostility

*Non-Manipulative*

15fq: Fifteen Factor Questionnaire	Fn: Restrained
16 Pf	N (Forthright/Privateness/Shrewd)
Eysenck Personality Profiler (Epp)	Manipulative
Global Personality Inventory	Manipulating
Hexaco-Pi	Sincerity
Jackson Personality Inventory--Revised	Social Astuteness
Neo-Pi-R	Straightforwardness



Occupational Personality Profile	Genuine-Persuasive
<i>Nurturance</i>	
Comrey Personality Scales (Cps)	Empathy Vs. Egocentrism (P)
Hogan Personality Inventory	Sensitive
Interpersonal Adjectives Scale	Warm-Agreeable (Lm)
Interpersonal Style Inventory	Nurturant
Millon Index Of Personality Styles	Nurturing
Neo-Pi-R	Altruism
Occupational Personality Questionnaire (Opq32n)	Caring (Rp10)
Personality Research Form	Nurturance
Self-Description Inventory	Unconcerned-Altruistic

<i>Tolerance</i>	
California Psychological Inventory (Cpi)	Tolerance
Jackson Personality Inventory--Revised	Tolerance

<i>Warmth</i>	
15fq: Fifteen Factor Questionnaire	Fa: Outgoing
16 Pf	Factor A (Warmth, Outgoing, Sociable)
Fundamental Interpersonal Relations Orientation - Feelings (Firo-F)	Expressed Behavior Affection (Ea)
Neo-Pi-R	Warmth
Personal Orientation Dimensions	Love
Personal Orientation Inventory	Capacity For Intimate Contact
Taylor-Johnson Temperament Analysis	Expressive-Response (D)

<i>Interpersonal Sensitivity</i>	
Bentler Psychological Inventory	Perceptiveness
California Psychological Inventory (Cpi)	Empathy
Emotional Judgment Inventory (Eji)	Identifying Others' Emotions (Io)
Empathizing Quotient (Eq)	
Empathy Quotient	Eq Cognitive Empathy
Empathy Quotient	Eq Emotional Reactivity
Empathy Quotient	Eq Social Skills
Empathy Quotient	Eq Total
E-Scales	Cognitive Concern
E-Scales	Cognitive Sensitivity
E-Scales	Emotional Concern

E-Scales	Emotional Sensitivity
Eysenck's Impulsivity, Venturesomeness, And Empathy Questionnaire	Empathy
Hexaco-Pi	Sentimentality
Hogan Personality Inventory	Caring
I7 Eysenck	Empathy
Ilt: Self Perceived Competencies	Showing Empathy
Interpersonal Reactivity Index (Iri)	Empathic Concern
Interpersonal Reactivity Index (Iri)	Perspective Taking
Interpersonal Style Inventory	Sensitive
Jackson Personality Inventory--Revised	Empathy
Mpq: Multicultural Personality Questionnaire	Cultural Empathy
Sales Achievement Predictor	Personal Diplomacy
Social Skills Inventory	Emotional Sensitivity
Social Skills Inventory	Social Sensitivity
Trait Sympathy Scale	Sympathy For The Disempowered
Trait Sympathy Scale	Sympathy For The Feelings Of Others

#### Global Conscientiousness

15fq: Fifteen Factor Questionnaire	Fg: Conscientious
15fq: Fifteen Factor Questionnaire	Fq3: Disciplined
16 Pf	Factor G (Dutiful, Persevering)
16 Pf	Factor Q3 (Controlled, Self-Disciplined)
16 Pf, 5th Edition--Global Factor	Self-Controlled
Abbreviated 15 Item Big Five Questionnaire	Conscientiousness
Able	Conscientiousness
Adjective Self-Description Questionnaire	Conscientiousness
Bars Bipolar Adjective Rating Scale	Conscientiousness
Bernreuter Personality Inventory	Self-Sufficiency
Bfi: Big Five Inventory	Conscientiousness
Bfms: Big Five Marker Scales	Conscientiousness
Bfq: Big Five Questionnaire	Conscientiousness
Big Five	Conscientiousness
Big Five Adjectives	Conscientiousness
Big Five Aspects Scales	Conscientiousness
California Psychological Inventory (Cpi) & Cpi 260	Work Orientation (Wo)
Ffpi	Conscientiousness
Global Personality Inventory	Conscientiousness
Goldberg 1983	Conscientiousness

Goldberg 1999	Conscientiousness
Goldberg's 50 Bipolar Adjectives	Conscientiousness
Goldberg's Adjectival Big-Five Markers	Dependability/Conscientiousness
Goldberg's Unipolar Markers For The Big-Five Factor Structure	Conscientiousness
Hexaco-Pi	Conscientiousness
Hogan Personality Inventory	Prudence
Interpersonal Style Inventory	Conscientious
IPIP International Personality Item Pool	Conscientiousness
IPIP-Hexaco	Conscientiousness
Jenkins Activity Survey	Job Involvement (Factor J)
Mini-IPIP	Conscientiousness
Mowen's Personality Scale	Conscientiousness
Neo-Pi-R	Conscientiousness
Norman's (1963) Bipolar Adjective Checklist	Conscientiousness
Occupational Personality Questionnaire (Opq32n)	Conscientious (Ts11)
Occupational Personality Questionnaire (Opq32n)	Forward Thinking (Ts9)
Personal Characteristics Inventory	Conscientiousness
Personal Style Inventory (Lounsbury)	Conscientiousness
Personality Research Inventory	Attitude Toward Work
Personnel Reaction Blank - 2004	Conventional Occupational Preference
Prevue Assessment - Major Scales	Conscientious
Prevue Assessment - Sub-Scales	Conscientious 1
Prevue Assessment - Sub-Scales	Conscientious 2
Rossi (2001)	Conscientiousness
Saucier's Mini-Markers	Conscientiousness
Survey Of Work Styles	Work Involvement
Taylor-Johnson Temperament Analysis	Self-Disciplined (I)
Tda	Conscientiousness
Tipi: Ten Item Personality Inventory	Conscientiousness
Tpque	Conscientiousness
Transparent Bipolar Inventory	Conscientiousness
Tsdi: Trait Self-Description Inventory	Conscientiousness
Work Behavior Inventory	Conscientiousness

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## APPENDIX B

### Tables

Table 1

*Meta-analytic Correlates of Agreeableness*

Criteria	Source	k	N	Obs r	$\rho$
<b><u>Work-Related Behaviors and Attitudes</u></b>					
<i>Job Performance Criteria</i>					
independent samples	Barrick, Mount, & Judge(2001)	308	52,633	0.06	0.10
supervisor ratings	Barrick, Mount, & Judge(2001)	151	22,193	0.06	0.10
objective performance	Barrick, Mount, & Judge(2001)	28	4,969	0.07	0.13
teamwork	Barrick, Mount, & Judge(2001)	17	1,820	0.17	0.27
getting ahead	Hogan & Holland 2003	42	5,017	0.07	0.11
task performance	Hurtz & Donovan 2000	9	1,754	0.05	0.08
Sales performance	Barrick, Mount, & Judge(2001)	27	3,551	0.01	0.01
objective sales criterion	Vinchur et al 1998	12	918	-0.02	--
customer service	Hurtz & Donovan 2000	11	1,719	0.11	0.19
<i>Overall Performance for Particular Jobs/Samples</i>					
Managers	Barrick, Mount, & Judge(2001)	55	9,864	0.04	0.08
Professionals	Barrick, Mount, & Judge(2001)	10	965	0.03	0.05
Police	Barrick, Mount, & Judge(2001)	18	2,015	0.06	0.10
Sales people	Vinchur et al 1998	23	2,342	0.03	--
Skilled or semi-skilled	Barrick, Mount, & Judge(2001)	44	7,194	0.05	0.08
Expatriates	Mol, et al 2005	11	1,021	0.09	0.11
Teams	Mount, Barrick, Stewart 1998	4	678	0.20	0.33
Dyadic service jobs	Mount, Barrick, Stewart 1998	7	908	0.09	0.13
<i>Citizenship Performance Criteria</i>					
getting along	Hogan & Holland 2003	26	2,949	0.12	0.23
job dedication	Hurtz & Donovan 2000	17	3,197	0.06	0.10

interpersonl facilitation	Hurtz & Donovan 2000	23	4,301	0.11	0.20
<i>Counterproductive Work Behaviors: Facets</i>					
Interpersonal deviance	Berry, Ones, & Sackett 2007	10	3,336	-0.36	-0.46
Organizational Deviance	Berry, Ones, & Sackett 2007	8	2,934	-0.25	-0.32
deviant behavior(lack of)	Salgado 2002	9	1,299	0.13	--
<i>Counterproductive Work Behaviors: Outcomes</i>					
accidents (lack of)	Salgado 2002	4	1,540	0.00	--
Accident Involvement	Clarke & Robertson 2005	14	3,528	-0.15	-0.26
<i>Withdrawal Behavior</i>					
absenteeism (lack of)	Salgado 2002	8	1,339	-0.03	--
turnover (lack of)	Salgado 2002	4	554	0.16	--
<i>Job Training</i>					
training performance	Barrick, Mount, & Judge(2001)	24	4,100	0.07	0.11
<i>Leadership</i>					
leader emergence	Judge, Bono, Ilies, & Gerhardt 2002	23	--	0.03	0.05
leader effectiveness	Judge, Bono, Ilies, & Gerhardt 2002	19	--	0.14	0.21
Entrepreneurial status	Zhao & Seibert 2006	7	1,350	-0.07	--
<i>Leadership Styles</i>					
charisma	Bono & Judge 2004	9	1,706	0.15	0.21
intellectual stimulation	Bono & Judge 2004	8	1,828	0.10	0.14
individ consideration	Bono & Judge 2004	8	1,828	0.13	0.17
transformatl leadership	Bono & Judge 2004	20	3,916	0.10	0.14
contingent reward	Bono & Judge 2004	7	1,622	0.13	0.17
MBEA	Bono & Judge 2004	6	1,469	-0.09	-0.11
passive	Bono & Judge 2004	7	1,564	-0.09	-0.12
<i>Job Attitudes.</i>					
Job Satisfaction	Judge, Heller, Mount 2002	38	11,856	0.13	0.17

career satisfaction	Ng, Eby, Sorensen & Feldman 2005	5	4,634	--	0.11
<i>Salary and Promotion</i>					
salary	Ng, Eby, Sorensen & Feldman 2005	6	6,286	--	-0.10
promotion	Ng, Eby, Sorensen & Feldman 2005	4	4,428	--	-0.05
<b><u>Educational Achievement</u></b>					
<i>Academic Performance</i>					
Academic Performance	Poropat 2009	109	58,522	0.07	0.07
<b><u>Motivational Variables</u></b>					
<i>Task-Related Motivation States</i>					
goal setting motivation	Judge & Ilies 2002	4	373	-0.24	-0.29
expectancy motivation	Judge & Ilies 2002	5	875	0.09	0.13
self-efficacy motivation	Judge & Ilies 2002	6	1,099	0.09	0.11
<i>Motivation Orientation</i>					
learning goal orientation (LGO)	Payne, Youngcourt, Beaubien 2007	9	2,448	0.15	0.19
prove performance goal orientation (PPGO)	Payne, Youngcourt, Beaubien 2007	9	2,448	-0.06	-0.07
avoid performance goal orientation (APGO)	Payne, Youngcourt, Beaubien 2007	5	1,405	-0.15	-0.19
<i>Motivation-Related Behavior</i>					
procrastination	Piers Steel 2007	24	5,001	-0.12	-0.14
<b><u>Stable Individual Differences</u></b>					
<i>General Cognitive Abilities</i>					
general intelligence	Ackerman & Heggestad 1997	6	941	--	0.01
crystallized intelligence	Ackerman & Heggestad 1997	10	2,206	--	0.04
fluid intelligence	Ackerman & Heggestad 1997	5	591	--	0.03

*Vocational Interests*

Realistic (RIASEC)	Barrick, Mount & Gupta 2003	37	10,879	0.00	0.01
Investigative (RIASEC)	Barrick, Mount & Gupta 2003	37	10,879	0.01	0.01
Artistic (RIASEC)	Barrick, Mount & Gupta 2003	37	10,879	0.02	0.02
Social (RIASEC)	Barrick, Mount & Gupta 2003	37	10,879	0.13	0.15
Enterprising (RIASEC)	Barrick, Mount & Gupta 2003	37	10,879	-0.05	-0.06
Conventional (RIASEC)	Barrick, Mount & Gupta 2003	35	10,485	-0.01	-0.01

**Other**

Social Desirab. Scales	Ones, Viswesvaran, & Reiss 1996	147	41, 847	0.11	0.14
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**Physical and Mental Health***Prevention and Risk Behaviors*

Alcohol Use	Malouff, et al 2007	24	--	-0.17	--
Smoking	Malouff,et al 2006	9	--	-0.12	--

*Mental Health: Clinical Disorders*

Paranoid	Saulsman & Page 2004	15	1,158	-0.34	--
Schizoid	Saulsman & Page 2004	15	1,158	-0.17	--
Schizotypal	Saulsman & Page 2004	15	1,158	-0.21	--
Antisocial	Saulsman & Page 2004	15	1,158	-0.35	--
Borderline	Saulsman & Page 2004	15	1,158	-0.23	--
Histrionic	Saulsman & Page 2004	15	1,158	-0.06	--
Narcissistic	Saulsman & Page 2004	15	1,158	-0.27	--
Avoidant	Saulsman & Page 2004	15	1,158	-0.11	--
Dependent	Saulsman & Page 2004	15	1,158	0.05	--
Obsessive-Compulsive	Saulsman & Page 2004	15	1,158	-0.04	--
Interpersonal Dependency	Bornstein & Cecero 2000	19	4,443	0.08	--

*Psychological Well-Being*

Marriage Satisfaction	Heller, Watson, Ilies 2004	19	3,071	0.24	0.29
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Life Satisfaction	Heller, Watson, Ilies 2004	19	12,092	0.29	0.35
Subjective Well Being: Overall	DeNeve & Cooper 1998	59	--	0.17	--
SWB as Life Satisfaction	DeNeve & Cooper 1998	49	--	0.16	--
SWB as Happiness	DeNeve & Cooper 1998	14	--	0.19	--
SWB as Positive Affect	DeNeve & Cooper 1998	21	--	0.17	--
SWB as Negative Affect	DeNeve & Cooper 1998	16	--	-0.13	--

*Note.* k = number of studies included in meta-analytic estimate; N = total number of participants included in meta-analytic estimate, obs r = sample size weighted,  $\rho$  = corrected for predictor and criterion unreliability.

Table 2

*Some Hypothesized Facets of Agreeableness*

	trust	modesty	cooperation	not outspoken	lack of aggression	non-manipulative	nurturance	tolerance	warmth	tenderness	sympathy	empathy
Costa & McCrae (1992 & 1995)	trust	modesty	compliance			straight-forwardness	altruism			tender mindedness		
Mount & Barrick (PCI 1995)			cooperation				consideration					
John & Srivastava (1998)	trust	modesty					altruism			tender mindedness		
Saucier & Ostendorf (1999)		modesty & humility					generosity		warmth / affection	gentleness		
Hough & Ones (2001)	trust (Compound ES-A-)	modesty (Compound Ex-A+)			lack of aggression (Compound A+C+)		nurturance [but also see warmth (compound Ex+A+)]	tolerance (Compound OE+A+)				
DeYoung, Quilty, & Petersen (2007)		politeness (compliance, morality, etc.)					compassion (empathy, concern, sympathy, etc)					

Soto & John (2009)	trustfulness vs. cynicism	humility vs. arrogance					compassion vs. insensitivity					
AB5C			cooperation		pleasantness	morality	nurturance	understanding	warmth	tenderness	sympathy	empathy
Davies' Pilot Study Content Analysis Sort	trust	modesty	cooperation	not outspoken	lack of hostility	non-manipulative	nurturance	tolerance	warmth			interpersonal sensitivity

Table 3

*Pilot Study: Agreeableness Categories/Construct Definitions from Content Analysis*

Agreeableness Category	Definition
Global Agreeableness	Scales can belong to this category either because they get at core global agreeableness or because they get at multiple agreeableness traits. Can involve the general tendency to be likable, friendly, nurturing, interpersonally sensitive, sincere, eager to be liked by others and to fit in, to get along, etc.
Trusting	Tendency to be trusting in relations with others; believes others are honest and well-intentioned; may believe that human nature is good at its core; unlikely to believe others act with ill-will.
Modesty	This category involves the tendency to be humble; does not talk about personal successes; deference; accepting blame or inferior position to keep harmony.
Cooperation	This category involves the tendency to prefer cooperation to competition, liking to work with others, being a team player, and striving for harmony.
Outspoken (Not)	Tendency to voice opinions and willing to criticize others.
Aggression (lack of)	Willingness and/or ability to express anger against others: interpersonal manifestation of internal anger resulting from inability to control it (low ES) or unwillingness to control it (low C). Wishes others ill, seeks to physically/verbally/emotionally harm others; strikes down rivals; vindictive rather than forgiving; desires to get even with others; spiteful; mean; angry. The KEY ELEMENT is the INTERPERSONAL part (i.e., it involves willingness and/or ability to express anger against OTHER PEOPLE, NOT just feeling anger or directing anger at self or objects- for ex. punching a wall).
Non-manipulative	This category involves the general tendency to be honest, sincere, forthcoming and straightforward when dealing with others, however, this does not involve assertiveness. Rather, it means not being likely to deceive, use, manipulate, or exploit others.

Nurturance	Nurturance involves the tendency to be helpful to others and responsive to others' needs; caring, kind, and considerate toward others; being supportive; being generous; doing things for others; helping the unfortunate; being selfless and altruistic; engaging in pro-social behavior.
Tolerance	This category involves the tendency to be open and accepting of others; being flexible and broadminded when it comes to other people.
Warmth	This category involves the tendency to be warm, affectionate, outwardly friendly.
Interpersonal sensitivity	The tendency to be sensitive to others' moods, emotions; socially sensitive; tactful; diplomatic; empathetic; sympathetic.

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Table 4

*Characteristics of the Internal Consistency Artifact Distributions for Agreeableness Measures*

Construct	N	k	Avg # of items	SD # of items	$\bar{r}_{xx}$	$SD_{r_{xx}}$	$\sqrt{\bar{r}_{xx}}$	$SD_{\sqrt{r_{xx}}}$	$\rho_{\alpha}$
Global Agreeableness	100,823	161	17	12	.77	.07	.88	.04	.79
Trust	12,547	14	10	5	.75	.10	.87	.06	.79
Modesty	6,976	9	14	9	.67	.07	.82	.04	.69
Cooperation	59,729	32	8	1	.69	.04	.83	.02	.69
Not Outspoken	229	1	20	--	.56	--	.75	--	.56
Lack of Aggression	17,785	41	20	13	.72	.10	.85	.07	.75
Non-Manipulative	12,358	15	14	6	.72	.06	.85	.04	.73
Nurturance	13,276	19	13	8	.75	.14	.86	.10	.79
Tolerance	21,676	12	22	5	.76	.04	.87	.02	.77
Warmth	13,767	13	13	5	.74	.08	.86	.04	.80
Interpersonal Sensitivity	33,635	33	16	10	.63	.11	.79	.07	.67

*Note.*  $\bar{r}_{xx}$  = mean reliability coefficient;  $SD_{r_{xx}}$  = standard deviation of reliability coefficients;  $\sqrt{\bar{r}_{xx}}$  = mean of the square root of reliability coefficients;  $SD_{\sqrt{r_{xx}}}$  = the standard deviation of the square root of reliability coefficients,  $\rho_{\alpha}$  = meta-analytic estimate of coefficient alpha- accounted for sampling distribution of reliabilities and weighted individual studies by the precision of their estimate (Rodriguez & Maeda, 2006).

Table 5

*Characteristics of Test Re-Test Reliabilities for Agreeableness Measures*

	K	N	Unit weighted Reliab Distrib		Time Interval in Days Btwn Admins	
			$\bar{r}_u$	SD $\bar{r}_u$	Mean	SD
Global Agreeableness	25	11,184	.72	.09	1,132.16	2,066.35
Cooperation	1	107	.67	--	30.00	--
Modesty	4	571	.74	.03	141.50	169.10
Nurturance	8	902	.74	.09	128.00	247.73
Non-Manipulative	2	363	.74	.05	37.00	32.53
Trusting	6	778	.70	.12	166.00	281.01
Lack of Aggression	8	908	.78	.10	171.00	258.21
Tolerance	11	789	.61	.11	3054.00	3329.12
Warmth	5	551	.79	.04	21.80	21.57
Interpersonal Sensitivity	18	1295	.66	.14	1915.61	2949.70
Not Outspoken	0	--	--	--	--	--

*Note.*  $\bar{r}_u$  = mean test re-test reliability coefficient; SD  $\bar{r}_u$  = standard deviation of test re-test reliability coefficients.

Table 6

*Detailed Meta-Analytic Correlations of Agreeableness Measures and Global Big Five Measures (Between Inventories)*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
<i>Overall</i>									
Global Agreeableness									
ES	48	11,213	.25	.13	.12	.32	.15	.07	.57
Ex	54	12,502	.07	.16	.15	.09	.18	-.21	.39
OE	39	9,886	.02	.10	.08	.02	.11	-.16	.20
C	43	12,405	.20	.15	.14	.26	.17	-.02	.54
Trusting									
ES	20	3,112	.27	.09	.04	.34	.05	.26	.42
Ex	36	7,467	.12	.10	.07	.16	.09	.01	.31
OE	14	3,845	.07	.13	.12	.09	.16	-.17	.35
A	15	3,501	.28	.12	.10	.37	.13	.16	.58
C	14	2,161	.12	.14	.11	.16	.14	-.07	.39
Modesty									
ES	17	3,711	.04	.12	.10	.05	.14	-.18	.28
Ex	19	4,238	-.14	.13	.11	-.20	.15	-.45	.05
OE	12	3,477	-.05	.10	.08	-.06	.11	-.24	.12



A	10	2,414	.24	.15	.14	.33	.20	.00	.66	
C	12	3,271	.00	.08	.05	.01	.06	-.09	.11	
Cooperation										
ES	8	1,836	.07	.13	.12	.10	.16	-.16	.36	
Ex	10	2,719	.02	.08	.06	.03	.08	-.10	.16	
OE	8	2,204	.00	.07	.04	.00	.05	-.08	.08	
A	5	1,488	.44	.10	.09	.61	.12	.41	.81	
C	6	1,349	.13	.08	.04	.18	.06	.08	.28	
Not Outspoken										
ES	6	1,748	.04	.18	.17	.05	.26	-.38	.48	
Ex	5	1,551	-.15	.12	.11	-.22	.16	-.48	.04	
OE	5	946	-.13	.04	.00	-.20	--	-.20	-.20	
A	4	797	.21	.16	.15	.33	.22	-.03	.69	
C	5	944	.05	.09	.06	.07	.08	-.06	.20	
Lack of Aggression										
ES	23	4,491	.24	.14	.12	.31	.15	.06	.56	
Ex	22	4,843	-.09	.10	.08	-.12	.10	-.28	.04	
OE	11	3,928	-.05	.10	.08	-.07	.11	-.25	.11	
A	15	4,266	.48	.10	.08	.64	.10	.48	.80	
C	13	3,546	.17	.15	.14	.23	.18	-.07	.53	

Non-manipulative

ES	10	1,803	.02	.16	.14	.02	.17	-.26	.30
Ex	27	6,565	-.02	.23	.22	-.03	.30	-.52	.46
OE	10	3,258	-.02	.14	.12	-.03	.17	-.31	.25
A	11	3,161	.13	.20	.19	.19	.27	-.25	.63
C	10	1,745	.05	.15	.13	.07	.17	-.21	.35

Nurturance

ES	17	2,546	.12	.11	.08	.16	.10	.00	.32
Ex	24	4,297	.15	.12	.09	.20	.12	.00	.40
OE	16	3,621	.07	.12	.09	.09	.13	-.12	.30
A	13	2,868	.29	.17	.15	.39	.20	.06	.72
C	15	2,394	.14	.09	.05	.19	.07	.07	.31

Tolerance

ES	20	2,543	.35	.11	.07	.45	.09	.30	.60
Ex	31	13,137	.10	.08	.06	.13	.08	.00	.26
OE	23	4,333	.19	.21	.20	.25	.27	-.19	.69
A	13	3,002	.25	.09	.06	.34	.08	.21	.47
C	15	2,614	.01	.10	.07	.02	.09	-.13	.17

Warmth

ES	11	1,832	.13	.11	.08	.17	.10	.01	.33
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Ex	29	6,867	.37	.11	.09	.47	.12	.27	.67
OE	6	1,967	.07	.08	.06	.10	.08	-.03	.23
A	9	1,927	.12	.08	.04	.15	.06	.05	.25
C	9	1,269	.05	.15	.13	.07	.17	-.21	.35
Interpersonal Sensitivity									
ES	29	5,216	.12	.25	.24	.17	.32	-.36	.70
Ex	40	14,489	.41	.21	.20	.56	.27	.12	1.00
OE	31	7,288	.17	.16	.15	.24	.20	-.09	.57
A	19	4,977	.12	.11	.09	.16	.13	-.05	.37
C	23	4,996	-.01	.15	.13	-.02	.17	-.30	.26

*Note.* ES =Emotional Stability, Ex = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness;  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD \rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .

Table 7

*Summary Meta-Analytic Correlations of Agreeableness Measures and Global Big Five Measures (Between Inventories)*

Hypothesized Agreeableness Facets	Big Five Global Measures				
	ES	EX	O	A	C
Trusting <i>Compound ES+A+</i>	<b>.34</b> (.27) <i>k</i> = 20; <i>N</i> = 3,112	.16 (.12) <i>k</i> = 36; <i>N</i> = 7,467	.09 (.07) <i>k</i> = 14; <i>N</i> = 3,845	<b>.37</b> (.28) <i>k</i> = 15; <i>N</i> = 3,501	.16 (.12) <i>k</i> = 14; <i>N</i> = 2,161
<b>Modesty</b> <i>Likely Facet</i>	.05 (.04) <i>k</i> = 17; <i>N</i> = 3,711	-.20 (-.14) <i>k</i> = 19; <i>N</i> = 4,238	-.06 (-.05) <i>k</i> = 12; <i>N</i> = 3,477	<b>.33</b> (.24) <i>k</i> = 10; <i>N</i> = 2,414	.01 (.00) <i>k</i> = 12; <i>N</i> = 3,271
<b>Cooperation</b> <i>Clear Facet</i>	.10 (.07) <i>k</i> = 8; <i>N</i> = 1,836	.03 (.02) <i>k</i> = 10; <i>N</i> = 2,719	.00 (.00) <i>k</i> = 8; <i>N</i> = 2,204	<b>.61</b> (.44) <i>k</i> = 5; <i>N</i> = 1,488	.18 (.13) <i>k</i> = 6; <i>N</i> = 1,349
Not Outspoken <i>Not enough K</i>	.05 (.04) <i>k</i> = 6; <i>N</i> = 1,748	-.22 (-.15) <i>k</i> = 5; <i>N</i> = 1,551	-.20 (-.13) <i>k</i> = 5; <i>N</i> = 946	<b>.33</b> (.21) <i>k</i> = 4; <i>N</i> = 797	.07 (.05) <i>k</i> = 5; <i>N</i> = 944
Lack of Aggression <i>Likely Compound ES+A+</i>	<b>.31</b> (.24) <i>k</i> = 23; <i>N</i> = 4,491	-.12 (-.09) <i>k</i> = 22; <i>N</i> = 4,843	-.07 (-.05) <i>k</i> = 11; <i>N</i> = 3,928	<b>.64</b> (.48) <i>k</i> = 15; <i>N</i> = 4,266	.23 (.17) <i>k</i> = 13; <i>N</i> = 3,546
<b>Non-Manipulative</b> <i>Weak Facet</i>	.02 (.02) <i>k</i> = 10; <i>N</i> = 1,803	-.03 (-.02) <i>k</i> = 27; <i>N</i> = 6,565	-.03 (-.02) <i>k</i> = 10; <i>N</i> = 3,258	<b>.19</b> (.13) <i>k</i> = 11; <i>N</i> = 3,161	.07 (.05) <i>k</i> = 10; <i>N</i> = 1,745
<b>Nurturance</b> <i>Likely Facet</i>	.16 (.12) <i>k</i> = 17; <i>N</i> = 2,546	.20 (.15) <i>k</i> = 24; <i>N</i> = 4,297	.09 (.07) <i>k</i> = 16; <i>N</i> = 3,621	<b>.39</b> (.29) <i>k</i> = 13; <i>N</i> = 2,868	.19 (.14) <i>k</i> = 15; <i>N</i> = 2,394
Tolerance <i>Compound ES+A+</i>	<b>.45</b> (.35) <i>k</i> = 20; <i>N</i> = 2,543	.13 (.10) <i>k</i> = 31; <i>N</i> = 13,137	.25 (.19) <i>k</i> = 23; <i>N</i> = 4,333	<b>.34</b> (.25) <i>k</i> = 13; <i>N</i> = 3,002	.02 (.01) <i>k</i> = 15; <i>N</i> = 2,614

Warmth <i>EX+ related</i>	.17 (.13) <i>k</i> = 11; <i>N</i> = 1,832	<b>.47 (.37)</b> <i>k</i> = 29; <i>N</i> = 6,867	.10 (.07) <i>k</i> = 6; <i>N</i> = 1,967	.15 (.12) <i>k</i> = 9; <i>N</i> = 1,927	.07 (.05) <i>k</i> = 9; <i>N</i> = 1,269
Interpersonal Sensitivity <i>EX+ related</i>	.17 (.12) <i>k</i> = 29; <i>N</i> = 5,216	<b>.56 (.41)</b> <i>k</i> = 40; <i>N</i> = 14,489	.24 (.17) <i>k</i> = 31; <i>N</i> = 7,288	.16 (.12) <i>k</i> = 19; <i>N</i> = 4,977	-.02 (-.01) <i>k</i> = 23; <i>N</i> = 4,996

*Note.* *k* = total number of studies, *N* = total sample size, meta-analytic correlations not in parentheses are corrected for sampling error and internal consistency unreliability in both measures, meta-analytic correlations in parentheses are observed values corrected only for sampling error. Solid boxes indicate stronger facets, dashed boxes indicate weaker facets, and gray shading indicates compounds or non-Agreeableness traits. Not Outspoken is also grayed out and is not considered further since it has less than 5 studies contributing to its meta-analytic estimate.

Table 8

*Detailed Meta-Analytic Intercorrelations of Global Agreeableness Measures and Agreeableness Facets (Between Inventories)*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
Global Agreeableness									
Cooperation	5	1,488	.44	.10	.09	.61	.12	.41	.81
Nurturance	13	2,868	.29	.17	.15	.39	.20	.06	.72
Modesty	10	2,414	.24	.15	.14	.33	.20	.00	.66
Non-Manipulative	11	3,161	.13	.20	.19	.19	.27	-.25	.63
Lack of Aggression	15	4,266	.48	.10	.08	.64	.10	.48	.80
Cooperation									
Nurturance	1	296	.19	--	--	.27	--	.27	.27
Modesty	2	920	.34	.09	.08	.51	.11	.33	.69
Non-Manipulative	4	1,012	-.02	.09	.06	-.03	.09	-.18	.12
Lack of Aggression	2	427	.55	.03	.00	.78	--	.78	.78
Nurturance									
Modesty	4	1,161	.20	.05	.00	.29	--	.29	.29
Non-Manipulative	11	1,825	.05	.15	.13	.07	.19	-.24	.38
Lack of Aggression	4	668	.20	.09	.04	.27	.05	.19	.35

Modesty

Non-Manipulative	12	3,682	.02	.13	.12	.03	.18	-.27	.33
Lack of Aggression	3	619	.34	.06	.00	.49	--	.49	.49

Non-Manipulative

Lack of Aggression	8	1,445	.11	.18	.17	.15	.24	-.24	.54
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*Note.*  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD \rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .

Table 9

*Summary: Meta-analytic Intercorrelations for Measures of Global Agreeableness and Facets (Between Inventories)*

	1	2	3	4	5	6
1. Global Agreeableness	--	<i>k</i> = 5 <i>N</i> = 1,488	<i>k</i> = 13 <i>N</i> = 2,868	<i>k</i> = 10 <i>N</i> = 2,414	<i>k</i> = 11 <i>N</i> = 3,161	<i>k</i> = 15 <i>N</i> = 4,266
2. Cooperation	.61 (.44)	--	<i>k</i> = 1 <i>N</i> = 296	<i>k</i> = 2 <i>N</i> = 920	<i>k</i> = 4 <i>N</i> = 1,012	<i>k</i> = 2 <i>N</i> = 427
3. Nurturance	.39 (.29)	.27 (.19)	--	<i>k</i> = 4 <i>N</i> = 1,161	<i>k</i> = 11 <i>N</i> = 1,825	<i>k</i> = 4 <i>N</i> = 668
4. Modesty	.33 (.24)	.51 (.34)	.29 (.20)	--	<i>k</i> = 12 <i>N</i> = 3,682	<i>k</i> = 3 <i>N</i> = 619
5. Non-Manipulative	.19 (.13)	-.03 (-.02)	.07 (.05)	.03 (.02)	--	<i>k</i> = 8 <i>N</i> = 1,445
6. Lack of Aggression	.64 (.48)	.78 (.55)	.27 (.20)	.49 (.34)	.15 (.11)	--

Note. *k* = total number of studies, *N* = total sample size, meta-analytic correlations not in parentheses are corrected for sampling error and internal consistency unreliability in both measures, meta-analytic correlations in parentheses are observed values corrected only for sampling error.



Table 10

*Results for Factor Analyses of Meta-Analytic Correlations of Agreeableness Traits (Between Inventories)*

Model	$\chi^2$	df	<i>p</i>	GFI	TLI	CFI	PCFI	RMSEA
Independence Model								
With Non-manipulative	35,303.602	10	.000	.645	.000	.000	.000	.384
Without Non-manipulative	33,288.7	6	.000	.597	.000	.000	.000	.481
General Agreeableness Factor								
With Non-manipulative	2,407.500	5	.000	.963	.864	.932	.466	.142
Without Non-manipulative	490	2	.000	.990	.956	.985	.328	.101
Hierarchical								
With Non-manipulative	2,407.500	5	.000	.963	.864	.932	.466	.142
Without Non-manipulative	490	2	.000	.990	.956	.985	.328	.101

*Notes.*  $\chi^2$  = Chi square statistic, df = degrees of freedom, *p* = significance level of chi square statistic, GFI = Goodness of Fit Index, TLI = Tucker Lewis Index, CFI = Comparative Fit Index PCFI = Parsimony Adjusted CFI, RMSEA = Root Mean Square Error of Approximation.

Table 11

*Meta-Analytic Correlates of Extraversion*

Criteria	Source	EXTRAVERSION		Dominance		Sociability		Activity		Positive Emotions	
		k	Obs r	k	Obs r	k	Obs r	k	Obs r	k	Obs r
		N	$\rho$	N	$\rho$	N	$\rho$	N	$\rho$	N	$\rho$
<b><u>Work-Related Behaviors and Attitudes</u></b>											
<i>Job Performance Criteria</i>											
independent samples	Barrick, Mount, & Judge(2001)	222	0.06	--	--	--	--	--	--	--	--
		39,432	0.12	--	--	--	--	--	--	--	--
supervisor ratings	Barrick, Mount, & Judge(2001)	164	0.07	--	--	--	--	--	--	--	--
		23,785	0.11	--	--	--	--	--	--	--	--
objective performance	Barrick, Mount, & Judge(2001)	37	0.06	--	--	--	--	--	--	--	--
		7,101	0.11	--	--	--	--	--	--	--	--
teamwork	Barrick, Mount, & Judge(2001)	48	0.08	--	--	--	--	--	--	--	--
		3,719	0.13	--	--	--	--	--	--	--	--
getting ahead	Hogan & Holland 2003	--	--	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	--	--	--
task performance	Hurtz & Donovan 2000	9	0.04	--	--	--	--	--	--	--	--
		1,839	0.07	--	--	--	--	--	--	--	--

Sales performance	Barrick, Mount, & Judge(2001)	35	0.07	--	--	--	--	--	--	--	--
		3,806	0.09	--	--	--	--	--	--	--	--
Sales performance- ratings	Vinchur et al 1998	27	0.09	25	0.15	18	0.06	--	--	--	--
		3,112	0.18	2,907	0.28	2,389	0.12	--	--	--	--
Sales performance- objective	Vinchur et al 1998	18	0.12	14	0.15	4	0.08	--	--	--	--
		2,629	0.22	2,278	0.26	279	0.15	--	--	--	--
customer service	Hurtz & Donovan 2000	10	0.07	--	--	--	--	--	--	--	--
		1,640	0.11	--	--	--	--	--	--	--	--
job proficiency (overall JP, tech prof, advancement, job knowledge)	Hough (1992)	--	--	274	0.10	23	0.00	--	--	--	--
		--	--	65,876	--	3,390	--	--	--	--	--
overall job performance	Hough (1992)	--	--	248	0.09	31	0.02	--	--	--	--
		--	--	30,642	--	3,782	--	--	--	--	--
technical proficiency	Hough (1992)	--	--	23	0.02	2	0.06	--	--	--	--
		--	--	17,001	--	736	--	--	--	--	--
sales effectiveness	Hough (1992)	--	--	7	0.25	1	0.19	--	--	--	--
		--	--	1,111	--	667	--	--	--	--	--
creativity	Hough (1992)	--	--	11	0.21	2	-0.25	--	--	--	--
		--	--	550	--	116	--	--	--	--	--
teamwork	Hough (1992)	--	--	39	0.08	--	--	--	--	--	--
		--	--	2,307	--	--	--	--	--	--	--

*Overall Performance for Particular Jobs/Samples*

Managers	Barrick, Mount, & Judge(2001)	67	0.10	--	--	--	--	--	--	--	--
		12,602	0.17	--	--	--	--	--	--	--	--
Professionals	Barrick, Mount, & Judge(2001)	4	-0.05	--	--	--	--	--	--	--	--
		476	-0.09	--	--	--	--	--	--	--	--
Police	Barrick, Mount, & Judge(2001)	20	0.06	--	--	--	--	--	--	--	--
		2,074	0.10	--	--	--	--	--	--	--	--
Sales people	Vinchur et al 1998	27	0.09	--	--	--	--	--	--	--	--
		3,112	--	--	--	--	--	--	--	--	--
Skilled or semi-skilled	Barrick, Mount, & Judge(2001)	44	0.03	--	--	--	--	--	--	--	--
		6,830	0.05	--	--	--	--	--	--	--	--
Expatriates	Mol, et al 2005	12	0.14	--	--	--	--	--	--	--	--
		1,114	0.17	--	--	--	--	--	--	--	--
Teams	Mount, Barrick, Stewart 1998	4	0.14	--	--	--	--	--	--	--	--
		678	0.22	--	--	--	--	--	--	--	--
Dyadic service jobs	Mount, Barrick, Stewart 1998	6	0.05	--	--	--	--	--	--	--	--
		829	0.07	--	--	--	--	--	--	--	--
Managers/executives	Hough (1992)	--	--	67	0.18	--	--	--	--	--	--
		--	--	10,080	--	--	--	--	--	--	--

Health care workers	Hough (1992)	--	--	12	0.05	1	0.00	--	--	--	--
		--	--	500	--	65	--	--	--	--	--
<i>Citizenship Performance Criteria</i>											
getting along	Hogan & Holland 2003	--	--	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	--	--	--
job dedication	Hurtz & Donovan 2000	16	0.03	--	--	--	--	--	--	--	--
		3,130	0.05	--	--	--	--	--	--	--	--
interpersonl facilitation	Hurtz & Donovan 2000	21	0.06	--	--	--	--	--	--	--	--
		4,155	0.11	--	--	--	--	--	--	--	--
commendable behavior	Hough (1992)	--	--	13	0.08	--	--	--	--	--	--
		--	--	53,045	--	--	--	--	--	--	--
<i>Counterproductive Work Behaviors: Facets</i>											
Interpersonal deviance	Berry, Ones, & Sackett 2007	8	0.02	--	--	--	--	--	--	--	--
		2,360	0.02	--	--	--	--	--	--	--	--
Organizational Deviance	Berry, Ones, & Sackett 2007	5	-0.07	--	--	--	--	--	--	--	--
		1,836	-0.09	--	--	--	--	--	--	--	--
deviant behavior(lack of)	Salgado 2002	12	-0.01	--	--	--	--	--	--	--	--
		2,383	--	--	--	--	--	--	--	--	--
law abiding behavior	Hough (1992)	--	--	10	0.29	--	--	--	--	--	--
		--	--	29,590	--	--	--	--	--	--	--
irresponsible behavior	Hough (1992)	--	--	14	-0.06	1	0.01	--	--	--	--
		--	--	38,578	--	667	--	--	--	--	--

*Counterproductive Work Behaviors: Outcomes*

accidents (lack of)	Salgado 2002	7	0.02	--	--	--	--	--	--	--	--
		2,341	--	--	--	--	--	--	--	--	--
Accident Involvement	Clarke & Robertson 2005	30	0.10	--	--	--	--	--	--	--	--
		6,048	0.16	--	--	--	--	--	--	--	--

*Withdrawal Behavior*

absenteeism (lack of)	Salgado 2002	10	-0.05	--	--	--	--	--	--	--	--
		1,799	--	--	--	--	--	--	--	--	--
turnover (lack of)	Salgado 2002	4	0.14	--	--	--	--	--	--	--	--
		554	--	--	--	--	--	--	--	--	--

*Job Training*

training performance	Barrick, Mount, & Judge(2001)	21	0.13	--	--	--	--	--	--	--	--
		3,484	0.23	--	--	--	--	--	--	--	--
training success	Hough (1992)	--	--	70	0.07	--	--	--	--	--	--
		--	--	8,389	--	--	--	--	--	--	--

*Leadership*

leader emergence	Judge, Bono, Ilies, & Gerhardt 2002	37	0.24	--	--	--	--	--	--	--	--
		--	0.33	--	--	--	--	--	--	--	--
leader effectiveness	Judge, Bono, Ilies, & Gerhardt 2002	23	0.17	--	--	--	--	--	--	--	--
		--	0.24	--	--	--	--	--	--	--	--
leader emergence & effectiveness	Judge, Bono, Ilies, & Gerhardt 2002	60	0.22	31	0.24	19	0.24	--	--	--	--
		11,705	0.31	7,692	0.37	5,827	0.37	--	--	--	--

Entrepreneurial status	Zhao & Seibert 2006	9	0.10	--	--	--	--	--	--	--	--
		1,476	--	--	--	--	--	--	--	--	--
<i>Leadership Styles</i>											
charisma	Bono & Judge 2004	9	0.17	--	--	--	--	--	--	--	--
		1,706	0.22	--	--	--	--	--	--	--	--
intellectual stimulation	Bono & Judge 2004	7	0.14	--	--	--	--	--	--	--	--
		1,574	0.18	--	--	--	--	--	--	--	--
individ consideration	Bono & Judge 2004	7	0.14	--	--	--	--	--	--	--	--
		1,574	0.18	--	--	--	--	--	--	--	--
transformatl leadership	Bono & Judge 2004	20	0.19	--	--	--	--	--	--	--	--
		3,692	0.24	--	--	--	--	--	--	--	--
contingent reward	Bono & Judge 2004	5	0.11	--	--	--	--	--	--	--	--
		1,215	0.14	--	--	--	--	--	--	--	--
MBEA	Bono & Judge 2004	5	-0.02	--	--	--	--	--	--	--	--
		1,215	-0.03	--	--	--	--	--	--	--	--
passive	Bono & Judge 2004	6	-0.07	--	--	--	--	--	--	--	--
		1,310	-0.09	--	--	--	--	--	--	--	--
<i>Job Attitudes.</i>											
Job Satisfaction	Judge, Heller, Mount 2002	75	0.19	--	--	--	--	--	--	--	--
		20,184	0.25	--	--	--	--	--	--	--	--
career satisfaction	Ng, Eby, Sorensen & Feldman 2005	6	--	--	--	--	--	--	--	--	--
		10,566	0.27	--	--	--	--	--	--	--	--

*Salary and Promotion*

salary	Ng, Eby, Sorensen & Feldman 2005	7	--	--	--	--	--	--	--	--	--
		6,610	0.10	--	--	--	--	--	--	--	--
promotion	Ng, Eby, Sorensen & Feldman 2005	4	--	--	--	--	--	--	--	--	--
		4,428	0.18	--	--	--	--	--	--	--	--

**Educational Achievement**

*Academic Performance*

Academic Performance	Poropat 2009	113	-0.01	--	--	--	--	--	--	--	--
		59,986	-0.01	--	--	--	--	--	--	--	--
Academic Performance	O'Connor & Paunonen 2007	22	-0.05	--	--	--	--	--	--	--	--
		5,161	-0.05	--	--	--	--	--	--	--	--
Educational Success	Hough (1992)	--	--	128	0.12	9	0.01	--	--	--	--
		--	--	63,057	--	2,953	--	--	--	--	--

**Motivational Variables**

*Task-Related Motivation States*

goal setting motivation	Judge & Ilies 2002	5	0.13	--	--	--	--	--	--	--	--
		498	0.15	--	--	--	--	--	--	--	--
expectancy motivation	Judge & Ilies 2002	6	0.07	--	--	--	--	--	--	--	--
		663	0.10	--	--	--	--	--	--	--	--
self-efficacy motivation	Judge & Ilies 2002	7	0.24	--	--	--	--	--	--	--	--
		2,067	0.33	--	--	--	--	--	--	--	--



*Motivation Orientation*

learning goal orientation (LGO)	Payne, Youngcourt, Beaubien 2007	12	0.24	--	--	--	--	--	--	--	--
		3,215	0.29	--	--	--	--	--	--	--	--
prove performance goal orientation (PPGO)	Payne, Youngcourt, Beaubien 2007	11	-0.03	--	--	--	--	--	--	--	--
		2,776	-0.03	--	--	--	--	--	--	--	--
avoid performance goal orientation (APGO)	Payne, Youngcourt, Beaubien 2007	5	-0.24	--	--	--	--	--	--	--	--
		1,404	-0.30	--	--	--	--	--	--	--	--

*Motivation-Related Behavior*

procrastination	Piers Steel 2007	18	-0.11	--	--	--	--	--	--	12	-0.17
		3,951	-0.13	--	--	--	--	--	--	1,934	-0.21
Effort	Hough (1992)	--	--	16	0.17	1	0.00	--	--	--	--
		--	--	17,156	--	667	--	--	--	--	--

**Stable Individual Differences**

*General Cognitive Abilities*

general intelligence	Ackerman & Heggestad 1997	35	--	--	--	--	--	--	--	--	--
		15,931	0.08	--	--	--	--	--	--	--	--
crystallized intelligence	Ackerman & Heggestad 1997	63	--	--	--	--	--	--	--	--	--
		24,280	0.11	--	--	--	--	--	--	--	--

fluid intelligence	Ackerman & Heggestad 1997	40	--	--	--	--	--	--	--	--	--	--
		11,395	0.06	--	--	--	--	--	--	--	--	--
<i>Vocational Interests</i>												
Realistic (RIASEC)	Barrick, Mount & Gupta 2003	39	0.03	--	--	--	--	--	--	--	--	--
		10,382	0.03	--	--	--	--	--	--	--	--	--
Investigative (RIASEC)	Barrick, Mount & Gupta 2003	39	0.01	--	--	--	--	--	--	--	--	--
		10,382	0.02	--	--	--	--	--	--	--	--	--
Artistic (RIASEC)	Barrick, Mount & Gupta 2003	39	0.08	--	--	--	--	--	--	--	--	--
		10,382	0.09	--	--	--	--	--	--	--	--	--
Social (RIASEC)	Barrick, Mount & Gupta 2003	39	0.25	--	--	--	--	--	--	--	--	--
		10,382	0.29	--	--	--	--	--	--	--	--	--
Enterprising (RIASEC)	Barrick, Mount & Gupta 2003	39	0.35	--	--	--	--	--	--	--	--	--
		10,382	0.41	--	--	--	--	--	--	--	--	--
Conventional (RIASEC)	Barrick, Mount & Gupta 2003	37	0.05	--	--	--	--	--	--	--	--	--
		9,988	0.06	--	--	--	--	--	--	--	--	--
<b><u>Other</u></b>												
Social Desirab. Scales	Ones, Viswesvaran, & Reiss 1996	274	0.04	--	--	--	--	--	--	--	--	--
		81,683	0.06	--	--	--	--	--	--	--	--	--

**Physical and Mental Health**

*Prevention and Risk Behaviors*

Alcohol Use	Malouff, et al 2007	24	0.03	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	--	--	--
Smoking	Malouff, et al 2006	9	0.06	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	--	--	--

*Mental Health: Clinical Disorders*

Paranoid	Saulsman & Page 2004	15	-0.12	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Schizoid	Saulsman & Page 2004	15	0.23	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Schizotypal	Saulsman & Page 2004	15	0.28	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Antisocial	Saulsman & Page 2004	15	0.04	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Borderline	Saulsman & Page 2004	15	-0.09	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Histrionic	Saulsman & Page 2004	15	0.42	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Narcissistic	Saulsman & Page 2004	15	0.20	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Avoidant	Saulsman & Page 2004	15	-0.44	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--

Dependent	Saulsman & Page 2004	15	-0.13	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Obsessive-Compulsive	Saulsman & Page 2004	15	-0.12	--	--	--	--	--	--	--	--
		1,158	--	--	--	--	--	--	--	--	--
Intrapsychic Dependency	Bornstein & Cecero 2000	19	-0.10	6	-0.28	6	0.03	6	-0.15	6	-0.09
		4,443	--	--	--	--	--	--	--	--	--
Antisocial Personality Disorder	Decuyper et al 2009	48	0.05	26	0.06	26	0.00	26	0.04	26	-0.08
		--	--	--	--	--	--	--	--	--	--
Psychopathy	Decuyper et al 2009	25	0.09	10	0.16	10	0.03	10	0.07	10	-0.10
		--	--	--	--	--	--	--	--	--	--
Antisocial Personality Disorder	Ruiz et al 2008	35	0.06	35	0.08	35	-0.02	35	0.07	35	-0.04
		--	--	--	--	--	--	--	--	--	--
Substance Use Disorders	Ruiz et al 2008	22	-0.06	22	-0.14	22	-0.08	22	-0.05	22	-0.17
		--	--	--	--	--	--	--	--	--	--
Dependent Personality Disorder		--	--	8	-0.25	8	-0.14	8	-0.18	8	-0.20
		--	--	3,501	--	3,501	--	3,501	--	3,501	--
<i>Psychological Well-Being</i>											
Marriage Satisfaction	Heller, Watson, Ilies 2004	22	0.14	--	--	--	--	--	--	--	--
		3,372	0.17	--	--	--	--	--	--	--	--
Life Satisfaction	Heller, Watson, Ilies 2004	19	0.28	--	--	--	--	--	--	--	--
		12,092	0.34	--	--	--	--	--	--	--	--

Subjective Well Being: Overall	DeNeve & Cooper 1998	41	0.17	11	0.14	15	0.20	8	0.10	5	0.31
		10,364	--	1,166	--	4,096	--	1,475	--	1,117	--
SWB as Life Satisfaction	DeNeve & Cooper 1998	54	0.17	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	--	--	--
SWB as Happiness	DeNeve & Cooper 1998	15	0.27	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	--	--	--
SWB as Positive Affect	DeNeve & Cooper 1998	39	0.20	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	--	--	--
SWB as Negative Affect	DeNeve & Cooper 1998	32	-0.07	--	--	--	--	--	--	--	--
		--	--	--	--	--	--	--	--	--	--
SWB as Life Satisfaction	Steel, Schmidt, Shultz 2008	35	0.28	3	0.37	3	0.29	3	0.17	3	0.46
		10,528	0.35	--	--	--	--	--	--	--	--
SWB as Positive Affect	Steel, Schmidt, Shultz 2008	53	0.44	4	0.46	3	0.36	4	0.65	4	0.59
		12,898	0.54	--	--	--	--	--	--	--	--
SWB as Negative Affect	Steel, Schmidt, Shultz 2008	49	-0.18	3	-0.20	3	-0.10	3	-0.23	3	-0.27
		11,569	-0.23	--	--	--	--	--	--	--	--

*Note.* k = number of studies included in meta-analytic estimate; N = total number of participants included in meta-analytic estimate, obs r = sample size weighted,  $\rho$  = corrected for predictor and criterion unreliability

Table 12

*Some Hypothesized Facets of Extraversion*

	Sociability	Positive Emotions	Dominance	Activity	Sensation Seeking/ Impulsivity	Other
Eysenck	sociability				Impulsivity (later in Psychoticism)	
Guilford	sociability	negative emotionality	ascendance	activity	introspection/ impulsivity	
Cattell (1980)	socially enmeshed	warm/easy going, enthusiastic	dominant		bold adventurous	
Costa & McCrae (1992 & 1995)	gregariousness	positive emotions, warmth	assertiveness	activity	excitement seeking	
Tellegen	social closeness	positive emotionality	social potency			well-being achievement
Watson & Clark (1997)	affiliation	positive emotionality	ascendance	energy	venturesome	ambition
Hogan & Hogan (1995)	sociability		surgency			Ambition (in later versions)
Saucier & Ostendorf (1999)	sociability	Warmth/affection (considered A)	assertiveness	activity/ adventurousness	unrestraint	
John & Srivastava (1999)	sociability	Positive emotionality	dominance	activity level		
Hough & Ones (2001)	sociability		dominance	activity/ energy level	expressiveness	
Soto & John (2008)	gregariousness	social confidence / anxiety	Assertiveness/ leadership		Adventurousness (OE)	
DeYoung, Quilty, & Peterson (2007)	Enthusiasm (sociability, positive emotions, etc.)		Assertiveness (dominance, leadership, etc.)		Similar small/moderate loadings on Enthusiasm & Assertiveness	

Table 13

*Extraversion Construct Definitions*

<i>Trait</i>	<i>Definitions for Big Five and Characteristics of High Scorers</i>	<i>Example Scales</i>
Extraversion	Likes and feels comfortable amidst larger groups; is outgoing, active, and assertive; may be cheerful and interpersonally warm	NEO-PI-R: Extraversion; Eysenck Personality Questionnaire: Extroversion
Positive Emotions	Experiences positive emotions such as joy, zest, cheerfulness	Positive and Negative Affect Scales: Positive Affect; Personality Research Form: Play
Sociability	Seeks the company of others; is talkative, outgoing, affiliative, and gregarious	Occupational Personality Questionnaire: Outgoing; Interpersonal Style Inventory: Sociable
Sensation Seeking	Tendency to seek out excitement, to be adventurous.	NEO-PI-R: facet – Excitement Seeking, Zuckerman Sensation Seeking Scale: Thrill & Adventure Seeking
Dominance	Assertive and prefers to be in the forefront of the group; prefers to lead than to follow	California Psychological Inventory: Social Presence; Millon Index of Personality Styles: Asserting
Activity	Active and fast-paced; prefers to stay busy and moves rapidly	Comrey Personality Scales: Activity; Gordon Personal Profile: Vigor

Table 14

*Characteristics of the Internal Consistency Artifact Distributions for Extraversion Measures*

Construct	N	k	Avg # of	SD # of	$\bar{r}_{xx}$	$SD_{r_{xx}}$	$\sqrt{\overline{r_{xx}}}$	$SD_{\sqrt{r_{xx}}}$	$\rho_{\alpha}$
			items	items					
Global Extraversion	123,243	199	18	12	.81	.06	.90	.04	.83
Positive Emotions	16,169	47	11	6	.81	.09	.90	.05	.85
Sociability	59,067	50	18	8	.79	.04	.89	.02	.80
Sensation Seeking	17,417	34	8	4	.71	.07	.84	.05	.73
Dominance	61,019	51	14	8	.74	.08	.86	.05	.77
Activity	24,879	20	17	5	.75	.07	.87	.04	.77

*Note.*  $\bar{r}_{xx}$  = mean reliability coefficient;  $SD_{r_{xx}}$  = standard deviation of reliability coefficients;  $\sqrt{\overline{r_{xx}}}$  = mean of the square root of reliability coefficients;  $SD_{\sqrt{r_{xx}}}$  = the standard deviation of the square root of reliability coefficients,  $\rho_{\alpha}$  = meta-analytic estimate of coefficient alpha- accounted for sampling distribution of reliabilities and weighted individual studies by the precision of their estimate (Rodriguez & Maeda, 2006).



Table 15  
*Characteristics of Test Re-Test Reliabilities for Extraversion Measures*

	K	N	Unit weighted Reliab Distrib		Time Interval in Days Btwn Admins	
			$\bar{r}_{tt}$	SD $\bar{r}_{tt}$	Mean	SD
Global Extraversion	63	5,842	.82	.08	650.45	1,757.72
Sociability	27	3,818	.77	.13	1,318.19	2,537.10
Dominance	28	12,479	.78	.10	1,178.14	2,522.40
Positive Emotions	9	634	.59	.20	29.00	17.31
Activity	4	8,850	.76	.06	72.25	60.94
Sensation Seeking	7	382	.67	.16	34.00	15.87

*Note.*  $\bar{r}_{tt}$  = mean test re-test reliability coefficient; SD  $\bar{r}_{tt}$  = standard deviation of test re-test reliability coefficients.

Table 16

*Detailed Meta-Analytic Correlations of Extraversion Measures and Global Big Five Measures (Between Inventory)*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
<i>Overall</i>									
Global Extraversion									
ES	89	18,246	.23	.12	.10	.28	.12	.08	.48
OE	61	14,638	.14	.14	.13	.18	.16	-.08	.44
A	54	12,502	.07	.16	.15	.09	.18	-.21	.39
C	71	18,405	.08	.14	.12	.09	.15	-.16	.34
Positive Emotions									
ES	27	6,356	.27	.16	.15	.33	.18	.03	.63
Ex	32	8,027	.44	.12	.11	.54	.13	.33	.75
OE	20	6,221	.23	.15	.14	.29	.18	-.01	.59
A	20	5,805	.21	.15	.14	.27	.17	-.01	.55
C	21	5,940	.26	.22	.22	.33	.26	-.10	.76
Sociability									
ES	59	12,023	.19	.15	.13	.24	.16	-.02	.50
Ex	80	26,269	.60	.14	.13	.75	.16	.49	1.01
OE	49	11,598	.10	.16	.14	.13	.18	-.17	.43

A	36	8,816	.11	.14	.12	.15	.16	-.11	.41
C	51	11,368	.06	.14	.12	.08	.16	-.18	.34
Sensation Seeking									
ES	19	4,460	.02	.19	.16	.03	.23	-.35	.41
Ex	23	6,427	.30	.16	.15	.39	.19	.08	.70
OE	9	3,071	.12	.12	.11	.17	.14	-.06	.40
A	8	2,135	-.05	.12	.10	-.06	.14	-.29	.17
C	12	2,917	-.18	.11	.09	-.23	.12	-.43	-.03
Dominance									
ES	57	13,055	.25	.09	.06	.31	.08	.18	.44
Ex	75	25,281	.49	.17	.17	.61	.21	.26	.96
OE	46	10,901	.21	.19	.18	.27	.23	-.11	.65
A	40	10,022	-.11	.16	.15	-.15	.19	-.46	.16
C	50	12,199	.10	.15	.14	.13	.17	-.15	.41
Activity									
ES	20	5,224	.17	.15	.13	.22	.17	-.06	.50
Ex	27	6,611	.34	.09	.07	.43	.08	.30	.56
OE	17	5,370	.14	.12	.11	.18	.15	-.07	.43
A	13	4,012	.00	.08	.06	.00	.08	-.13	.13
C	17	4,220	.20	.11	.09	.26	.11	.08	.44

*Note.* ES =Emotional Stability, Ex = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness;  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$ = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD \rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .

Table 17

*Summary Meta-Analytic Correlations of Extraversion Measures and Global Big Five Measures (Between Inventories)*

Proposed Extraversion Facets	Big Five Global Measures				
	ES	EX	O	A	C
Positive Emotions	.33 (.27) <i>k</i> = 27; <i>N</i> = 6,356	<b>.54 (.44)</b> <i>k</i> = 32; <i>N</i> = 8,027	.29 (.23) <i>k</i> = 20; <i>N</i> = 6,221	.27 (.21) <i>k</i> = 20; <i>N</i> = 5,805	.33 (.26) <i>k</i> = 21; <i>N</i> = 5,940
Sociability	.24 (.19) <i>k</i> = 59; <i>N</i> = 12,023	<b>.75 (.60)</b> <i>k</i> = 80; <i>N</i> = 26,269	.13 (.10) <i>k</i> = 49; <i>N</i> = 11,598	.15 (.11) <i>k</i> = 36; <i>N</i> = 8,816	.08 (.06) <i>k</i> = 51; <i>N</i> = 11,368
Sensation Seeking	.03 (.02) <i>k</i> = 19; <i>N</i> = 4,460	<b>.39 (.30)</b> <i>k</i> = 23; <i>N</i> = 6,427	.17 (.12) <i>k</i> = 9; <i>N</i> = 3,071	-.06 (-.05) <i>k</i> = 8; <i>N</i> = 2,135	-.23 (-.18) <i>k</i> = 12; <i>N</i> = 2,917
Dominance	.31 (.25) <i>k</i> = 57; <i>N</i> = 13,055	<b>.61 (.49)</b> <i>k</i> = 75; <i>N</i> = 25,281	.27 (.21) <i>k</i> = 46; <i>N</i> = 10,901	-.15 (-.11) <i>k</i> = 40; <i>N</i> = 10,022	.13 (.10) <i>k</i> = 50; <i>N</i> = 12,199
Activity	.22 (.17) <i>k</i> = 20; <i>N</i> = 5,224	<b>.43 (.34)</b> <i>k</i> = 27; <i>N</i> = 6,611	.18 (.14) <i>k</i> = 17; <i>N</i> = 5,370	.00 (.00) <i>k</i> = 13; <i>N</i> = 4,012	.26 (.20) <i>k</i> = 17; <i>N</i> = 4,220

*Note.* *k* = total number of studies, *N* = total sample size, meta-analytic correlations not in parentheses are observed values corrected only for sampling error, meta-analytic correlations in parentheses are corrected for sampling error and internal consistency unreliability in both measures.

Table 18

*Detailed Meta-Analytic Intercorrelations of Global Extraversion Measures and Extraversion Facets (Between Inventories)*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
Global Extraversion									
Positive Emotions	32	8,027	.44	.12	.11	.54	.13	.33	.75
Sociability	80	26,269	.60	.14	.13	.75	.16	.49	1.01
Sensation Seeking	23	6,427	.30	.16	.15	.39	.19	.08	.70
Dominance	75	25,281	.49	.17	.17	.61	.21	.26	.96
Activity	27	6,611	.34	.09	.07	.43	.08	.30	.56
Positive Emotions									
Sociability	11	1,639	.37	.15	.13	.46	.16	.08	.45
Sensation Seeking	13	2,833	.23	.14	.12	.30	.16	.04	.56
Dominance	11	1,906	.20	.10	.07	.24	.09	.09	.39
Activity	5	729	.13	.05	.00	.16	--	.16	.16
Sociability									
Sensation Seeking	10	3,622	.19	.05	.01	.25	.01	.23	.27
Dominance	42	8,144	.27	.14	.13	.34	.16	.08	.60

Activity	15	3,596	.21	.11	.09	.28	.12	.08	.48
Sensation Seeking									
Dominance	8	2,356	.22	.10	.08	.29	.10	.13	.45
Activity	5	2,529	.10	.10	.09	.13	.12	-.07	.33
Dominance									
Activity	15	3,589	.28	.12	.10	.37	.13	.16	.58

*Note.*  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD \rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .

Table 19

*Summary: Meta-analytic Intercorrelations for Measures of Global Extraversion and Facets (Between Inventories)*

	1	2	3	4	5	6
1. Global Extraversion	--	<i>k</i> = 32 <i>N</i> = 8,027	<i>k</i> = 80 <i>N</i> = 26,269	<i>k</i> = 23 <i>N</i> = 6,427	<i>k</i> = 75 <i>N</i> = 25,281	<i>k</i> = 27 <i>N</i> = 6,611
2. Positive Emotions	.54 (.44)	--	<i>k</i> = 11 <i>N</i> = 1,639	<i>k</i> = 13 <i>N</i> = 2,833	<i>k</i> = 11 <i>N</i> = 1,906	<i>k</i> = 5 <i>N</i> = 729
3. Sociability	.75 (.60)	.46 (.37)	--	<i>k</i> = 10 <i>N</i> = 3,622	<i>k</i> = 42 <i>N</i> = 8,144	<i>k</i> = 15 <i>N</i> = 3,596
4. Sensation Seeking	.39 (.30)	.30 (.23)	.25 (.19)	--	<i>k</i> = 8 <i>N</i> = 2,356	<i>k</i> = 5 <i>N</i> = 2,529
5. Dominance	.61 (.49)	.24 (.20)	.34 (.27)	.29 (.22)	--	<i>k</i> = 15 <i>N</i> = 3,589
6. Activity	.43 (.34)	.16 (.13)	.28 (.21)	.13 (.10)	.37 (.28)	--

Note. *k* = total number of studies, *N* = total sample size, meta-analytic correlations not in parentheses are observed values corrected only for sampling error, meta-analytic correlations in parentheses are corrected for sampling error and internal consistency unreliability in both measures.



Table 20

*Results for Factor Analyses of Meta-Analytic Correlations of Extraversion Traits (Between Inventories)*

Model	$\chi^2$	df	<i>p</i>	GFI	TLI	CFI	PCFI	RMSEA
Independence Model	16,919.682	10	.000	.740	.000	.000	.000	.266
General Extraversion Factor	2,181.521	5	.000	.965	.743	.871	.436	.135
Hierarchical (DeYoung): Sens Seek on Assertiveness	1,254.299	5	.000	.979	.852	.926	.463	.102
Hierarchical (DeYoung): Sens Seek on Enthusiasm	1,139.664	5	.000	.982	.866	.933	.466	.097
Hierarchical (DeYoung): Sens Seek on both Assertiveness and Enthusiasm	662.332	3	.000	.989	.870	.961	.288	.096
Hierarchical (DeYoung): Sens Seek straight to Global Extraversion	1076.278	5	.000	.982	.873	.937	.468	.095

*Notes.*  $\chi^2$  = Chi square statistic, df = degrees of freedom, *p* = significance level of chi square statistic, GFI = Goodness of Fit Index, TLI = Tucker Lewis Index, CFI = Comparative Fit Index PCFI = Parsimony Adjusted CFI, RMSEA = Root Mean Square Error of Approximation.

Table 21

*Review of General Factor of Personality Findings in the Literature*

Authors	Journal	Year	Sample	Inventories	Correls within or between	Method 1: EFA	Method 2: CFA	Method 3: CFA
						1st Factor	Hierarchical/ Interfactor Correlation <sup>a</sup>	Bifactor GFP
Musek	JRP	2007	1	BFI	within	50		
			2	IPIP	within	40		
			3	BFO	within	45		
Rushton, Bons, Hur	JRP	2008	1	PRF & JPI together	mixed	37		
			2	29 Self-Rating Scales (mostly from PRF)	mixed	39		
			3	PSSDQ & EAS	mixed	32 <sup>c</sup>		
Rushton & Irwing	PAID	2008	1	meta of Digman 14 matrices (NEO, PCI, etc)	within & then meta		45	
			2	Mount et al (NEO, HPI, PCI, IPIP)	within & then meta		44	
Rushton & Irwing	PAID	2009	1	CPS	within		41	
			2	MMPI-2	within	35	49	
			3	MPQ (multicultural)	within	35		41

Veselka et al.	TRHG	2009	1 (twin 1)	MT48 (mental toughness) & NEO	mixed	48
			1 (twin 2)	MT48 (mental toughness) & NEO	mixed	46
			2 (twin 1)	TEIQue & Big Five	mixed	39
			2 (twin 2)	TEIQue & Big Five	mixed	35
Rushton, Bons, Ando, et al.	TRHG	2009	1 <sup>d</sup>	BFQ	within	54
			2 <sup>e</sup>	TCI	within	22
				NEO	within	22
			3 (twin 1)	NEO, HumorSQ, TEIQue	mixed	33
			3 (twin 2)	NEO, HumorSQ, TEIQue	mixed	31
Veselka, Schermer, et al.	TRHG	2009	1 (twin 1)	HEXACO & TEIQue	mixed	33
			1 (twin 2)	HEXACO & TEIQue	mixed	33
Rushton & Irwing	PAID	2009	1	MPQ (multidimensional)	within	25
Rushton & Irwing	PAID	2009	1	16 sets of Big Five (BFI, TDA, NEO, Mini Markers)	within & then meta	54
			2	GZTS	within	36
			3	CPI	within	35
			4	TCI	within	49
Rushton & Irwing	PAID	2009	1	MCMI-III	within	41
			2	DAPP-BQ	within	61
			3	PAI	within	65

Schermer & Vernon	PAID	2010	1	PRF	within	55	
			2	PRF	within	42	
Erdle, Irwing, Rushton, & Park	PAID	2010	1	BFI	within		57
van der Linden, Nijenhuis, & Bakker <sup>g</sup>	JRP	2010	1	overall meta of Big Five & Five Factor measures	within & then meta	45	57 <sup>t</sup>
			2	NEO-FFI	within	45	
			3	NEO-PI-R	within	55	
			4	BFI	within	51	
			5	IPIP	within	47	
			6	peer	within & then meta	79	
			7	misc questionnaires	within & then meta	56	
			8	students	within & then meta	47	
			9	employees	within & then meta	42	
			10	adults	within & then meta	47	
			11	school	within & then meta	62	
			12	special samples	within & then meta	42	
Rushton, Irwing, Booth	TRHG	2010	1 (general population)	DAPP-BQ	within		34

			2 (twins)	DAPP-BQ	within	35
			3 (clinical)	DAPP-BQ	within	34
van der Linden et al	JRP	2010	1 (adolescents)	Quick Big Five (QBF)	within	35
DeVries	JRP	2010	1	HEXACO-PI	within	24
				FFPI	within	42
			2	HEXACO-PI-R	within	24
				NEO	within	31
van der Linden et al <sup>h</sup>	IJSA	2011	1	NPV	within	34
				GLTS	within	29
				PMT	within	57
			2	NPV	within	29
				GLTS	within	27
			3	NEO-PI-R	within	51
				NPV	within	36
				GLTS	within	30
				PMT	within	51
			4	NEO-FFI	within	41
				NPV	within	32
			5	NPV	within	35
				PIT	within	63
			6	NEO-PI-R	within	46
				NPV	within	36
				GLTS	within	29
				PMT	within	52
			7 (samples 1-6)	NEO-PI-R	within	49
				NEO-FFI	within	41
				NPV	within	34

				GLTS	within	29		
				PMT	within	57		
				PIT	within	63		
van der Linden et al	PAID	2011	1 (employment)	GITP	within	48		
			2 (selection)		within	47		
			2 (assessment)		within	47		
Davies		2011	1	re-analysis of Ones (1993) meta	mixed, then meta	30	49	23 <sup>i</sup>
			2	varied	<b>within</b> , then meta	36	50	50 <sup>i</sup>
			3	varied	<b>between</b> , then meta	32	38	26 <sup>i</sup>

<sup>a</sup>Usually shown as a hierarchical model and in the two 2nd order factors case, the authors multiply the paths from the third order gfp which is essentially equivalent to the correlation between the 2nd order factors.

<sup>b</sup>Both inventories from same author (Jackson).

<sup>c</sup>mother rating children (2-9 years old), genetic gfp

<sup>d</sup>MTMM of sorts (parent, teacher, self)

<sup>e</sup>The correlation between the GFP from the TCI & the GFP from the NEO  $r = .72$

<sup>f</sup>I calculated the CFA % by multiplying the paths from the GFP in their figure.

<sup>g</sup>For the moderator analyses, it wasn't stated what method was used so 1st factor EFA was assumed since that's how the overall meta was done.

<sup>h</sup>Military training samples

<sup>i</sup>Used  $\omega_h$  to find the amount of general factor saturation. McDonald's coefficient  $\omega_h$  (McDonald, 1999; Revelle & Zinbarg, 2009; Zinbarg et al., 2005), is found by analyzing a bifactor model, then squaring the sum of the general factor loadings and dividing by the sum of the total correlation matrix.

Table 22

*Characteristics of the Internal Consistency Artifact Distributions for Global Big Five Measures: data from Viswesvaran & Ones (2000)*

Construct	k	$\bar{r}_{xx}$	$SD_{r_{xx}}$	$\overline{\sqrt{r_{xx}}}$	$SD_{\sqrt{r_{xx}}}$
Emotional Stability	370	.78	.11	.88	.07
Extraversion	307	.78	.09	.88	.05
Openness	251	.73	.12	.85	.09
Agreeableness	123	.75	.11	.86	.07
Conscientiousness	307	.78	.10	.88	.06

*Note.*  $\bar{r}_{xx}$  = mean reliability coefficient;  $SD_{r_{xx}}$  = standard deviation of reliability coefficients;  $\overline{\sqrt{r_{xx}}}$  = mean of the square root of reliability coefficients;  $SD_{\sqrt{r_{xx}}}$  = the standard deviation of the square root of reliability coefficients.

Table 23

*Summary Meta-Analytic Intercorrelation Matrix of Global Big Five Measures: Intercorrelations from Ones (1993)*

	1	2	3	4	5
1. Emotional Stability	--	<i>k</i> = 710 <i>N</i> = 440,440	<i>k</i> = 423 <i>N</i> = 254,937	<i>k</i> = 561 <i>N</i> = 415,679	<i>k</i> = 587 <i>N</i> = 490,296
2. Extraversion	.15 (.19)	--	<i>k</i> = 418 <i>N</i> = 252,004	<i>k</i> = 243 <i>N</i> = 135,529	<i>k</i> = 632 <i>N</i> = 683,001
3. Openness	.13 (.16)	.14 (.17)	--	<i>k</i> = 236 <i>N</i> = 144,205	<i>k</i> = 338 <i>N</i> = 356,680
4. Agreeableness	.19 (.25)	.13 (.17)	.08 (.11)	--	<i>k</i> = 344 <i>N</i> = 162,975
5. Conscientiousness	.21 (.26)	.00 (.00)	-.05 (-.06)	.21 (.27)	--

*Note.* Sample size weighted mean observed correlations are listed first, then sample size weighted mean correlations corrected for internal consistency unreliability in both measures are listed second in parentheses. *k* is the number of independent samples that contributed to that meta-analytic estimate and *N* is the total sample size across the correlations that were meta-analyzed for that estimate.



Table 24

*Results for Factor Analyses of Meta-Analytic Correlations of Global Big Five Personality Traits: Intercorrelations from Ones (1993)*

Model	$\chi^2$	df	<i>p</i>	GFI	TLI	CFI	PCFI	RMSEA
Null Model	48,807.956	10	.000	.923	.000	.000	.000	.139
GFP only	11,361.145	5	.000	.982	.535	.767	.384	.095
Interfactor Correlation	8,602.583	4	.000	.987	.559	.824	.330	.092
Hierarchical	8,602.583	4	.000	.987	.559	.824	.330	.092
Bifactor	3,411.535	3	.000	.995	.767	.930	.279	.067 <sup>f</sup>

*Notes.*  $\chi^2$  = Chi square statistic, df = degrees of freedom, *p* = significance level of chi square statistic, GFI = Goodness of Fit Index, TLI = Tucker Lewis Index, CFI = Comparative Fit Index PCFI = Parsimony Adjusted CFI, RMSEA = Root Mean Square Error of Approximation, ( $\omega_h$ ) = omega hierarchical. <sup>a</sup>. size of 1st factor; <sup>b</sup>.  $\omega_h$  from direct gfp loadings on the big five; <sup>c</sup>. correlation between alpha and beta; <sup>d</sup>.  $\omega_h$  using indirect effect of gfp through alpha and beta; <sup>e</sup>.  $\omega_h$  using direct effect of gfp on big 5, controlling for variance due to alpha and beta; <sup>f</sup>. the best fitting mode is bifactor (some separate gfp variable – could be either substantive or method).

Table 25

*Characteristics of the Internal Consistency Artifact Distributions for Global Big Five Measures*

Construct	N	k	$\bar{r}_{xx}$	$SD_{r_{xx}}$	$\sqrt{\bar{r}_{xx}}$	$SD_{\sqrt{r_{xx}}}$
Emotional Stability	106,415	220	.82	.07	.90	.04
Extraversion	123,243	199	.81	.06	.90	.04
Openness	79,970	150	.75	.08	.87	.05
Agreeableness	100,823	161	.77	.07	.88	.04
Conscientiousness	162,482	205	.80	.07	.89	.04

*Note.*  $N$  = number of subjects;  $k$  = number of independent samples;  $\bar{r}_{xx}$  = mean reliability coefficient;  $SD_{r_{xx}}$  = standard deviation of reliability coefficients;  $\sqrt{\bar{r}_{xx}}$  = mean of the square root of reliability coefficients;  $SD_{\sqrt{r_{xx}}}$  = the standard deviation of the square root of reliability coefficients.

Table 26

*Detailed Meta-Analytic Intercorrelations of Global Big Five Measures: Within Inventories*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
Emotional Stability									
Extraversion	211	92,111	.22	.16	.15	<b>.27</b>	.18	-.03	.57
Openness	154	65,095	.07	.16	.16	<b>.09</b>	.20	-.24	.42
Agreeableness	167	79,610	.24	.20	.20	<b>.31</b>	.24	-.08	.70
Conscientiousness	166	84,256	.27	.17	.17	<b>.33</b>	.21	-.02	.68
Extraversion									
Openness	159	71,206	.26	.16	.15	<b>.33</b>	.19	.02	.64
Agreeableness	158	75,274	.16	.21	.20	<b>.20</b>	.26	-.23	.63
Conscientiousness	156	74,154	.15	.16	.15	<b>.19</b>	.18	-.11	.49
Openness									
Agreeableness	148	61,538	.15	.13	.12	<b>.19</b>	.16	-.07	.45
Conscientiousness	148	62,258	.09	.19	.19	<b>.12</b>	.24	-.27	.51
Agreeableness									
Conscientiousness	158	76,306	.32	.19	.18	<b>.41</b>	.23	.03	.79

*Note.*  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD_\rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $\rho$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .

Table 27

*Detailed Meta-Analytic Intercorrelations of Global Big Five Measures: Between Inventories*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
Emotional Stability									
Extraversion	89	18,246	.23	.12	.10	<b>.28</b>	.12	0.08	0.48
Openness	50	11,747	.06	.14	.12	<b>.08</b>	.15	-0.17	0.33
Agreeableness	48	11,213	.25	.13	.12	<b>.32</b>	.15	0.07	0.57
Conscientiousness	46	11,162	.27	.17	.16	<b>.34</b>	.19	0.03	0.65
Extraversion									
Openness	61	14,638	.14	.14	.13	<b>.18</b>	.16	-0.08	0.44
Agreeableness	54	12,502	.07	.16	.15	<b>.09</b>	.18	-0.21	0.39
Conscientiousness	71	18,405	.08	.14	.12	<b>.09</b>	.15	-0.16	0.34
Openness									
Agreeableness	39	9,886	.02	.10	.08	<b>.02</b>	.11	-0.16	0.20
Conscientiousness	41	11,101	.00	.15	.14	<b>.00</b>	.17	-0.28	0.28
Agreeableness									
Conscientiousness	43	12,405	.20	.15	.14	<b>.26</b>	.17	-0.02	0.54

*Note.*  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD_\rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .

Table 28

*Summary Intercorrelation Matrices (Within Inventories vs. Between Inventories)*

<b>Within Same Inventories</b>					
	ES	EX	O	A	C
ES	--	211 (92,111)	154 (65,095)	167 (79,610)	166 (84,256)
EX	.27 (.22)	--	159 (71,206)	158 (75,274)	156 (74,154)
O	.09 (.07)	.33 (.26)	--	148 (61,538)	148 (62,258)
A	.31 (.24)	.20 (.16)	.19 (.15)	--	158 (76,306)
C	.33 (.27)	.19 (.15)	.12 (.09)	.41 (.32)	--

<b>Between Different Inventories</b>					
	ES	EX	O	A	C
ES	--	89 (18,246)	50 (11,747)	48 (11,213)	46 (11,162)
EX	.28 (.23)	--	61 (14,638)	54 (12,502)	71 (18,405)
O	.08 (.06)	.18 (.14)	--	39 (9,886)	41 (11,101)
A	.32 (.25)	.09 (.07)	.02 (.02)	--	43 (12,405)
C	.34 (.27)	.09 (.08)	.00 (.00)	.26 (-.20)	--

*Note.* Numbers below the diagonal are observed (and internal consistency reliability corrected) meta-analytic correlations. Numbers above the diagonal are  $k$ , the number of independent samples, and  $N$ , the number of individuals contributing to that meta-analytic correlation.

Table 29

*Detailed Confirmatory Factor Analysis Result: General Factor of Personality (Within vs. Between Inventories)*

		Model Fit Statistics							
Model	Data Source	$\chi^2$	df	<i>p</i>	GFI	TLI	CFI	PCFI	RMSEA
Null Model	Within same inventories	26544.678	10	.000	.853	.000	.000	.000	.191
	Between different inventories	2981.511	10	.000	.905	.000	.000	.000	.154
GFP only	Within same inventories	3950.308	5	.000	.979	.703	.851	.426	.104
	Between different inventories	306.476	5	.000	.990	.797	.899	.449	.069
Interfactor	Within same inventories	1091.738	4	.000	.994	.898	.959	.384	.061
	Between different inventories	120.906	4	.000	.996	.902	.961	.384	.048
Hierarchical	Within same inventories	1091.738	4	.000	.994	.898	.959	.384	.061
	Between different inventories	120.906	4	.000	.996	.902	.961	.384	.048
Bifactor	Within same inventories	1091.738	3	.000	.994	.863	.959	.288	.070
	Between different inventories	6.759	3	.080	1.000	.996	.999	.300	.010 <sup>f</sup>

*Notes.* GFP saturation = percent of variance accounted for by the general factor,  $\chi^2$  = Chi square statistic, df = degrees of freedom,  $p$  = significance level of chi square statistic, GFI = Goodness of Fit Index, TLI = Tucker Lewis Index, CFI = Comparative Fit Index PCFI = Parsimony Adjusted CFI, RMSEA = Root Mean Square Error of Approximation, ( $\omega_h$ ) = omega hierarchical. <sup>a.</sup> size of 1st factor; <sup>b.</sup>  $\omega_h$  from direct gfp loadings on the big five; <sup>c.</sup> correlation between alpha and beta; <sup>d.</sup>  $\omega_h$  using indirect effect of gfp through alpha and beta; <sup>e.</sup>  $\omega_h$  using direct effect of gfp on big 5, controlling for variance due to alpha and beta; <sup>f.</sup> the best fitting model is for between inventories bifactor (some separate gfp variable – could be either substantive or method).

Table 30

*Variance in Big Five Due to GFP, Alpha, Beta, and Unique Variance*

Dataset	Trait	Std. Factor Loadings			% variance due to			Unique Variance
		GFP	Alpha	Beta	GFP	Alpha	Beta	
Ones (1993)	ES	.30	.43	--	0.09	0.18	--	0.73
	A	.20	.43	--	0.04	0.18	--	0.78
	C	-.02	.44	--	0.00	0.19	--	0.81
	EX	.46	--	.00	0.21	--	0.00	0.79
	O	.36	--	.00	0.13	--	0.00	0.87
Davies (within)	ES	.48	.00	--	0.23	0.00	--	0.77
	A	.54	.00	--	0.29	0.00	--	0.71
	C	.56	.00	--	0.31	0.00	--	0.69
	EX	.33	--	.44	0.11	--	0.19	0.70
	O	.20	--	.44	0.04	--	0.19	0.77
Davies (between)	ES	.53	.41	--	0.28	0.17	--	0.55
	A	.15	.41	--	0.02	0.17	--	0.81
	C	.18	.41	--	0.03	0.17	--	0.80
	EX	.44	--	.30	0.19	--	0.09	0.72
	O	.11	--	.30	0.01	--	0.09	0.90

Note. "--" indicates that factor loadings were constrained to be zero.

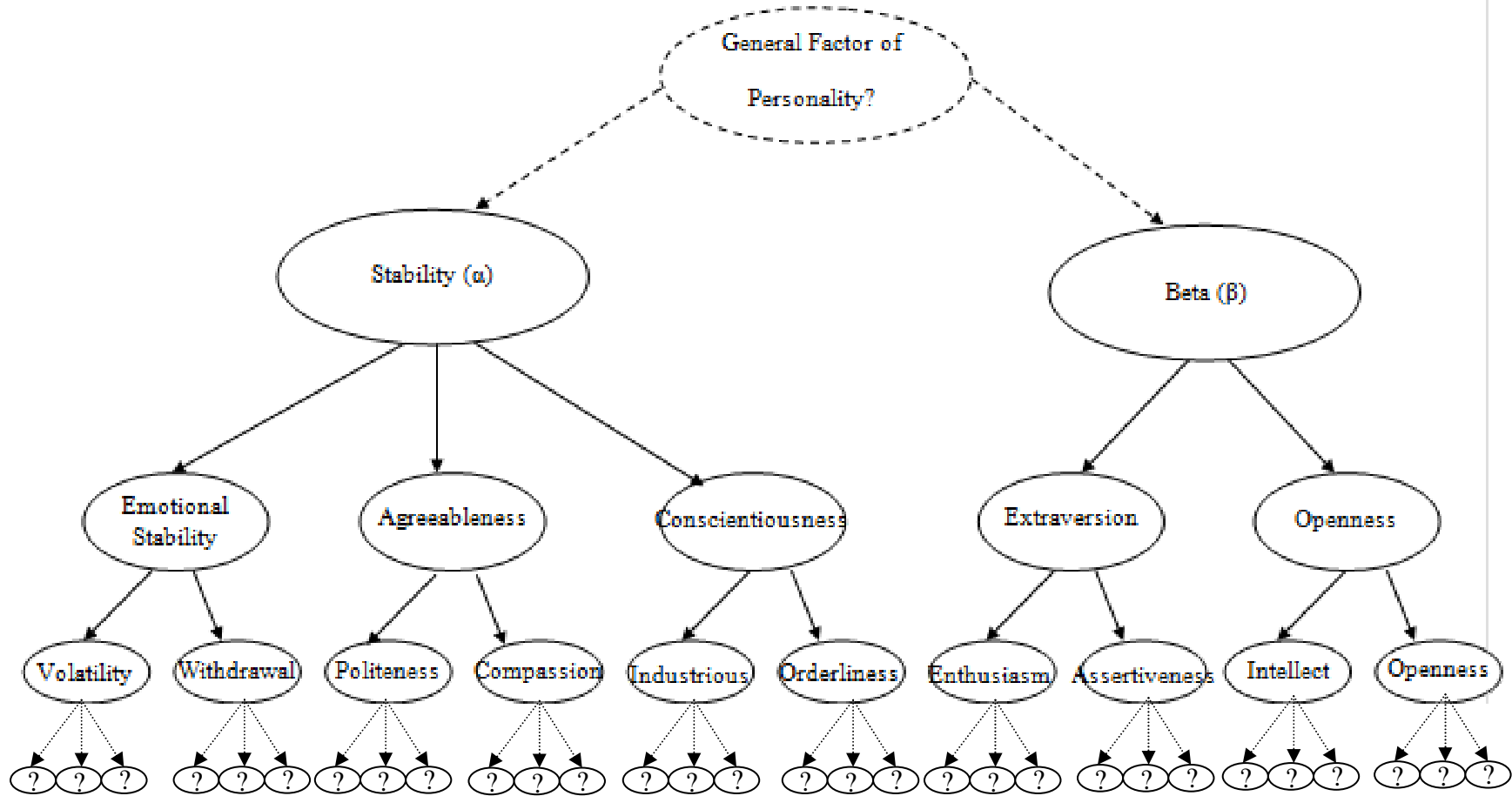


## APPENDIX C

### Figures

Figure 1

*Hierarchical Conceptualization of Personality (Example)*



*For example purposes only, not necessarily 3 facets for each meso-level facet.*

Figure 2

*Test Re-Test: Agreeableness through Year 1*

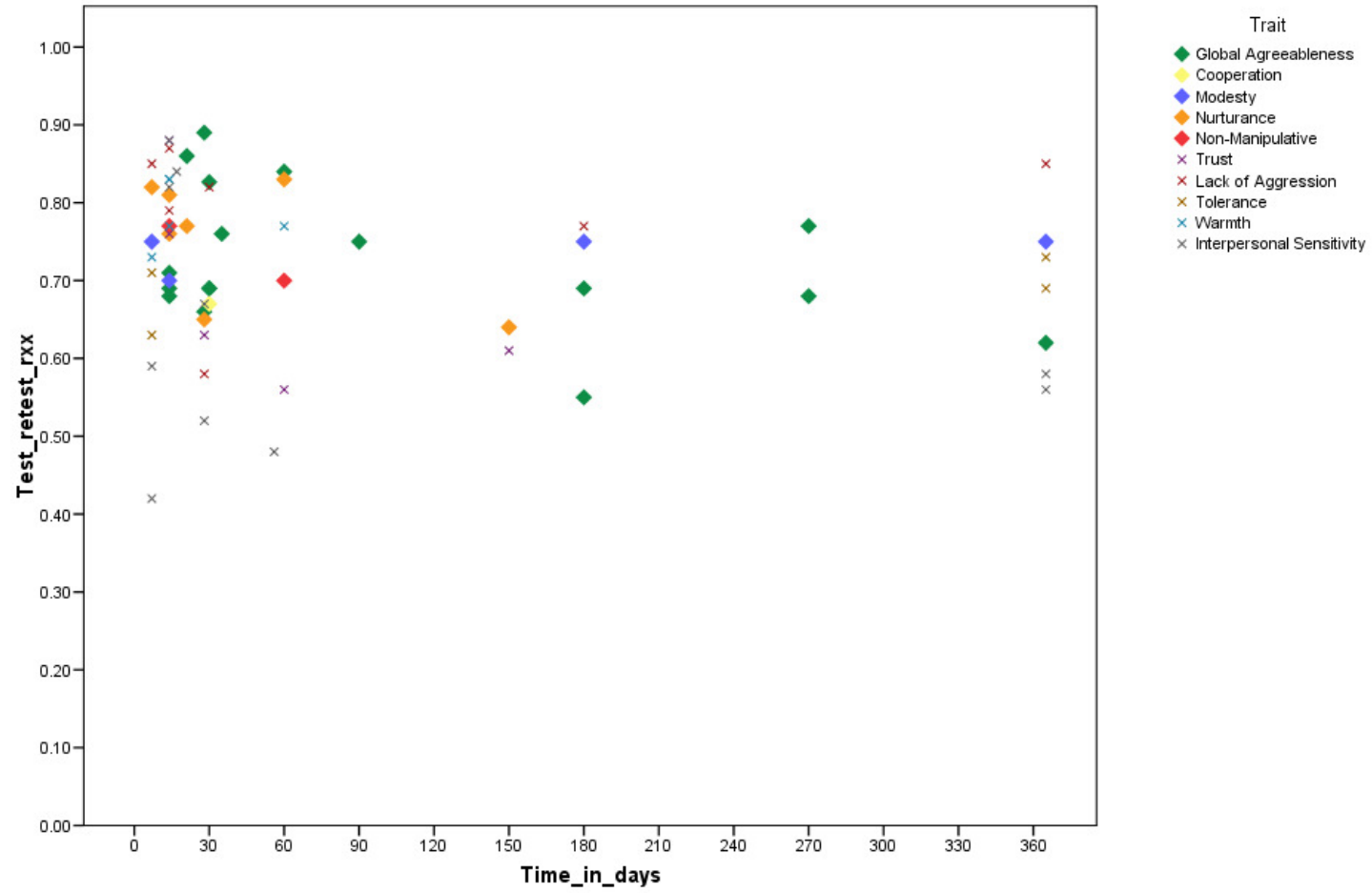


Figure 3

*Test Re-Test: Agreeableness through Year 25*

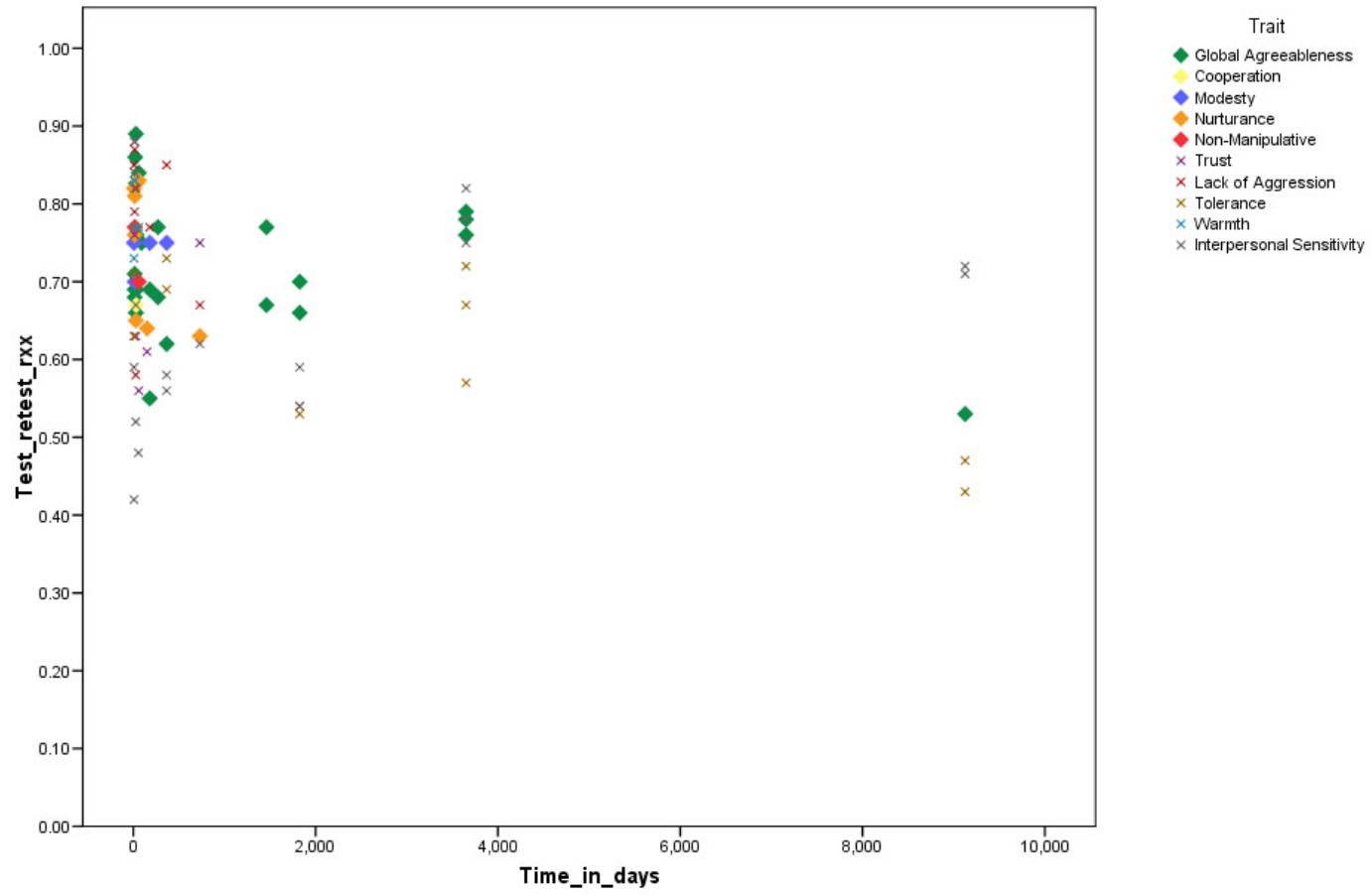


Figure 4

*Percentage of Variance Accounted for in Potential Agreeableness Facets*

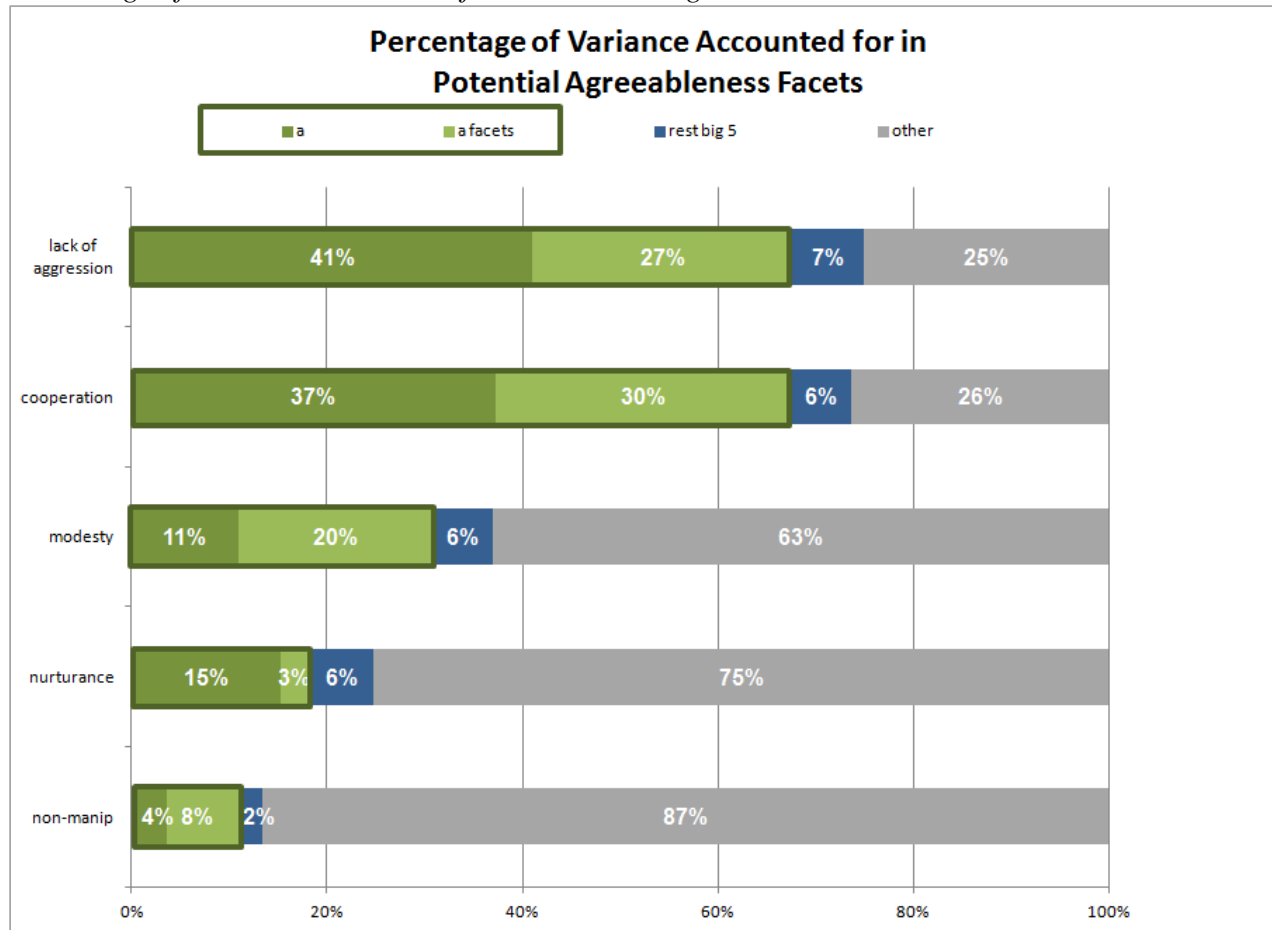


Figure 5

*Agreeableness Confirmatory Factor Analysis: General Factor*

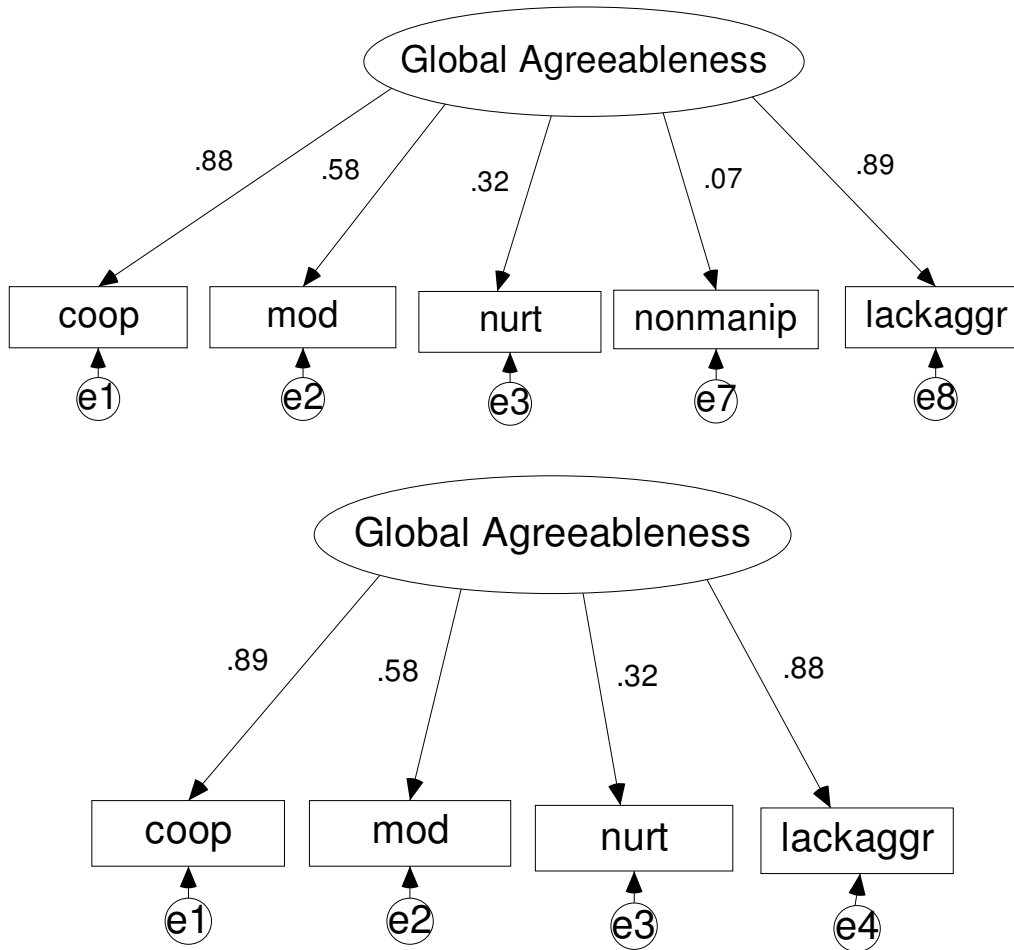


Figure 6

*Agreeableness Confirmatory Factor Analysis: Hierarchical*

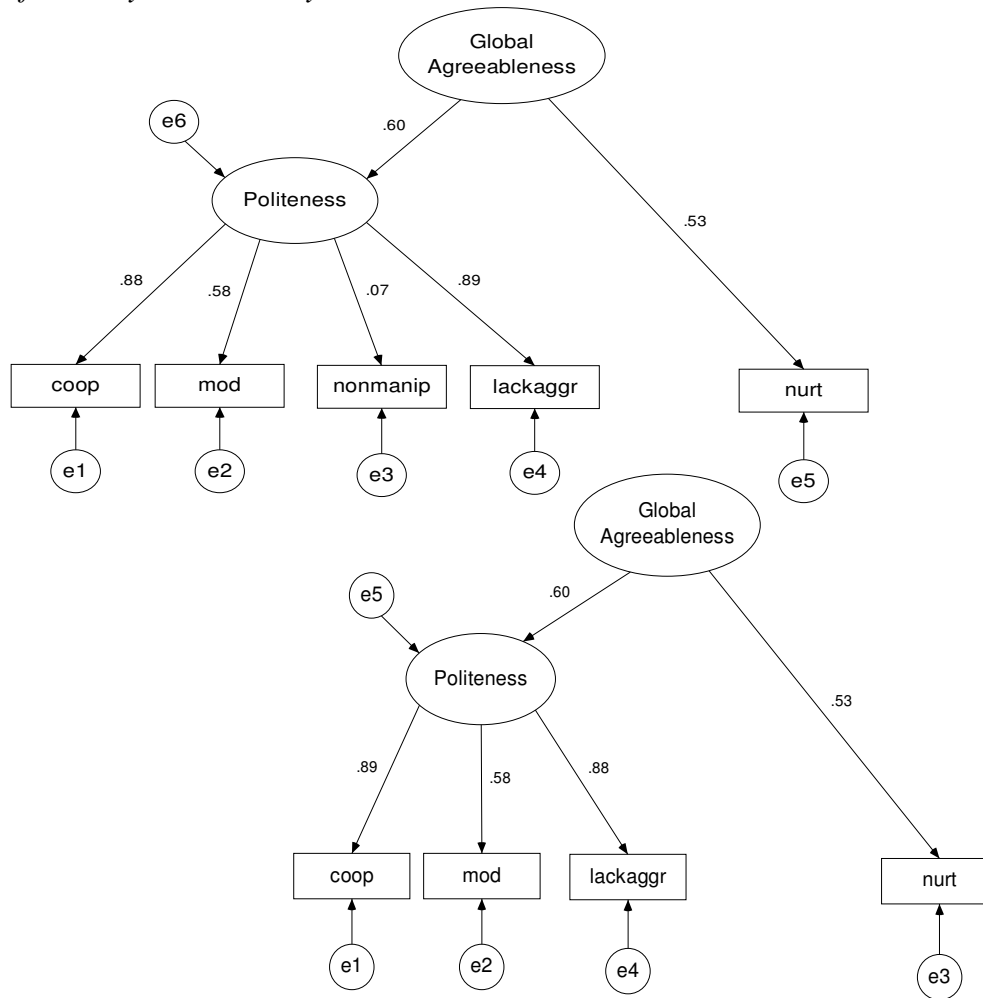


Figure 7

*Test Re-Test: Extraversion through Year 1*

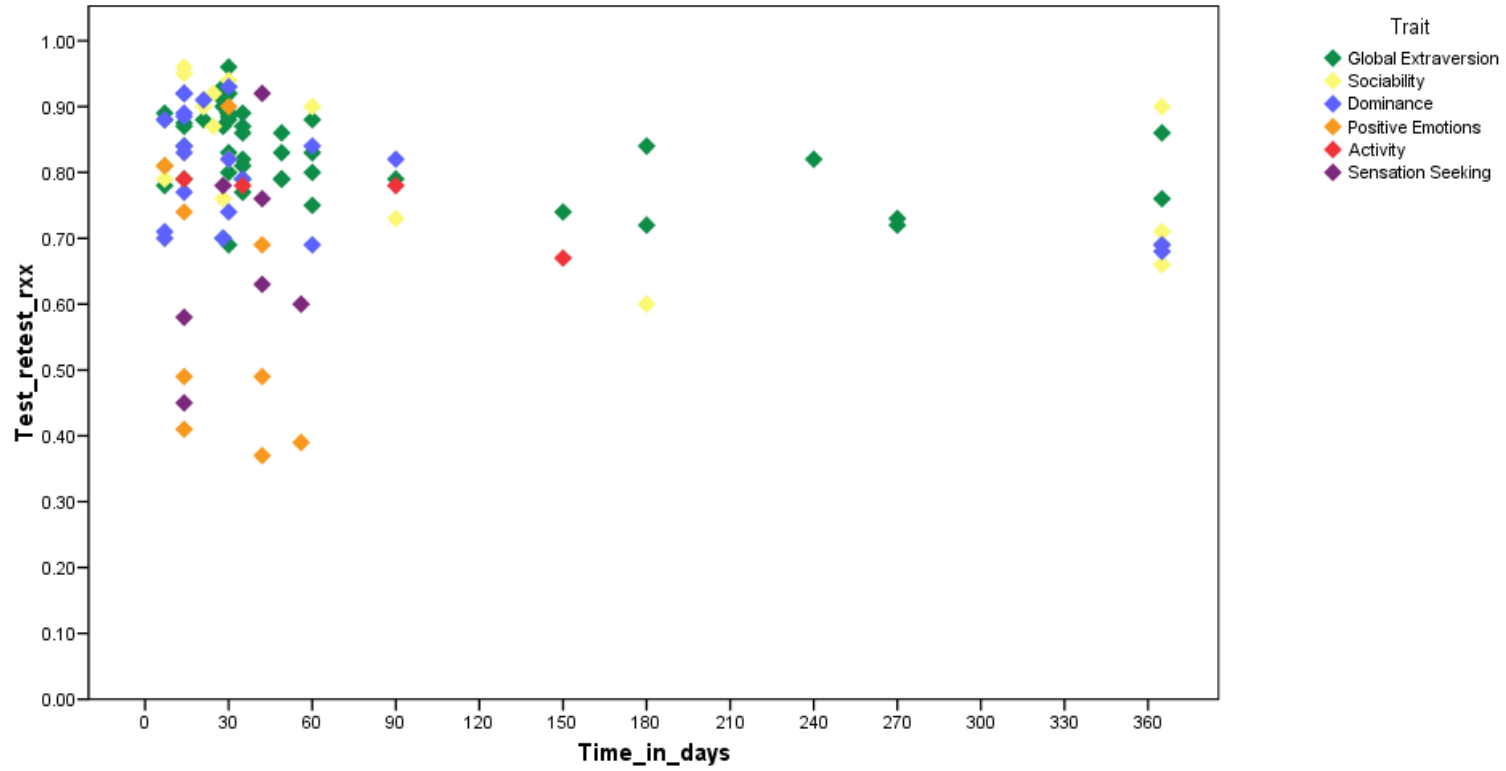




Figure 8

*Test Re-Test: Extraversion through Year 25*

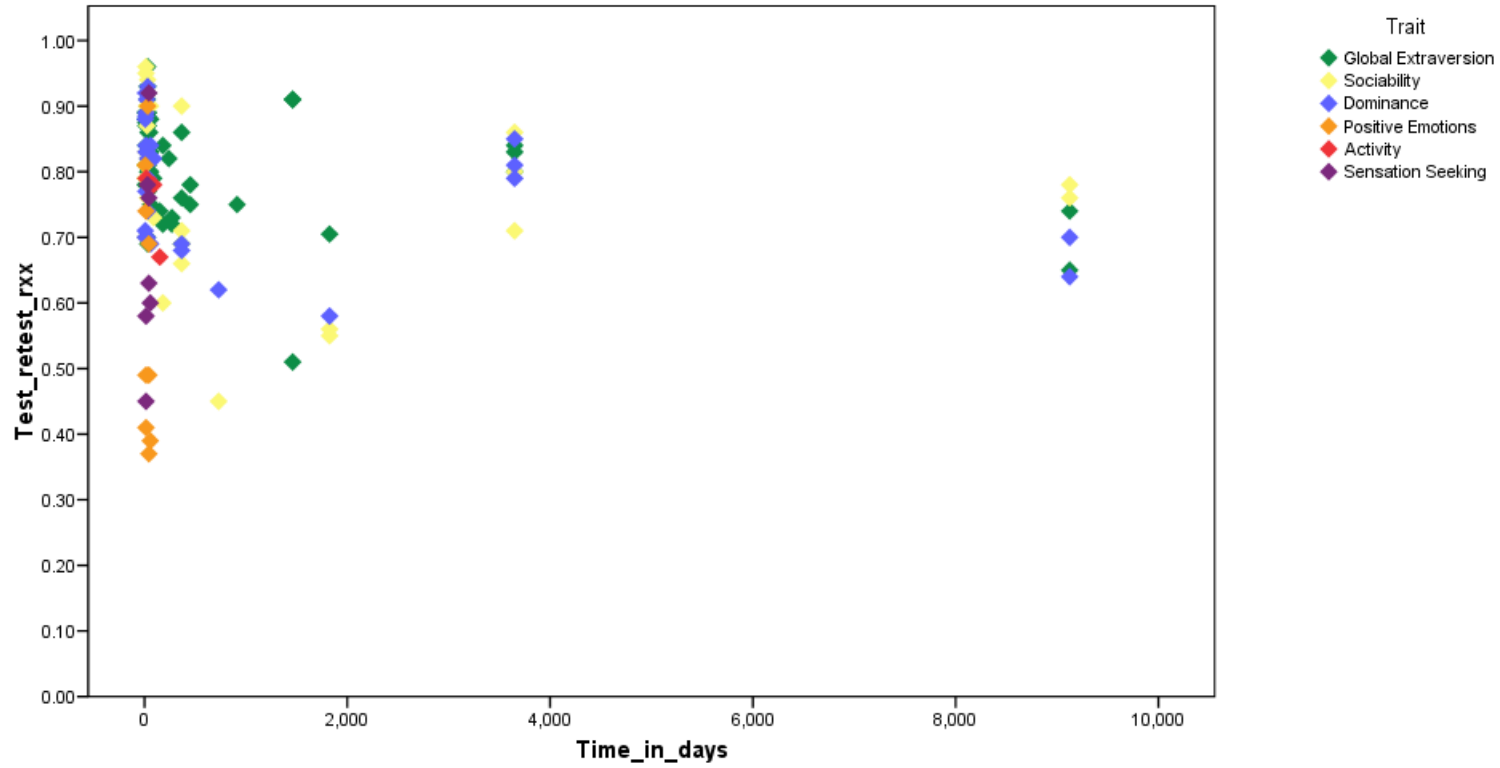


Figure 9

*Percentage of Variance Accounted for in Potential Extraversion Facets*

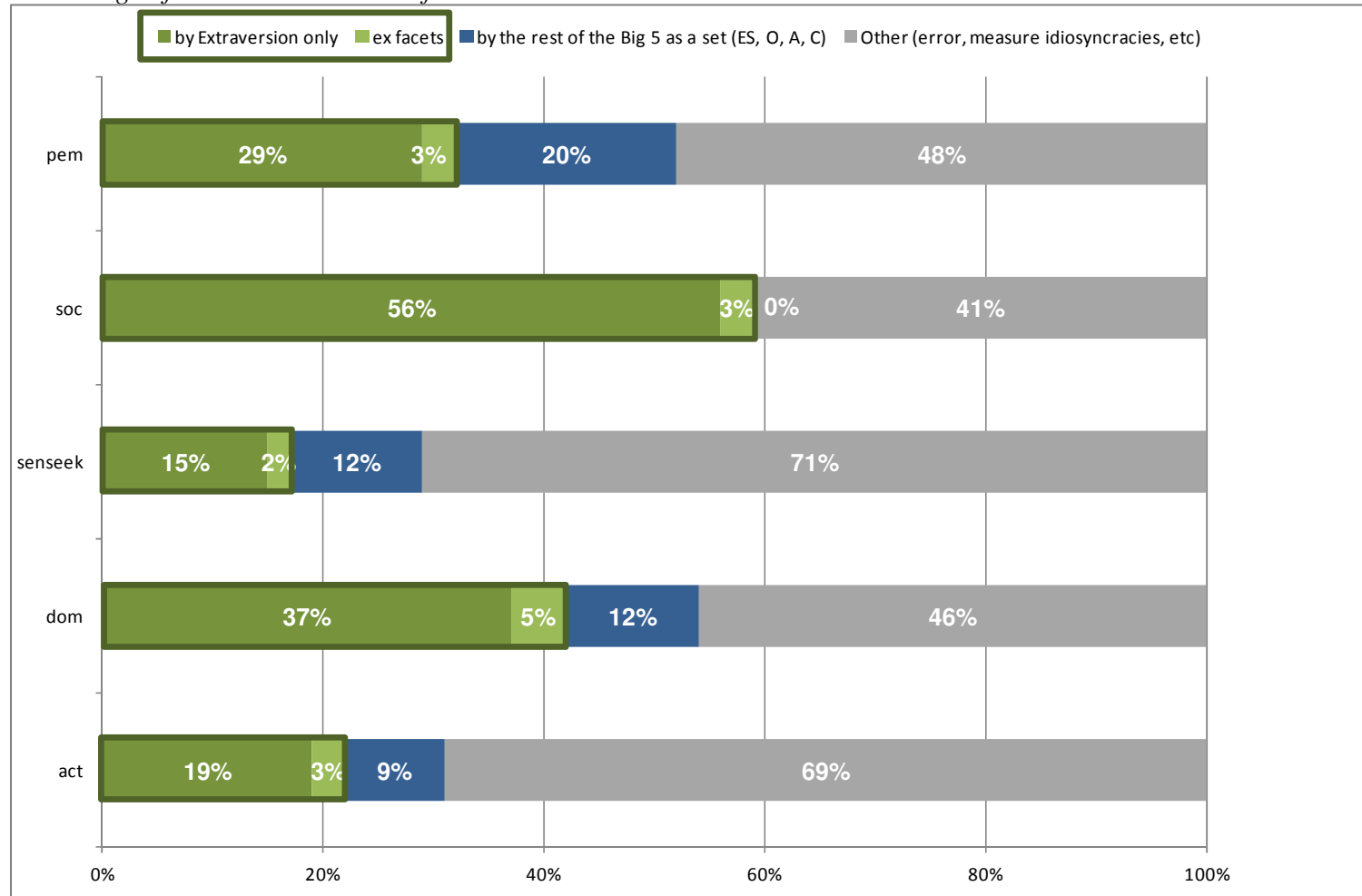


Figure 10

*Extraversion Confirmatory Factor Analysis: General Factor*

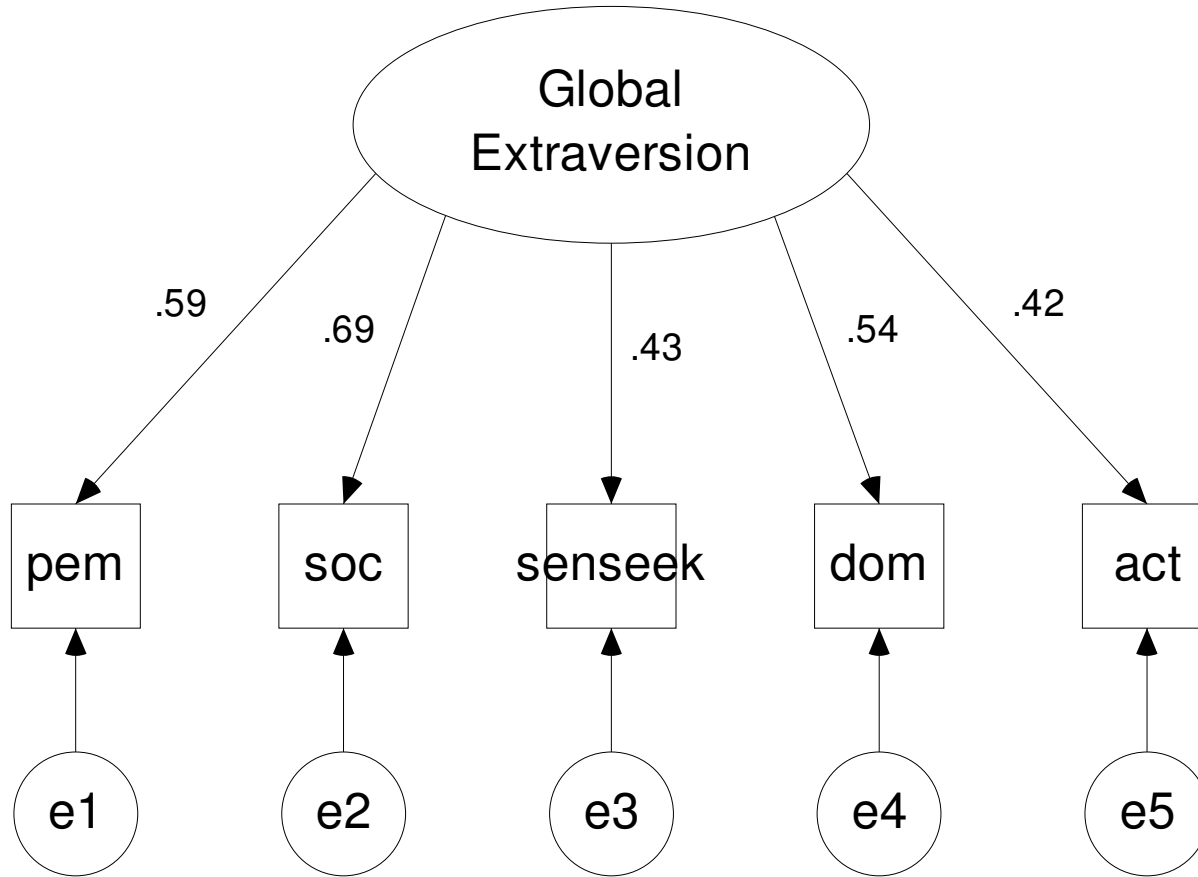


Figure 11

*Extraversion Confirmatory Factor Analysis: Hierarchical (DeYoung), Sensation Seeking on Assertiveness*

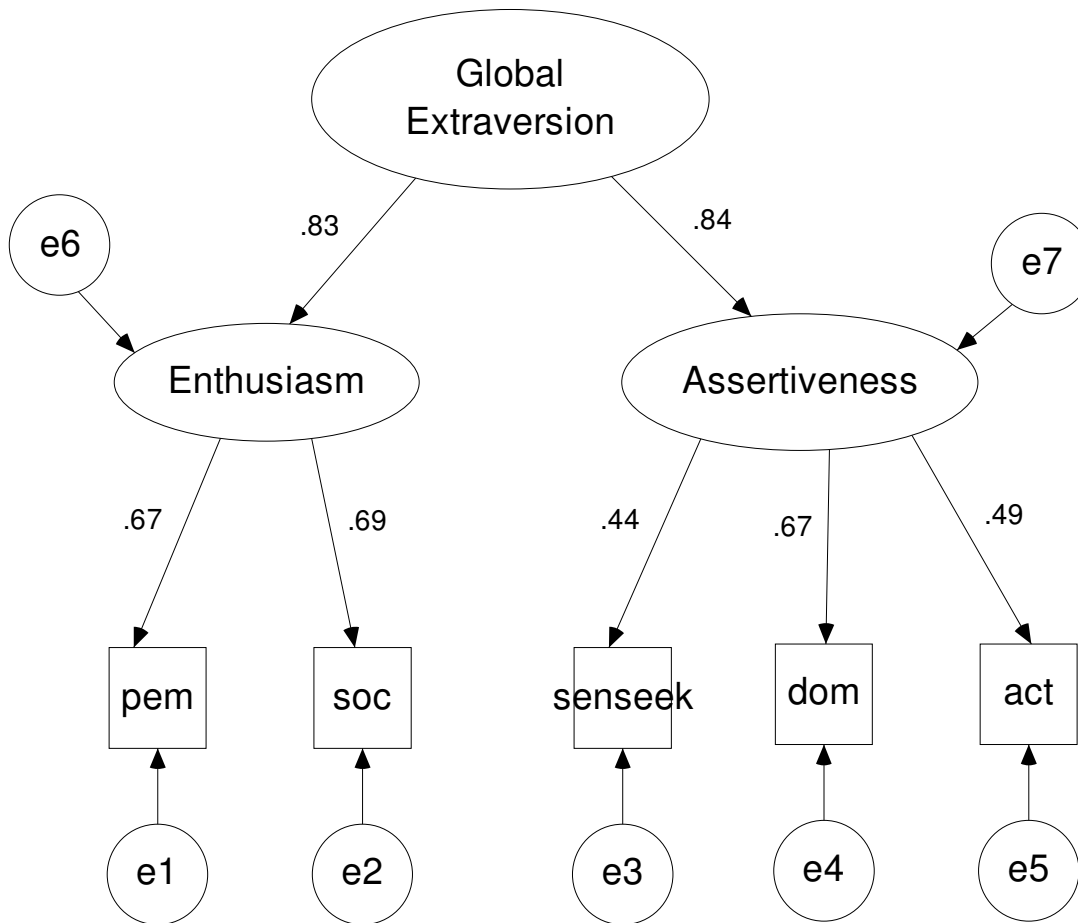


Figure 12

*Extraversion Confirmatory Factor Analysis: Hierarchical (DeYoung), Sensation Seeking on Enthusiasm*

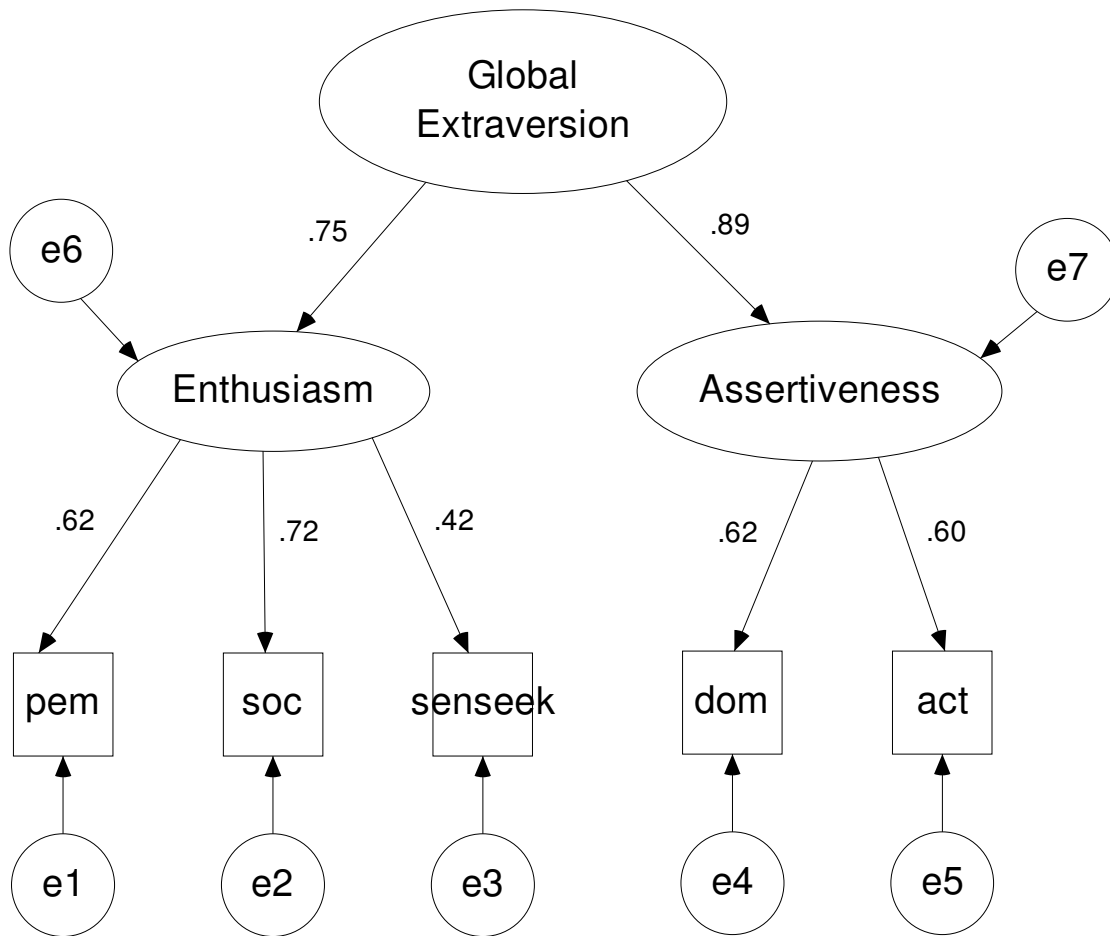


Figure 13

*Extraversion Confirmatory Factor Analysis: Hierarchical (DeYoung), Sensation Seeking on Assertiveness and Enthusiasm*

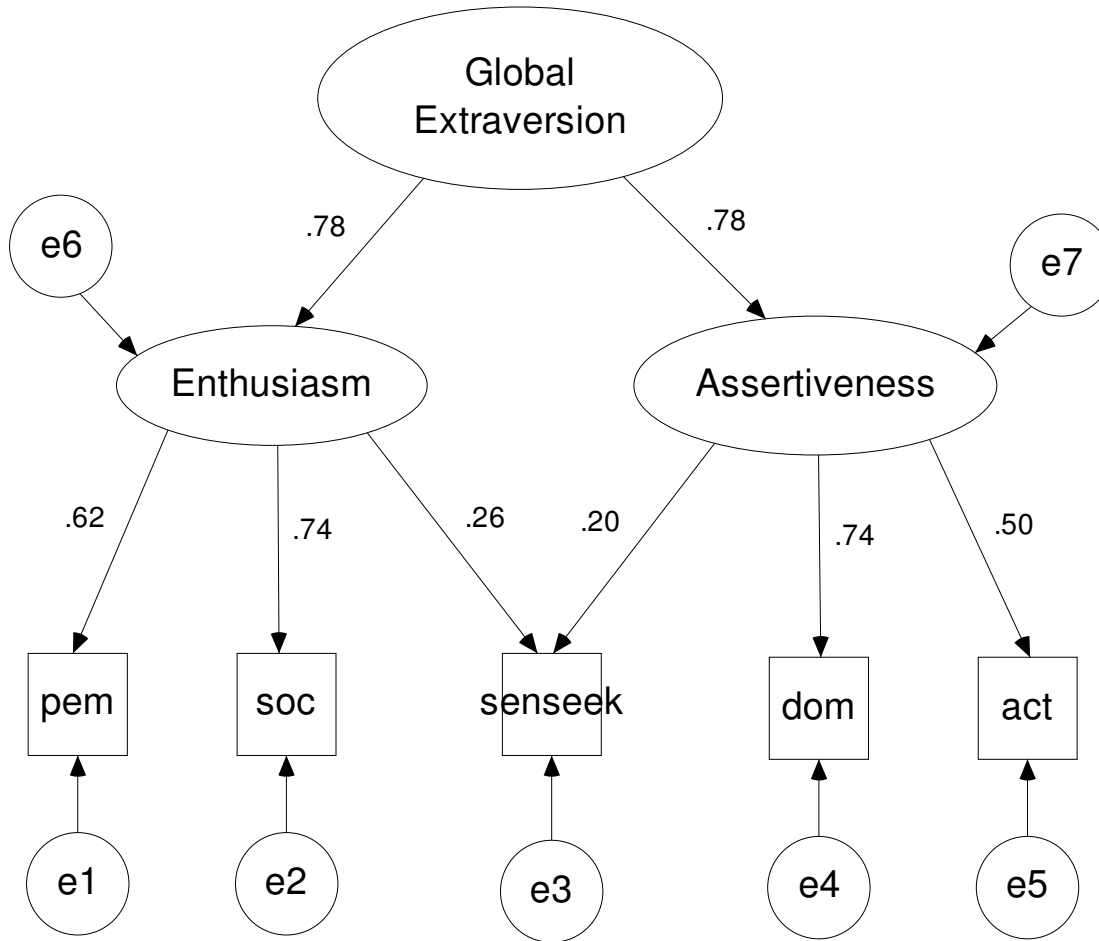


Figure 14

*Extraversion Confirmatory Factor Analysis: Hierarchical (DeYoung), Sensation Seeking Straight to Global Extraversion*

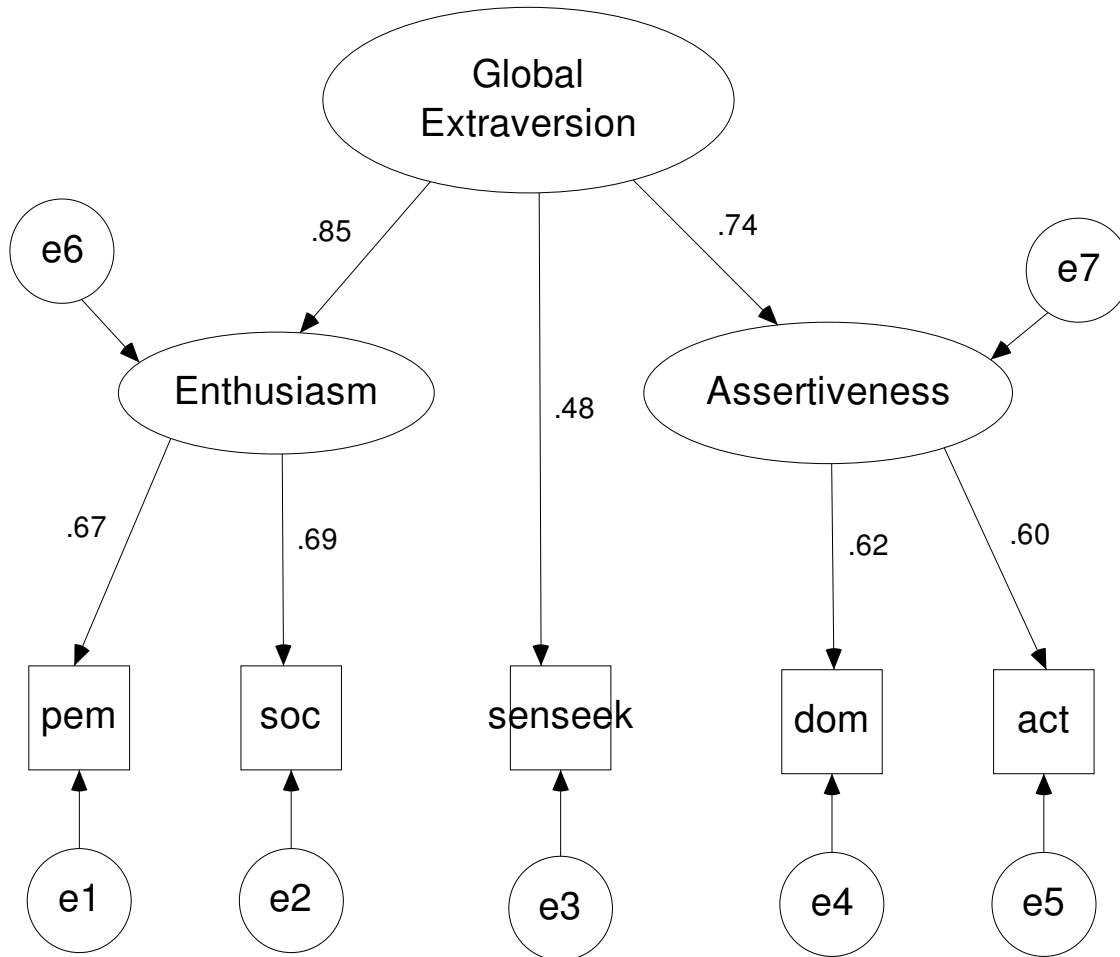


Figure 15

*GFP Confirmatory Factor Analysis: General Factor (data from Ones 1993)*

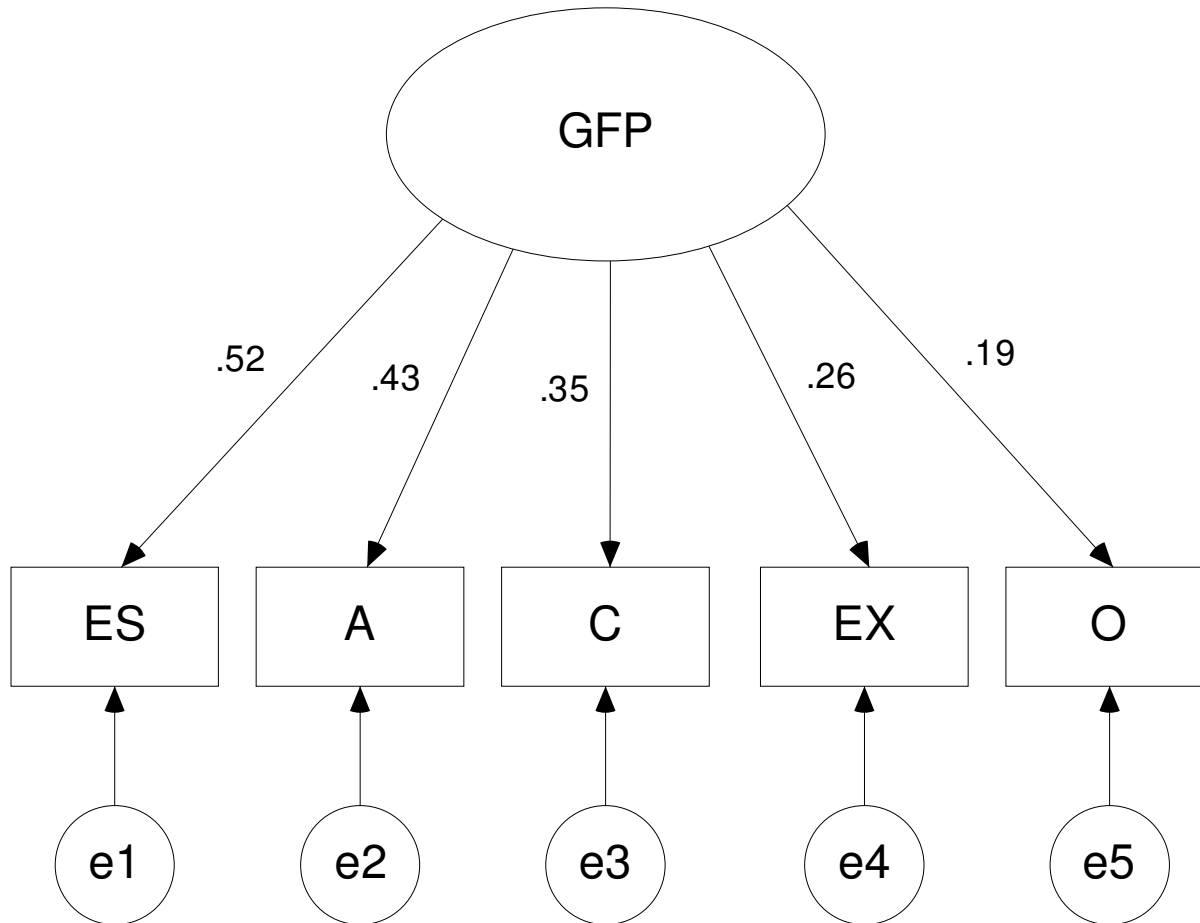




Figure 16

*GFP Confirmatory Factor Analysis: Interfactor (data from Ones 1993)*

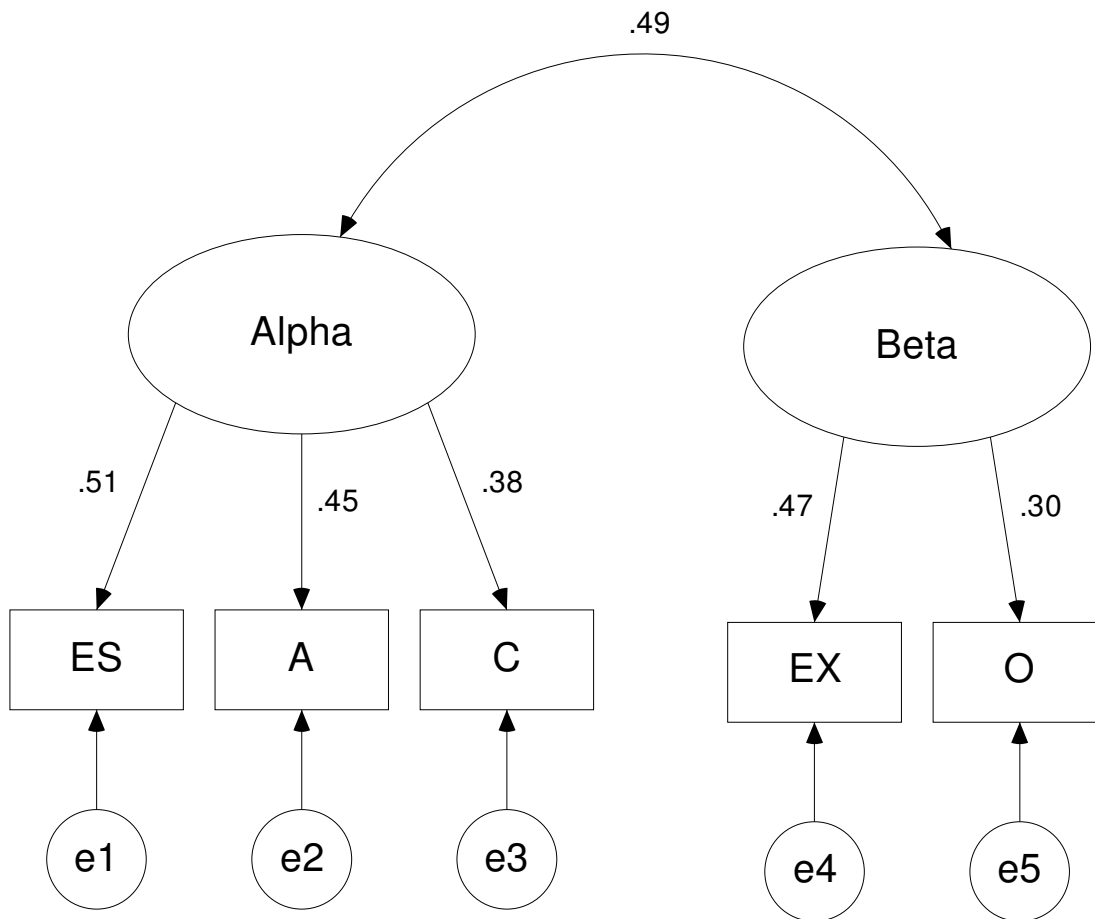


Figure 17  
*GFP Confirmatory Factor Analysis: Hierarchical (data from Ones 1993)*

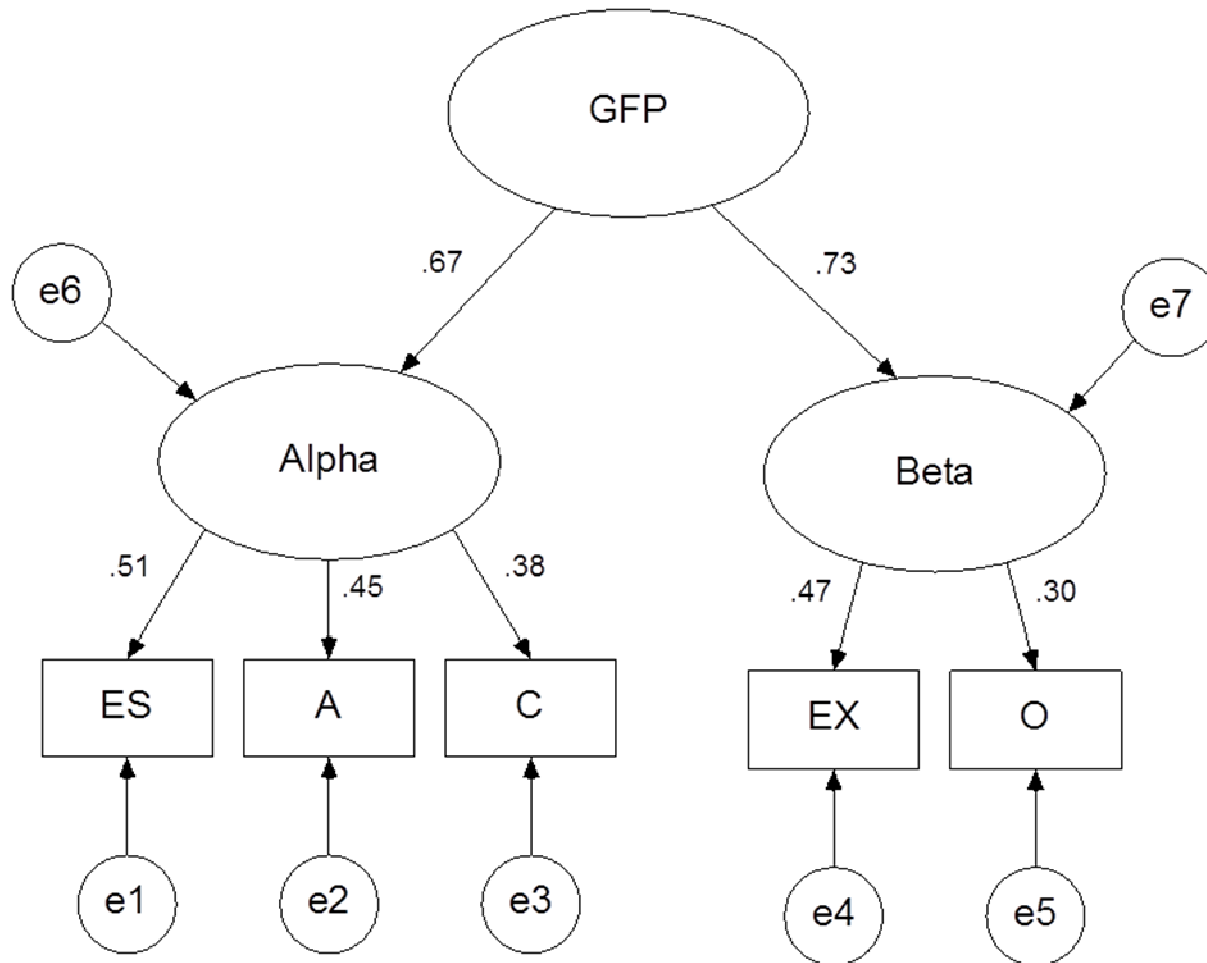


Figure 18

*GFP Confirmatory Factor Analysis: Bifactor (data from Ones 1993)*

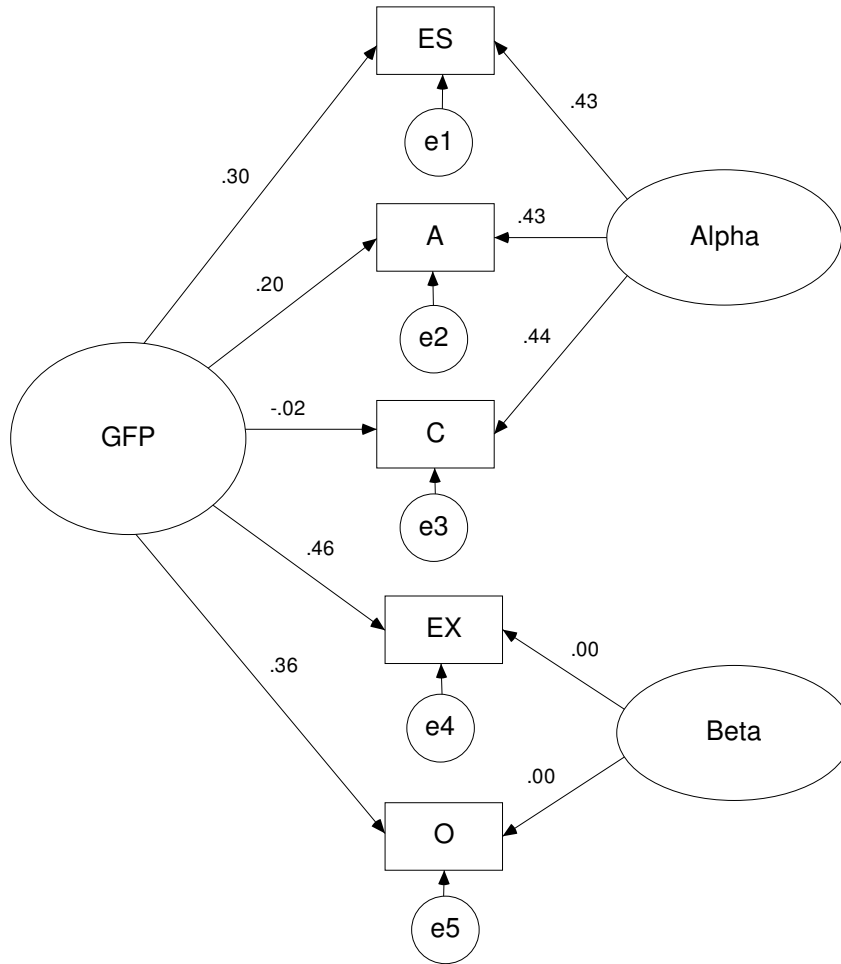


Figure 19

*GFP Confirmatory Factor Analysis: General Factor (Within Same Inventory)*

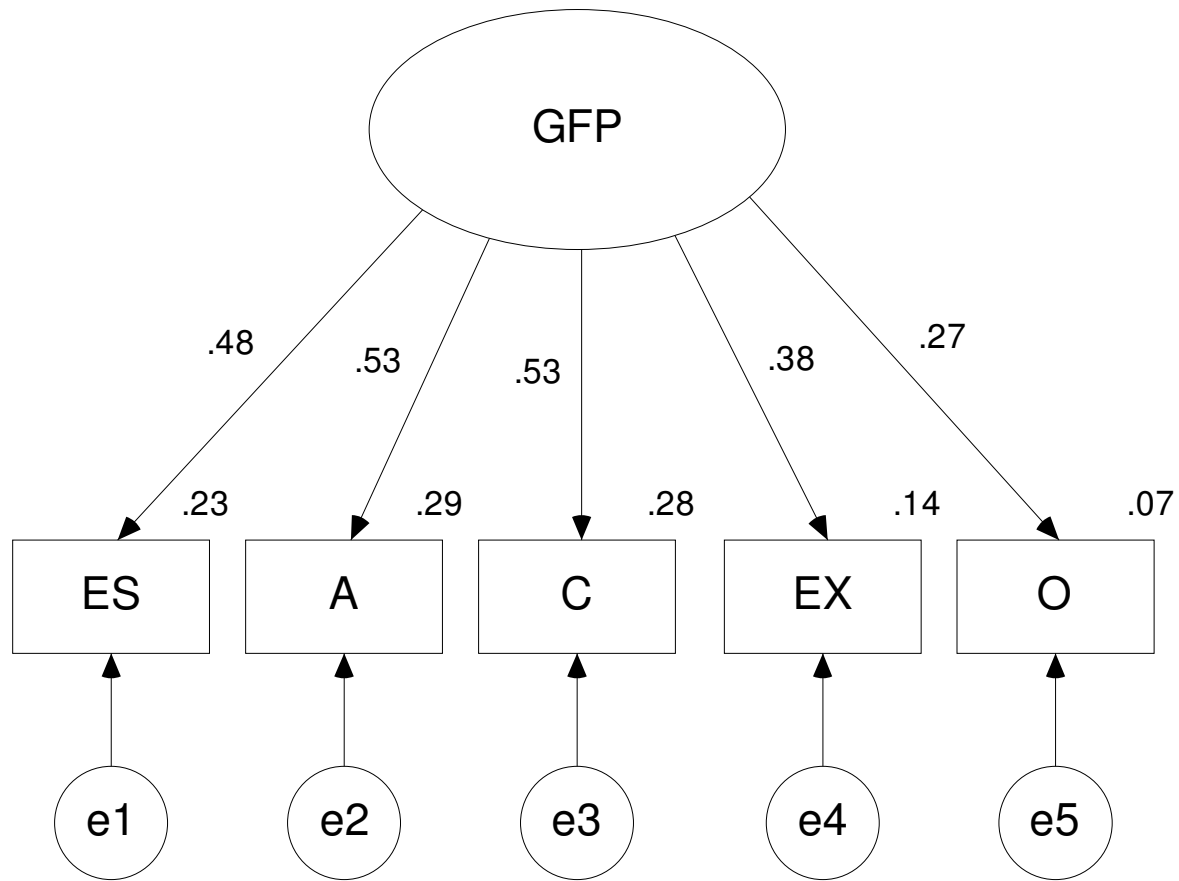


Figure 20

*GFP Confirmatory Factor Analysis: Interfactor (Within Same Inventory)*

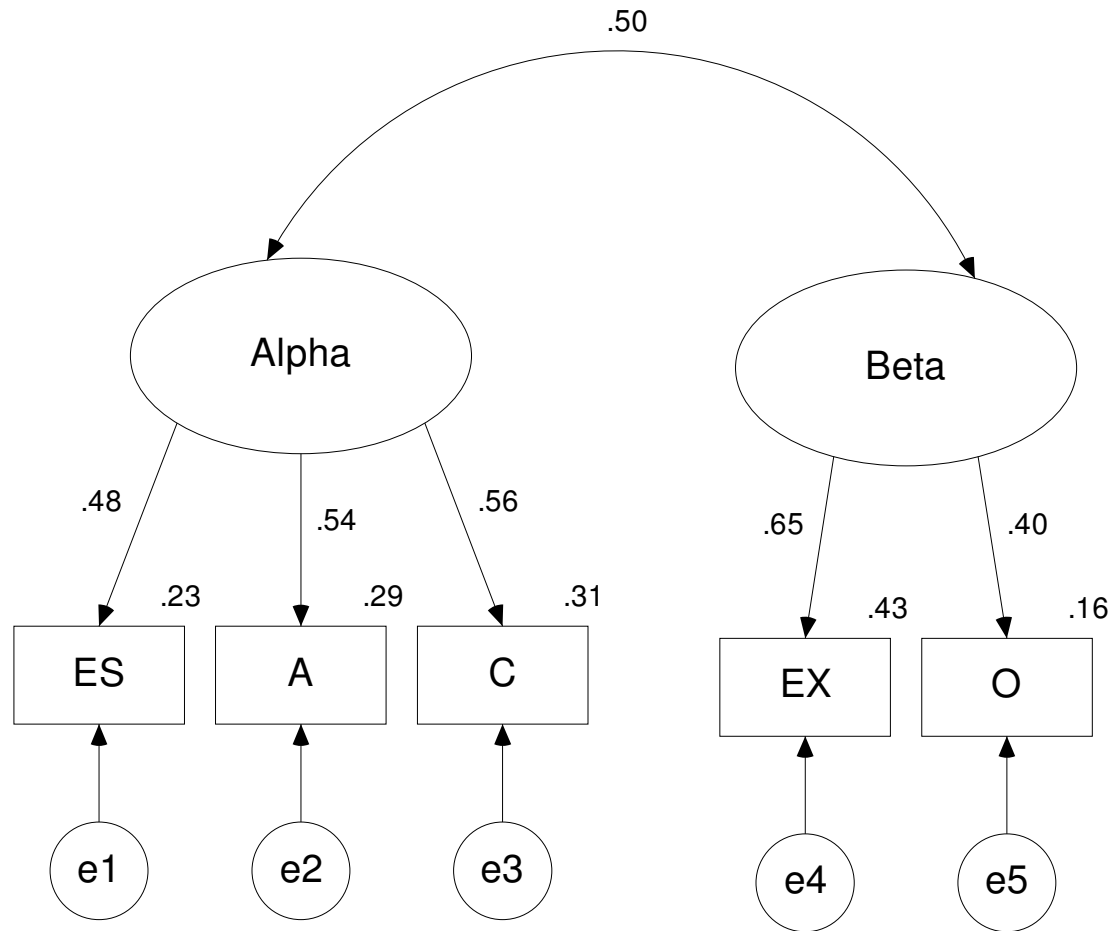


Figure 21

*GFP Confirmatory Factor Analysis: Hierarchical (Within Same Inventory)*

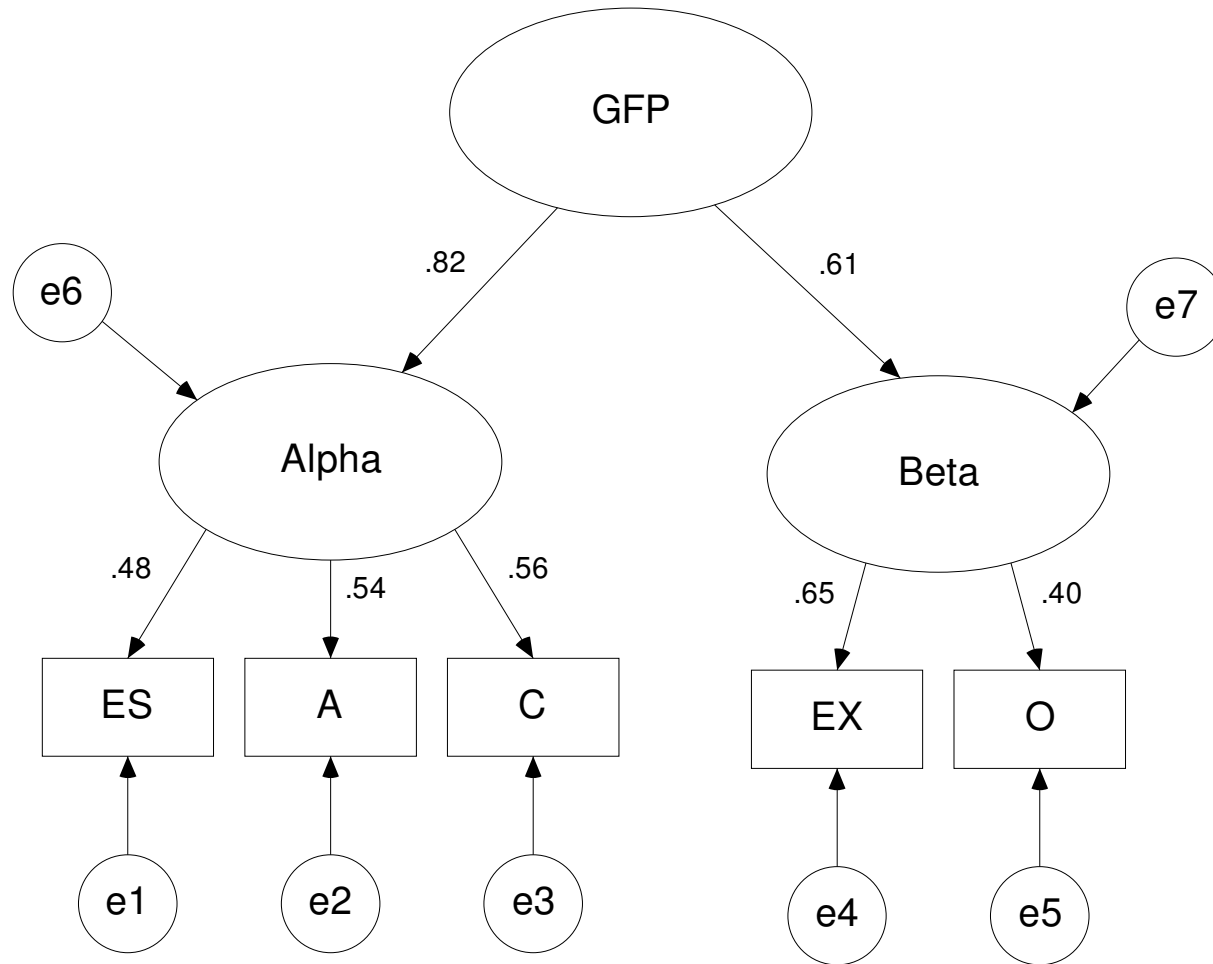


Figure 22

*GFP Confirmatory Factor Analysis: Bifactor (Within Same Inventory)*

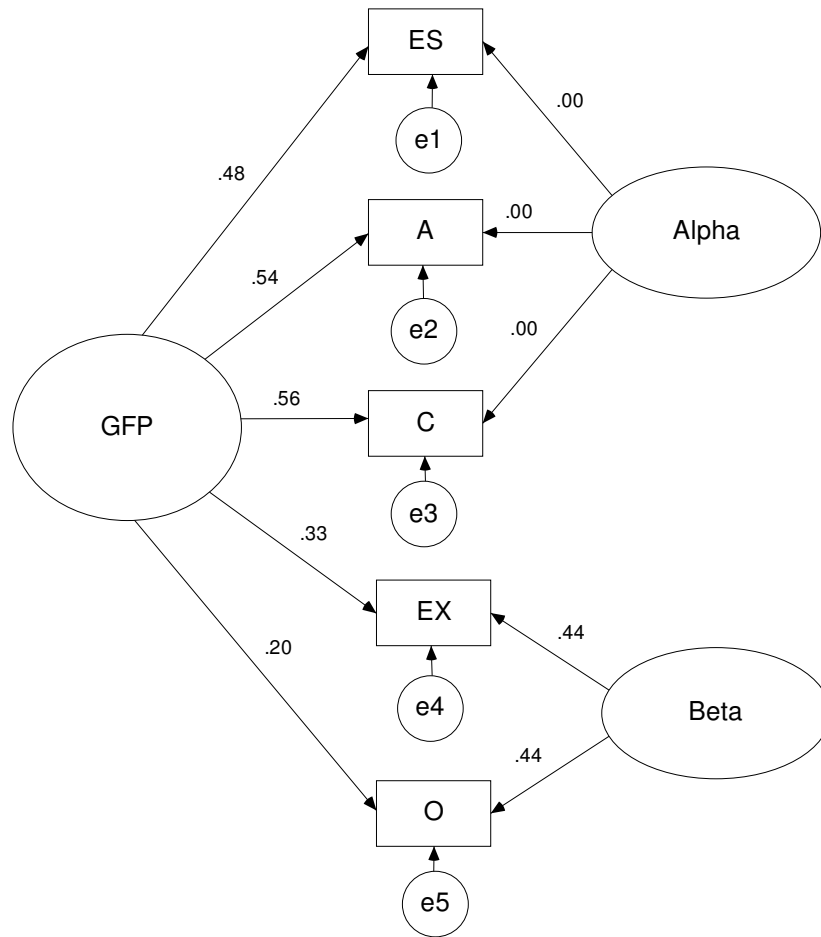


Figure 23

*GFP Confirmatory Factor Analysis: General Factor (Between Different Inventories)*

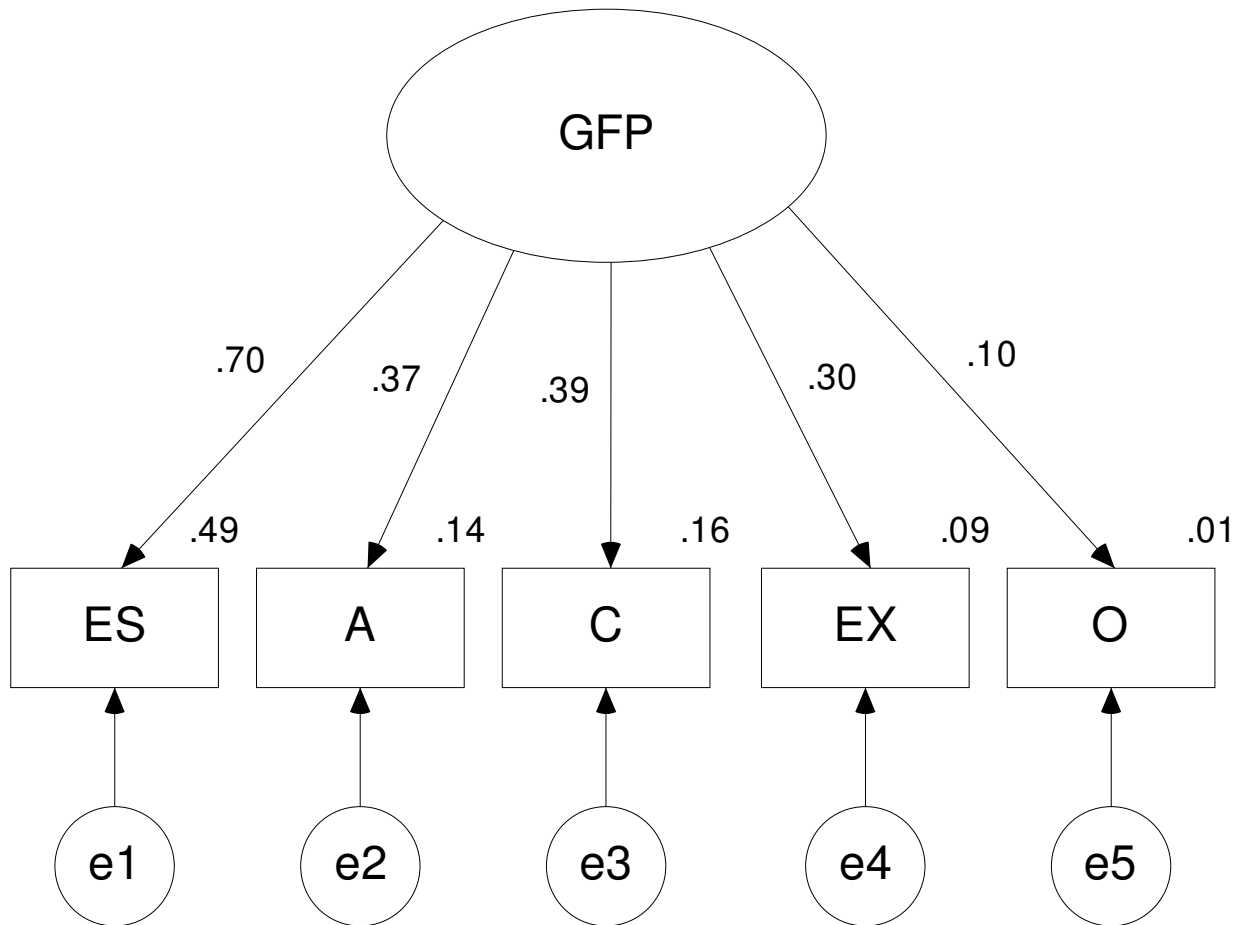




Figure 24

*GFP Confirmatory Factor Analysis: Interfactor (Between Different Inventories)*

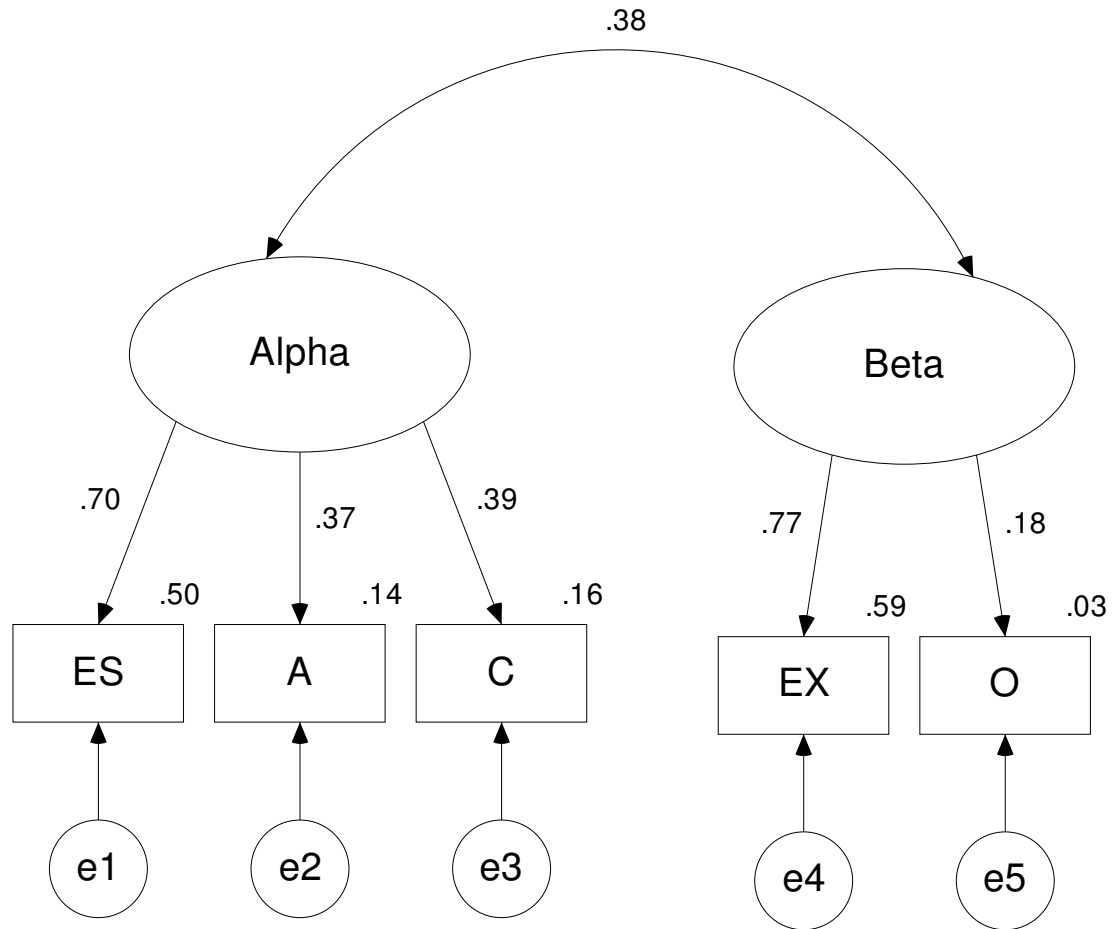


Figure 25

*GFP Confirmatory Factor Analysis: Hierarchical (Between Different Inventories)*

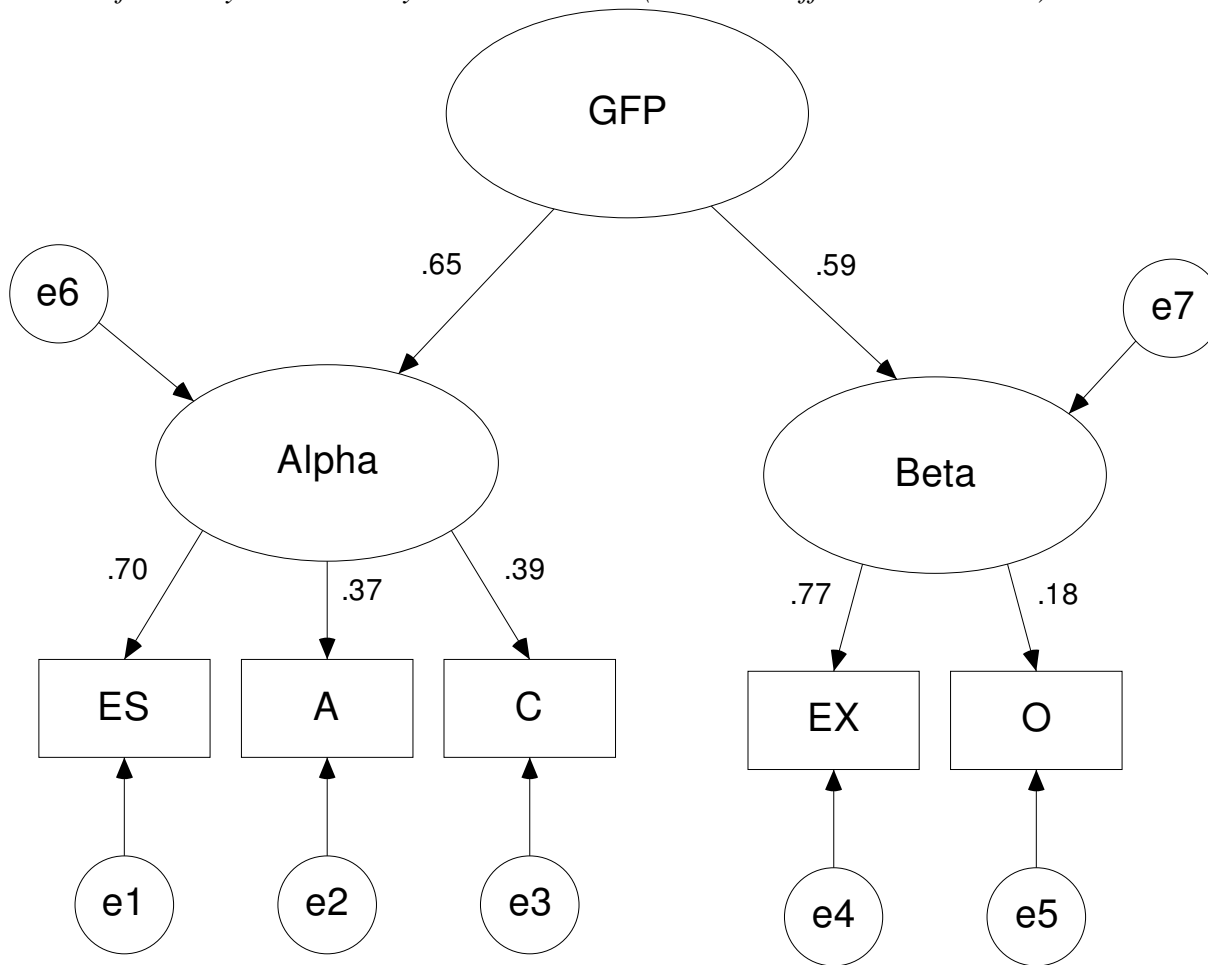
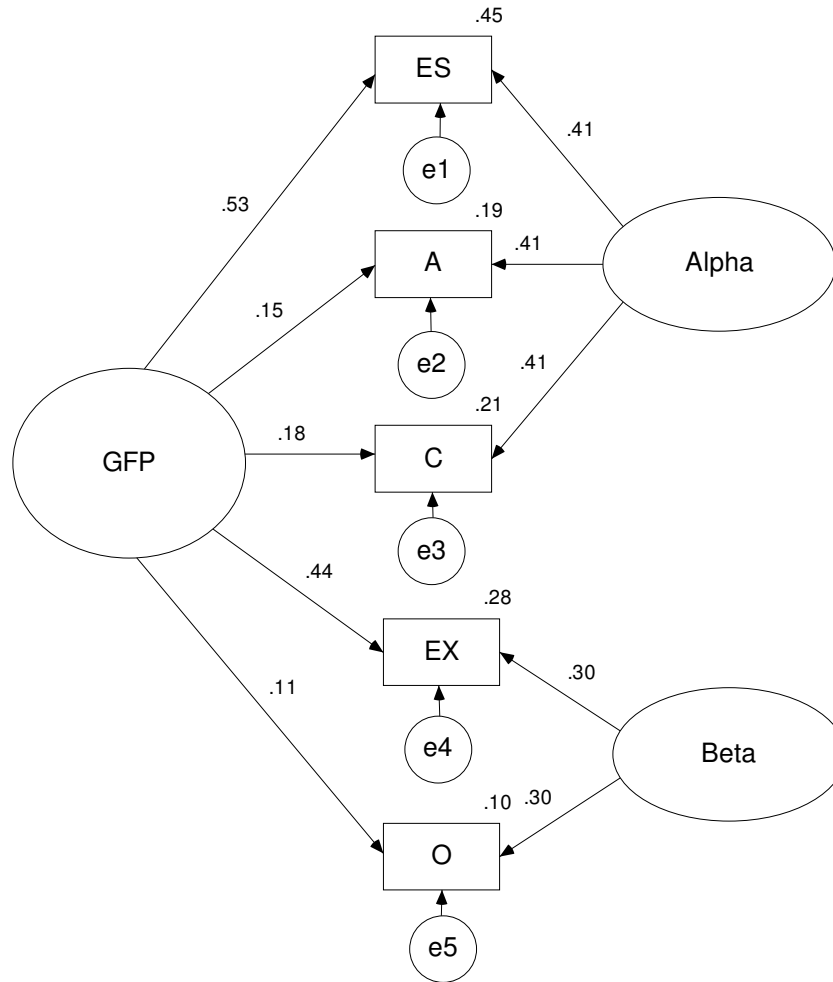


Figure 26

*GFP Confirmatory Factor Analysis: Bifactor (Between Different Inventories)*



## APPENDIX D

Tables including Data from both Within and Between Inventories

Table 31

*Detailed Meta-Analytic Correlations of Agreeableness Measures and Global Big Five Measures (Within and Between Inventories)*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
<i>Overall</i>									
Global Agreeableness									
ES	206	98,193	.27	.20	.19	.34	.24	-.06	.73
Ex	203	85,507	.14	.21	.21	.18	.26	-0.25	0.61
OE	178	78,794	.14	.13	.12	.18	.16	-0.08	0.44
C	192	96,081	.31	.18	.17	.40	.22	0.04	0.76
Trusting									
ES	30	13,365	.29	.12	.10	.37	.13	0.16	0.58
Ex	39	13,064	.10	.11	.09	.10	.09	-0.05	0.25
OE	16	7,345	-.05	.21	.21	-.05	.20	-0.38	0.28
A	15	3,501	.28	.12	.10	.37	.13	.16	.58
C	19	8,454	.15	.13	.12	.20	.15	-0.05	0.45
Modesty									
ES	25	9,781	-.04	.15	.14	-.06	.18	-0.36	0.24
Ex	30	12,763	-.16	.18	.17	-.22	.23	-0.60	0.16

	OE	22	11,855	-.05	.16	.16	-.07	.22	-0.43	0.29
	A	14	5,331	.47	.26	.26	.66	.36	.07	1.00
	C	14	6,299	-.03	.07	.05	-.04	.06	-0.14	0.06
Cooperation										
	ES	15	8,102	.11	.15	.14	.14	.19	-0.17	0.45
	Ex	13	8,378	-.02	.19	.18	-.03	.25	-0.44	0.38
	OE	9	3,204	-.01	.06	.03	-.01	.04	-0.08	0.06
	A	5	1,488	.44	.10	.09	.61	.12	0.41	.81
	C	9	7,661	.10	.10	.10	.13	.13	-0.07	0.33
Not Outspoken										
	ES	7	3,776	-.14	.21	.20	-.21	.29	-0.69	0.27
	Ex	5	1,551	-.15	.12	.11	-.22	.16	-0.48	0.04
	OE	5	946	-.13	.04	.00	-.20	.00	-.20	-.20
	A	4	797	.21	.16	.15	.33	.22	-0.03	0.69
	C	6	2,972	-.06	.09	.08	-.09	.11	-0.27	0.09
Lack of Aggression										
	ES	32	11,178	.35	.18	.18	.46	.22	0.10	0.82
	Ex	30	10,630	-.21	.20	.19	-.27	.25	-0.68	0.14
	OE	20	10,368	-.02	.12	.12	-.02	.16	-0.28	0.24

A	19	6,221	.43	.15	.14	.58	.18	0.28	0.88
C	15	4,311	.20	.15	.14	.27	.18	-0.03	0.57
Non-manipulative									
ES	17	7,627	.07	.09	.08	.10	.10	-0.06	0.26
Ex	30	10,526	.02	.23	.23	.02	.30	-0.47	0.51
OE	13	7,219	-.05	.12	.11	-.08	.15	-0.33	0.17
A	12	3,622	.15	.19	.18	.20	.25	-0.21	.61
C	13	5,706	.06	.14	.14	.08	.18	-0.22	0.38
Nurturance									
ES	30	11,218	.11	.13	.12	.15	.15	-0.10	0.40
Ex	37	18,200	.22	.11	.10	.29	.13	0.08	0.50
OE	24	9,692	.09	.08	.07	.12	.09	-0.03	0.27
A	18	9,232	.49	.23	.23	.66	.30	.17	1.00
C	19	6,187	.24	.11	.09	.31	.12	0.11	0.51
Tolerance									
ES	22	8,543	.45	.09	.08	.58	.10	0.42	0.74
Ex	31	13,137	.10	.08	.06	.13	.08	0.00	0.26
OE	23	4,333	.19	.21	.20	.25	.27	-0.19	0.69
A	15	9,002	.57	.23	.23	.76	.30	0.27	1.00

	C	17	8,614	.48	.31	.31	.63	.40	-0.03	1.00
Warmth										
	ES	14	6,254	.19	.10	.08	.24	.10	0.08	0.40
	Ex	31	10,289	.37	.10	.09	.47	.11	.29	.65
	OE	8	5,467	.04	.14	.13	.05	.17	-0.23	0.33
	A	11	3,849	.25	.15	.14	.33	.18	0.03	0.63
	C	12	5,691	.08	.12	.12	.10	.15	-0.15	0.35
Interpersonal Sensitivity										
	ES	38	14,972	.24	.21	.20	.33	.27	-0.11	0.77
	Ex	41	15,864	.43	.20	.20	.57	.26	0.14	1.00
	OE	33	8,128	.21	.19	.18	.29	.25	-0.12	0.70
	A	23	11,753	.22	.12	.11	.31	.16	0.05	0.57
	C	27	11,761	.21	.22	.21	.28	.28	-0.18	0.74

*Note.* ES =Emotional Stability, Ex = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness;  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD \rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .



Table 32

*Summary Meta-Analytic Correlations of Agreeableness Measures and Global Big Five Measures (Within and Between Inventories)*

Proposed Agreeableness Facets	Big Five Global Measures				
	ES	EX	O	A	C
Trusting	.37 (.29) <i>k</i> = 30; <i>N</i> = 13,365	.10 (.10) <i>k</i> = 39; <i>N</i> = 13,064	-.05 (-.05) <i>k</i> = 16; <i>N</i> = 7,345	.37 (.28) <i>k</i> = 15; <i>N</i> = 3,501	.20 (.15) <i>k</i> = 19; <i>N</i> = 8,454
Modesty	-.06 (-.04) <i>k</i> = 25; <i>N</i> = 9,781	-.22 (-.16) <i>k</i> = 30; <i>N</i> = 12,763	-.07 (-.05) <i>k</i> = 22; <i>N</i> = 11,855	.66 (.47) <i>k</i> = 14; <i>N</i> = 5,331	-.04 (-.03) <i>k</i> = 14; <i>N</i> = 6,299
Cooperation	.14 (.11) <i>k</i> = 15; <i>N</i> = 8,102	-.03 (-.02) <i>k</i> = 13; <i>N</i> = 8,378	-.01 (-.01) <i>k</i> = 9; <i>N</i> = 3,204	.61 (.44) <i>k</i> = 5; <i>N</i> = 1,488	.13 (.09) <i>k</i> = 10; <i>N</i> = 8,038
Not Outspoken	-.21 (-.14) <i>k</i> = 7; <i>N</i> = 3,776	-.22 (-.15) <i>k</i> = 5; <i>N</i> = 1,551	-.20 (-.13) <i>k</i> = 5; <i>N</i> = 946	.33 (.21) <i>k</i> = 4; <i>N</i> = 797	-.09 (-.06) <i>k</i> = 6; <i>N</i> = 2,972
Lack of Aggression	.46 (.35) <i>k</i> = 32; <i>N</i> = 11,178	-.27 (-.21) <i>k</i> = 30; <i>N</i> = 10,630	-.02 (-.02) <i>k</i> = 20; <i>N</i> = 10,368	.58 (.43) <i>k</i> = 19; <i>N</i> = 6,221	.27 (.20) <i>k</i> = 15; <i>N</i> = 4,311
Non-Manipulative	.10 (.07) <i>k</i> = 17; <i>N</i> = 7,627	.02 (.02) <i>k</i> = 30; <i>N</i> = 10,526	-.08 (-.05) <i>k</i> = 13; <i>N</i> = 7,219	.20 (.3,622) <i>k</i> = 12; <i>N</i> = 3,622	.08 (.06) <i>k</i> = 13; <i>N</i> = 5,706
Nurturance	.15 (.11) <i>k</i> = 30; <i>N</i> = 11,218	.29 (.22) <i>k</i> = 37; <i>N</i> = 18,200	.12 (.09) <i>k</i> = 24; <i>N</i> = 9,692	.66 (.49) <i>k</i> = 18; <i>N</i> = 9,232	.31 (.24) <i>k</i> = 19; <i>N</i> = 6,187
Tolerance	.58 (.45) <i>k</i> = 22; <i>N</i> = 8,543	.13 (.10) <i>k</i> = 31; <i>N</i> = 13,137	.25 (.19) <i>k</i> = 23; <i>N</i> = 4,333	.76 (.57) <i>k</i> = 15; <i>N</i> = 9,002	.63 (.48) <i>k</i> = 17; <i>N</i> = 8,614
Warmth	.24 (.19) <i>k</i> = 14; <i>N</i> = 6,254	.47 (.37) <i>k</i> = 31; <i>N</i> = 10,289	.05 (.04) <i>k</i> = 8; <i>N</i> = 5,467	.33 (.25) <i>k</i> = 11; <i>N</i> = 3,849	.10 (.08) <i>k</i> = 12; <i>N</i> = 5,691

Interpersonal Sensitivity	.33(.24) <i>k</i> = 38; <i>N</i> = 14,972	.57 (.43) <i>k</i> = 41; <i>N</i> = 15,864	.29 (.21) <i>k</i> = 33; <i>N</i> = 8,128	.31 (.22) <i>k</i> = 23; <i>N</i> = 11,753	.28 (.21) <i>k</i> = 27; <i>N</i> = 11,761
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*Note.* *k* = total number of studies, *N* = total sample size, meta-analytic correlations not in parentheses are corrected for sampling error and internal consistency unreliability in both measures, meta-analytic correlations in parentheses are observed values corrected only for sampling error.

Table 33

*Detailed Meta-Analytic Intercorrelations of Global Agreeableness Measures and Agreeableness Facets (Within and Between Inventories)*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
Global Agreeableness									
Cooperation	5	1,488	.44	.10	.09	.61	.12	0.41	.81
Nurturance	18	9,232	.49	.23	.23	.66	.30	.17	1.00
Modesty	14	5,331	.47	.26	.26	.66	.36	.07	1.00
Non-Manipulative	12	3,622	.15	.19	.18	.20	.25	-0.21	.61
Cooperation									
Nurturance	5	4,230	.36	.05	.01	.51	.02	.48	.54
Modesty	5	4,656	.17	.19	.19	.25	.28	-.21	.71
Non-Manipulative	7	2,918	.28	.23	.22	.41	.32	-.12	.94
Nurturance									
Modesty	13	9,505	.23	.15	.15	.33	.21	-.02	.68
Non-Manipulative	15	4,027	.22	.19	.18	.31	.26	-.12	.74
Modesty									
Non-Manipulative	14	5,390	.13	.20	.19	.20	.28	-.26	.66

*Note.*  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score

correlation (correcting for unreliability in both measures);  $SD \rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .

Table 34

*Summary: Meta-analytic Intercorrelations for Measures of Global Agreeableness and Facets (Within and Between Inventories)*

	1	2	3	4	5
1. Global Agreeableness	--	$k = 5$ $N = 1,488$	$k = 18$ $N = 9,232$	$k = 14$ $N = 5,331$	$k = 12$ $N = 3,622$
2. Cooperation	.61 (.44)	--	$k = 5$ $N = 4,230$	$k = 5$ $N = 4,656$	$k = 7$ $N = 2,918$
3. Nurturance	.66 (.49)	.51 (.36)	--	$k = 13$ $N = 9,505$	$k = 15$ $N = 4,027$
4. Modesty	.66 (.47)	.25 (.17)	.33 (.23)	--	$k = 14$ $N = 5,390$
5. Non-Manipulative	.20 (.15)	.41 (.28)	.31 (.22)	.20 (.13)	--

Note.  $k$  = total number of studies,  $N$  = total sample size, meta-analytic correlations not in parentheses are observed values corrected only for sampling error, meta-analytic correlations in parentheses are corrected for sampling error and internal consistency unreliability in both measures.

Table 35

*Detailed Meta-Analytic Correlations of Extraversion Measures and Global Big Five Measures (Within and Between Inventories)*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
<i>Overall</i>									
Global Extraversion									
ES	289	106,059	.22	.15	.14	.27	.17	-.02	.56
OE	210	81,975	.24	.16	.16	.31	.20	-.02	.63
A	203	85,507	.14	.21	.21	.18	.26	-.25	.60
C	217	88,690	.14	.16	.15	.17	.18	-.13	.47
Positive Emotions									
ES	30	8,156	.28	.16	.15	.34	.18	.05	.63
Ex	37	12,488	.41	.11	.09	.50	.11	.32	.68
OE	29	13,488	.08	.23	.23	.11	.28	-.36	.57
A	21	6,805	.21	.14	.13	.26	.16	.00	.52
C	22	6,940	.25	.21	.20	.30	.25	-.10	.71
Sociability									
ES	72	24,964	.27	.17	.16	.33	.20	.01	.66
Ex	95	42,551	.61	.19	.19	.76	.23	.38	1.00

	OE	59	19,976	.10	.14	.13	.14	.17	-.14	.41
	A	50	25,097	.18	.19	.18	.23	.23	-.15	.62
	C	58	24,445	.14	.17	.17	.17	.21	-.17	.51
Sensation Seeking										
	ES	21	5,672	.03	.17	.16	.03	.20	-.30	.36
	Ex	26	8,377	.29	.15	.14	.39	.18	.09	.69
	OE	13	6,815	.17	.11	.10	.22	.14	.00	.45
	A	11	4,873	-.07	.12	.11	-.10	.14	-.34	.14
	C	13	3,917	-.14	.12	.10	-.18	.13	-.40	.03
Dominance										
	ES	73	30,478	.30	.11	.10	.37	.13	.16	.58
	Ex	94	45,906	.48	.17	.16	.60	.20	.27	.93
	OE	63	23,811	.20	.16	.15	.26	.20	-.06	.58
	A	52	26,356	-.05	.24	.24	-.07	.30	-.57	.42
	C	59	28,698	.14	.17	.16	.18	.18	-.15	.52
Activity										
	ES	26	11,542	.18	.15	.14	.24	.18	-.06	.54
	Ex	28	8,708	.34	.08	.06	.44	.07	.32	.56
	OE	18	6,370	.16	.13	.11	.21	.15	-.03	.46

A	15	6,098	.06	.17	.16	.07	.21	-.27	.42
C	19	7,248	.28	.13	.12	.36	.15	.11	.60

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*Note.* ES = Emotional Stability, Ex = Extraversion, O = Openness, A = Agreeableness, C = Conscientiousness;  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD \rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .



Table 36

*Summary Meta-Analytic Correlations of Extraversion Measures and Global Big Five Measures (Within and Between Inventories)*

Proposed Extraversion Facets	Big Five Global Measures				
	ES	EX	O	A	C
Positive Emotions	.34 (.28) <i>k</i> = 30; <i>N</i> = 8,156	<b>.50 (.41)</b> <i>k</i> = 37; <i>N</i> = 12,488	.11 (.08) <i>k</i> = 29; <i>N</i> = 13,488	.26 (.21) <i>k</i> = 21; <i>N</i> = 6,805	.30 (.25) <i>k</i> = 22; <i>N</i> = 6,940
Sociability	.33 (.27) <i>k</i> = 72; <i>N</i> = 24,964	<b>.76 (.61)</b> <i>k</i> = 95; <i>N</i> = 42,551	.14 (.10) <i>k</i> = 59; <i>N</i> = 19,976	.23 (.18) <i>k</i> = 50; <i>N</i> = 25,097	.17 (.14) <i>k</i> = 58; <i>N</i> = 24,445
Sensation Seeking	.03 (.03) <i>k</i> = 21; <i>N</i> = 5,672	<b>.39 (.29)</b> <i>k</i> = 26; <i>N</i> = 8,377	.22 (.17) <i>k</i> = 13; <i>N</i> = 6,815	-.10 (-.07) <i>k</i> = 11; <i>N</i> = 4,873	-.18 (-.14) <i>k</i> = 13; <i>N</i> = 3,917
Dominance	.37 (.30) <i>k</i> = 73; <i>N</i> = 30,478	<b>.60 (.48)</b> <i>k</i> = 94; <i>N</i> = 45,906	.26 (.20) <i>k</i> = 63; <i>N</i> = 23,811	-.07 (-.05) <i>k</i> = 52; <i>N</i> = 26,356	.18 (.14) <i>k</i> = 59; <i>N</i> = 28,698
Activity	.24 (.18) <i>k</i> = 26; <i>N</i> = 11,542	<b>.44 (.34)</b> <i>k</i> = 28; <i>N</i> = 8,708	.21 (.16) <i>k</i> = 18; <i>N</i> = 6,370	.07 (.06) <i>k</i> = 15; <i>N</i> = 6,098	.36 (.28) <i>k</i> = 19; <i>N</i> = 7,248

*Note.* *k* = total number of studies, *N* = total sample size, meta-analytic correlations not in parentheses are observed values corrected only for sampling error, meta-analytic correlations in parentheses are corrected for sampling error and internal consistency unreliability in both measures.

Table 37

*Detailed Meta-Analytic Intercorrelations of Global Extraversion Measures and Extraversion Facets (Within and Between Inventories)*

Variables	k	N	$\bar{r}$	$SD_r$	$SD_{res}$	$\rho$	$SD_\rho$	Lower CI	Upper CI
Global Extraversion									
Positive Emotions	37	12,488	.41	.11	.09	.50	.11	.32	.68
Sociability	95	42,551	.61	.19	.19	.76	.23	.38	1.00
Sensation Seeking	26	8,377	.29	.15	.14	.39	.18	.09	.69
Dominance	94	45,906	.48	.17	.16	.60	.20	.27	.93
Activity	28	8,708	.34	.08	.06	.44	.07	.32	.56
Positive Emotions									
Sociability	15	6,885	.31	.09	.07	.39	.09	.24	.53
Sensation Seeking	18	6,125	.32	.13	.12	.41	.15	.17	.66
Dominance	19	8,167	.16	.11	.10	.20	.12	.01	.40
Activity	6	1,729	.31	.16	.15	.40	.19	.09	.71
Sociability									
Sensation Seeking	13	6,360	.23	.07	.05	.30	.07	.19	.41
Dominance	70	47,553	.35	.27	.27	.44	.33	-.10	.99

Activity	27	15,219	.26	.10	.09	.34	.12	.14	.54
Sensation Seeking									
Dominance	11	5,094	.16	.11	.10	.21	.13	.01	.42
Activity	6	3,529	.18	.15	.15	.24	.20	-.09	.57
Dominance									
Activity	23	22,425	.40	.13	.13	.52	.16	.25	.79

*Note.*  $k$  = number of independent samples;  $N$  = number of subjects;  $\bar{r}$  = mean observed correlation (corrected for sampling error only);  $SD_r$  = standard deviation of observed correlations;  $SD_{res}$  = observed variability minus variability due to sampling error and unreliability in both predictor and criterion;  $\rho$  = true score correlation (correcting for unreliability in both measures);  $SD \rho$  = standard deviation of true score correlation; Lower CI = Lower bound of 90% Credibility Interval for  $r$ ; Upper CI = Upper bound of 90% Credibility Interval for  $\rho$ .

Table 38

*Summary: Meta-analytic Intercorrelations for Measures of Global Extraversion and Facets (Within and Between Inventories)*

	1	2	3	4	5	6
1. Global Extraversion	--	<i>k</i> = 37 <i>N</i> = 12,488	<i>k</i> = 95 <i>N</i> = 42,551	<i>k</i> = 26 <i>N</i> = 8,377	<i>k</i> = 94 <i>N</i> = 45,906	<i>k</i> = 28 <i>N</i> = 8,708
2. Positive Emotions	.50 (.41)	--	<i>k</i> = 15 <i>N</i> = 6,885	<i>k</i> = 18 <i>N</i> = 6,125	<i>k</i> = 19 <i>N</i> = 8,167	<i>k</i> = 6 <i>N</i> = 1,729
3. Sociability	.76 (.61)	.39 (.31)	--	<i>k</i> = 13 <i>N</i> = 6,360	<i>k</i> = 70 <i>N</i> = 47,553	<i>k</i> = 27 <i>N</i> = 15,219
4. Sensation Seeking	.39 (.29)	.41 (.32)	.30 (.23)	--	<i>k</i> = 11 <i>N</i> = 5,094	<i>k</i> = 6 <i>N</i> = 3,529
5. Dominance	.60 (.48)	.20 (.16)	.44 (.35)	.21 (.16)	--	<i>k</i> = 23 <i>N</i> = 22,425
6. Activity	.44 (.34)	.40 (.31)	.34 (.26)	.24 (.18)	.52 (.40)	--

Note. *k* = total number of studies, *N* = total sample size, meta-analytic correlations not in parentheses are observed values corrected only for sampling error, meta-analytic correlations in parentheses are corrected for sampling error and internal consistency unreliability in both measures.