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A Meta-analytic Test of Redundancy and Relative Importance of the Dark Triad and Five Factor Model of Personality

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Abstract

We examined the relationships between Machiavellianism, narcissism, and psychopathy—the three traits of the Dark Triad (DT)—and the Five Factor Model (FFM) of personality. The review identified 310 independent samples drawn from 215 sources and yielded information pertaining to global trait relationships and facet-level relationships. We used meta-analysis to examine (a) the bivariate relations between the DT and the five global traits and 30 facets of the FFM; (b) the relative importance of each of the FFM global traits in predicting DT; and (c) the relationship between the DT and FFM facets identified in translational models of narcissism and psychopathy. These analyses identified consistent and theoretically meaningful associations between the DT traits and the facets of the FFM. The five traits of the FFM, in a relative importance analysis, accounted for much of the variance in Machiavellianism, narcissism, and psychopathy, respectively, and facet-level analyses identified specific facets of each FFM trait that were consistently associated with narcissism (e.g., angry/hostility, modesty) and psychopathy (e.g., straightforwardness, deliberation). The FFM explained nearly all of the variance in psychopathy (R^2_c = .88) and a substantial portion of the variance in narcissism (R^2_c = .42).

Taxonometric research is "fundamental and dynamic science, dedicated to exploring the causes of relationships and similarities among organisms" (Gould, 1989, p. 98). Gould's pronouncement is endorsed with vigor in the field of personality, where the Five Factor Model (FFM) has emerged as the dominant taxonomy for organizing consistencies in individuals' dispositional tendencies (McCrae & Costa, 2013). Why are some people more adept at influencing others and making friends, whereas others prefer solitude and deliberation? Why are some individuals willing to help, but others regularly fail to render needed assistance? Why do some remain emotionally unperturbed in stressful times, whereas others become distraught when some little thing goes wrong? The FFM's explanation: variations among people can be conceptualized in terms of five fundamental dimensions—emotional stability, extraversion, openness to experience, agreeableness, and conscientiousness.

Along with the FFM, a number of personality investigators have begun to explore the Dark Triad (DT) of Machiavellianism, narcissism, and psychopathy (Paulhus & Williams, 2002). The DT is not intended to be a unifying or complementary set of constructs in the same way as the FFM, rather they are three related, but separable traits that pertain to more malevolent psychological propensities and behavioral strategies. These traits may supplement the FFM traits, in that the FFM explains general dispositional tendencies that apply to most people and interpersonal situations, whereas the DT focuses on less desirable personality traits that are characteristic of people who manipulate and misuse others (Furnham, Richards, & Paulhus, 2013). The DT traits may, however, be redundant with those traits identified by the FFM, with the result that measures of the facets and global traits of the FFM fully predict the qualities

described in the DT (e.g., Brunell, Gentry, & Campbell, 2008; Douglas, Bore, & Munro, 2012; Miller, Lynam, Widiger, & Leukefeld, 2001).

The current study quantifies the degree of overlap between the FFM and DT. We use meta-analytic methods to test relatedness and redundancy. Then, we assess the strength of the relationship between the FFM traits and the DT traits to draw conclusions about their empirical overlap at the global and facet levels. We conclude with a research agenda and discussion of where the DT fits within the extant personality literature.

Big Five and Dark Three

A trait approach to personality assumes that an individual's enduring psychological and behavioral tendencies are caused, in part, by their "cortical, subcortical, or postural dispositions" (Allport, 1968, p. 48). Although hundreds of traits have been investigated, five have been identified consistently across measures, time, and cultures: emotional stability (i.e., confidence, security, and low anxiety), extraversion (i.e., surgency, sociability, dominance, excitement seeking), openness to experience (i.e., creativity, broad mindedness), agreeableness (i.e., cooperative, trusting, and compliant), and conscientiousness (i.e., dutiful, achievement striving, dependable). Goldberg (1993), in his lexical analysis of the words used to describe people, termed these five qualities the Big Five. Costa and McCrae (1992b; McCrae & Costa, 2013) incorporated these personality dimensions in their Five Factor Model. Although the field of personality's dominant theoretical paradigm, the FFM is not beyond conceptual and empirical challenge. Block (2010, p. 11) suggests that the FFM's set of traits may not be sufficiently "inclusive of those aspects of character personologists deemed crucial to consider," particularly those aspects of individual difference that are most closely associated with morality, conscience, and self-regulation (Block, 1995).

These kinds of qualities are represented in the trio of traits that make up the Dark Triad: Machiavellianism, narcissism, and psychopathy. Individuals who score high on Machiavellianism measures advocate the use of manipulative tactics in dealing with others, and express a cynical view of human nature and moral outlook that puts expediency above principle (Christie & Geis, 1970). People with narcissistic traits hold exceedingly high and unrealistic views of themselves, which they express through claims of entitlement, grandiosity, and a rejection of negative feedback. Individuals with psychopathic traits are emotionally callous, impulsive, and lack empathy. Excessive levels of two of the traits, narcissism and psychopathy are clinical disorders, and all three traits show positive relations to a number of destructive and undesirable behaviors including aggression (e.g., Kerig & Stellwagen, 2010), criminal recidivism (e.g., Asscher et al., 2011), substance abuse (e.g., Benning, Patrick, Hicks, Blonigen, & Krueger, 2003), and counterproductive work behavior (O'Boyle, Forsyth, Banks, & McDaniel, 2012).

The DT-FFM Interface

Conceptual analyses of the Dark Triad suggest Machiavellianism, narcissism, and psychopathy, although distinct, share certain commonalities—interpersonal hostility (e.g., Lynam, Gaughan, Miller, Miller, Mullins-Sweat, and Widiger, 2011), callousness (Jones & Paulhus, 2011), ethical expediency (Ashton & Lee, 2001), and interpersonal offensiveness (Egan & McCorkindale, 2007). Empirical analyses, too, have consistently identified links between the traits of the DT and those of more mainstream structural models of personality, including the FFM. Douglas et al. (2012), for example, found that agreeableness and neuroticism accounted for 47% of the variance in scores on a common measure of Machiavellianism (the Mach-V). Glover, Miller, Lynam, Crego, and Widiger (2012), using facet-level indicators from a common measure of the FFM (NEO PI-R), accurately predicted individuals' scores on measures of both grandiose and

vulnerable narcissism. Similarly, Lynam, Miller, and their colleagues have empirically demonstrated that psychopathy can be predicted by considering individuals' agreeableness, conscientiousness, extraversion, and neuroticism (Lynam et al., 2011; Miller & Lynam, 2003). To frame our discussion of the DT traits and FFM traits, we rely on the more frequently cited definitions of these traits along with recent theoretical analyses of their intersections (e.g., Glover et al., 2012; Lynam et al., 2011; Miller & Lynam, 2003). For the FFM traits we used Costa and McCrae's (1992a; 1992b) definition of the content domain of each of the FFM traits. We defined the DT traits using Christie and Geis's (1970) analysis of Machiavellianism, Raskin and Hall's (1979) definition on narcissism, and Hare's (1991) definition of psychopathy.

Machiavellianism and the FFM

Those high in Machiavellianism tend to be cynical manipulators who willingly sacrifice relationships and moral principles to achieve their aims (Jones & Paulhus, 2009; Kish-Gephart et al., 2010). This orientation is the obverse of the elements of agreeableness of the FFM. As Costa and McCrae (1992a, p. 15) explain, individuals high in agreeableness are "fundamentally altruistic:" they are eager to help other people, sympathetic to their needs, and believe other people are similarly relationally benevolent. Individuals who are low in agreeableness, in contrast, are "egocentric, skeptical of others' intentions, and competitive rather than cooperative" (p. 15). Empirical findings have generally confirmed the inverse relationship between Machiavellianism and agreeableness (e.g., Kessler et al., 2010; Lee & Ashton, 2005).

Machiavellianism's association with the remaining traits in the FFM—extraversion, conscientiousness, neuroticism, and openness—is less certain both theoretically and empirically. Machiavellianism contains a social element, such as achieving goals through interpersonal maneuvering, but these strategies do not require behaviors typical of a person high in

extraversion: gregariousness, warmth, and so on. Machiavellianism may also be related to conscientiousness as people with Machiavellian traits are known to be self-disciplined, status- and achievement-oriented, and deliberate in their actions—all characteristics of conscientiousness. Yet, self-descriptions rarely include one of the prime features of conscientiousness: adherence to moral obligations. Nor does Machiavellianism include tolerance for ambiguity, creativity, or intellectual curiosity, all elements of openness in the FFM. Machiavellian cynicism and distrust of others may, however, signal higher levels of anxiety, anger, self-consciousness, and even depression (Ferris et al., 2005). Ashton, Lee, and Son (2000) as well as Paulus and Williams (2002) report small positive correlations between neuroticism and Machiavellianism.

Narcissism and the FFM

Extreme self-aggrandizement is the hallmark of narcissism: almost pathologically high self-esteem, coupled with fantastical thinking pertaining to power, wealth, and success, emotionally extreme reactions to criticism, and a voracious need for attention and admiration from others (Rhodewalt & Peterson, 2009). Narcissism relates to an inflated view of self and a desire to have this self-love reinforced by others (Kernberg, 1989). To achieve this reinforcement, individuals with narcissistic traits exaggerate their achievements, block criticism, refuse to compromise, and seek out interpersonal and romantic relationships only with admiring individuals (Campbell, 1999; Resick, Whitman, Weingarden, & Hiller, 2009). The cognitions of those high in narcissism center on fantasies of control, success, power, and self-admiration (Morf & Rhodewalt, 2001). To others, individuals with high narcissism appear arrogant, self-promoting, and aggressive, and in the long run, less likable (Buffardi & Campbell, 2008).

People who display both introverted and narcissistic tendencies would be rarities, for

only by sharing their own positive self-conception with others do individuals with narcissistic traits achieve their desired goal of being admired and obeyed. As narcissism involves egotistic behaviors, it is unlikely to be related to agreeableness. Individuals high in narcissism may be charming and gregarious initially, but they show little concern for others' opinions, do not go out of their way to help others, and are anything but modest. Based on the extant research, narcissism should be positively associated with extraversion, but negatively associated with agreeableness (Campbell & Miller, 2013; Samuel & Widiger, 2008). In addition to being "disagreeable extraverts" (Paulhus, 2001), individuals with narcissistic traits may be prone to anger and aggressive behavior. This tendency, however, may remain dormant until their egos are threatened. Therefore, narcissism may be positively related to neuroticism (e.g., Campbell & Miller, 2013; Duffy, Shaw, Scott, & Tepper, 2006; Samuel & Widiger, 2008) but mainly due to its relation to anger.

Psychopathy and the FFM

Psychopathy, in keeping with its intimidating etymological roots—*psycho* (of the mind) and *pathy* (denoting disorder or dysfunction)—is defined by a set of interpersonally aversive qualities, including emotional superficiality, low impulse control, disregard for others feelings and well-being, lack of remorse for actions that harm others, and social manipulativeness. These qualities are, in general, inconsistent with two of the FFM traits: agreeableness and conscientiousness. These two traits are based on respect for others, harmony as a salient and prominent motivator for behavior, and abidance to societal rules, so we expect that increases in psychopathy will signal declines in both agreeableness and conscientiousness (Decuyper, De Pauw, De Fruyt, De Bolle, & De Clercq, 2009; Lynam & Derefinko, 2006).

As with Machiavellianism, psychopathy's association with extraversion, neuroticism, and

openness—is less certain. Individuals with psychopathic traits can be outwardly charming, and so may tend toward extraversion (see DePaulo, 2010; Lynam & Derefinko, 2006). However, psychopathic traits like emotionality, along with an inability to respond with empathy to others, likely reduces the level of rewards experienced when interacting with others. Blunted affect suggests neither emotional stability nor neuroticism, but emotional neutrality. Openness includes facets that may be consistent with psychopathy—active imagination and a preference for the unusual and novel—but also qualities that are antithetical to psychopathy: openness to feelings, strong impressions to works of art and to beauty, and a willingness to examine and even reconsider one's personal values. Therefore, we expect a negative association between openness and psychopathy (e.g., Decuyper et al., 2009; Douglas et al., 2012).

The Redundancy of the DT

Conceptually and empirically, the three DT traits overlap to some extent with the traits of the FFM. For example, previous research examining the magnitude of the bivariate correlations among the traits of the two models and their interdependence in factor analyses provide some evidence of each model's similarities and uniqueness. A multivariate analysis that uses all five FFM traits to predict DT traits, however, would provide a stronger test of the non-redundancy assumption. Moreover, a facet-level analysis that uses the components of each of the FFM traits—the facets rather than the composite scores—may reveal additional redundancies if the magnitude and direction of effects are dissimilar across facets. For example, the neuroticism facets of angry/hostility and depression moderately correlate to narcissism, but in opposite directions (Campbell & Miller, 2013; Miller, Gaughan, Pryor, Kamen, & Campbell, 2009; Samuel & Widiger, 2008). We therefore examined both the collective effects of the five global FFM traits as well the collective effects of those facets proposed in the literature.

We devised the following strategy in determining non-redundancy. First, we used meta-analysis to determine the bivariate relations between the DT and the five global traits and 30 facets of the FFM. Second, we use relative importance analysis to test the overlap of each DT trait on the meta-analytically derived FFM relations as a collective test of redundancy at the global level. Finally, we will use relative importance analysis to test the overlap of each DT with those FFM facets proposed in the literature. To our knowledge, this is the first instance of a meta-analytic, multivariate test of redundancy and as such, there are no accepted thresholds of redundancy. We can conclude that 75 percent overlap (R^2 = .75) is more concerning than 50 percent overlap (R^2 = .50), but only 100 percent overlap indicates total redundancy. However, given that measures of the FFM are ones designed to assess general or normative levels of the FFM traits, whereas the DT measures more unusual and possibly more extreme levels of personality, these analyses will likely yield only conservative estimates of the construct relations between the FFM and DT. For example, one should not assume that unexplained variance in any DT trait automatically means that the DT is not redundant with the FFM. Numerous measurement and sampling artifacts have the potential to substantially attenuate these relations and tests of redundancy. Nevertheless, the current work serves as a baseline measurement of redundancy and a springboard for future DT research.

Methods

Literature Search

We searched six databases--ABI Inform, AllAcademic.com, Google Scholar, ProQuest dissertations and theses, PsycINFO, and Web of Science--for published and unpublished research using various combinations of the following keywords: Machiavellian, Machiavellianism, MACH-IV, MACH-V, Nach-C, Nach-E, Supernumerary Personality

Inventory, narcissism, Narcissistic Personality Inventory, State-Trait Grandiosity Scale, Psychological Entitlement Scale, Wink-Gough Narcissism scale, psychopathy, MMPI, CPI, Psychopathic Personality Inventory, Social Personality Inventory, Self-Reported Psychopathy Questionnaire and psychopathy checklist. We conducted this keyword search in German, French, and Spanish. To identify additional studies, we posted requests for unpublished studies and data to various e-mail listservs (e.g., SPSP-listserv, OB-LIST). We also examined the reference sections of meta-analyses, narrative reviews, and bibliographies on the dimensions of the Dark Triad (e.g., Decuyper et al. 2009; Fehr, Sampson, & Paulhus, 1992; Holtzman & Strube, 2009; Mudrack, 1990; Ruffo-Fiore, 1990; Ruiz, Pincus, & Schinka, 2008). The study search was finalized in October, 2011, yielding several thousand potential sources of data, more than 500 of which were unpublished manuscripts, conference papers, and dissertations.

Inclusion Criteria

To be included in the systematic review, a study needed to examine a Dark Triad trait or facet at the individual level of analysis and measure one or more FFM traits or another DT trait or facet. Personality has both an implicit and explicit component (James & LeBreton, 2010, 2012), but the DT has overwhelmingly been studied with explicit measures, and we excluded projective tests of DT traits (e.g., the Rorschach). Peer, spouse, and supervisor ratings of the DT were exceedingly rare, but we did include non-self-report measures of DT traits such as expert ratings (e.g., Chatterjee & Hambrick, 2007). We did not include proxy measures of the DT such as the socialization scale of the California Personality Inventory, which is sometimes treated as a psychopathy measure (e.g., O'Boyle et al., 2012). Two of the components of the DT were originally conceptualized as clinical psychiatric disorders, and as a result, there are clinical measures of narcissism and psychopathy available. We eliminated clinical samples, but did not

eliminate samples where a scale capable of a clinical diagnosis was administered to a non-clinical sample.

As with proxy measures of the DT, we applied the same criterion to the FFM and only included those measures that explicitly included a five-factor scale by name. For example, although the seven scales of the Hogan Personality Inventory (HPI; Hogan & Hogan, 1995) were originally based on the FFM, we did not include the HPI in the meta-analysis. Although there are links between HPI traits and the FFM (e.g., median correlation of .73 for neuroticism and adjustment), others are not as strong (e.g., median correlation of .30 for openness and success) (Hogan & Holland, 2003). As such, we were hesitant to apply a different standard to the FFM than the DT. The vast majority of FFM measures (approximately 90%) were the NEO-PI (Costa & McCrae, 1985) and its revisions (e.g., Costa & McCrae, 1992a), the Big Five Inventory (BFI; John, Donahue, & Kentle, 1991), the IPIP and its variants such as the TIPI-G (Muck, Hell, & Gosling, 2007) and mini-IPIP (Donnellan, Oswald, Baird, & Lucas, 2006), and the HEXACO (Lee & Ashton, 2004). Regarding the HEXACO, we did not include the honesty-humility aspect.

When insufficient information was reported in the primary study, we requested effect sizes from authors before excluding the study from our sample. There were no stipulations concerning the nationality of a sample or a study's language.

Coding of Studies

Both the DT and the FFM have varying degrees of multidimensionality reported in the literature and we coded facet level relations for both. When a study reported only facet level correlates, we created a linear composite (Nunnally, 1978), but only when all dimensions of the measure were available. We used Wood's (2008) detection heuristics to identify and eliminate duplicate samples reported in two or more publications, but when a study reported multiple,

independent samples we included effect sizes from each sample as long as it met the aforementioned inclusion criteria. Three individuals with previously published meta-analyses and doctorates in management and psychology coded the studies. Initial interrater agreements exceeded .90 and any disagreements were resolved via consensus. All data, including sample information, scale reliabilities, effect sizes, and publication information for every analysis can be retrieved from the first author's university website, along with supplementary materials (e.g., tests of publication bias).

Meta-Analytic Procedure

We used Hunter and Schmidt's (2004) equations to calculate the mean effect sizes and accompanying statistics (e.g., confidence intervals, credibility intervals). We report the observed effect sizes in all tables. We also report effect sizes corrected for unreliability. Ideally, corrections for unreliability are made at the local or individual study level. However, the preponderance of studies we identified did not report internal consistencies, thus we calculated artifact distributions (reported in Appendix A) to correct for unreliability using procedures and recommendations outlined in Hunter and Schmidt (2004).

For the tests of redundancy, the variance accounted for estimate (R^2) provides the overall explanatory power of FFM and the relative importance analysis (Johnson & LeBreton, 2004) provides the weights of each FFM predictor. This type of analysis outputs relative weights that allow for ratio comparisons (e.g., a FFM trait with a relative weight of .10 has half the explanatory power as a trait with a weight of .20). Relative weight analysis also outputs absolute or raw weights, which are the variance accounted for estimates of each predictor; these raw weights sum to the R^2 of the model. For the tests of relative importance, we used procedures described in Johnson and LeBreton (2004) with matrix regression syntax in SPSS 18.0 provided

by Dr. Jeff Johnson and relative importance analysis syntax available from Drs. Scott Tonidandel and James LeBreton at relativeimportance.davidson.edu.

Results

Many of the studies we identified examined global-level FFM and DT trait relationships and so provided the data needed to examine the relations between the FFM traits and Machiavellianism, narcissism, and psychopathy (see Table 1). However, a significant subset reported estimates of the strength of relationship between specific FFM facets and two of the three DT traits: narcissism (see Table 2) and psychopathy (see Table 3). Given our focus on the relationships among constructs rather than measurement per se, we base our analyses on the disattenuated correlations (i.e., those corrected for unreliability).

Relations between the DT and FFM

----------INSERT TABLE 1 ABOUT HERE---------

Machiavellianism. Machiavellianism was significantly and negatively associated with agreeableness (r_c = -.39) and conscientiousness (r_c = -.21), and positively correlated with neuroticism (r_c = .09). Machiavellianism was not associated with extraversion or openness (r_c = -.01 & -.04, respectively), but the variance in reported correlations between both these FFM traits and Machiavellianism were substantial. The credibility interval for extraversion ranged from -.24 to .21 and -.10 to .29 for neuroticism. Wide credibility intervals indicate possible moderators (Whitener, 1990), such as subpopulations and excluded predictors, but with multifaceted constructs, as is the case with each of the FFM traits, wide ranges could result from differential relations among the facets to the DT.

Narcissism. Narcissism was significantly and positively associated with three traits of the FFM—extraversion (r_c = .40), openness (r_c = .20), and conscientiousness (r_c = .09)—and

negatively associated with the remaining two: agreeableness (r_c = -.29) and neuroticism (r_c = -.16). The negative relation to neuroticism runs counter to the psychoanalytic literature (e.g., Horowitz & Arthur, 1988), but is consistent with previous theoretical and empirical FFM extrapolations from diagnostic criteria (Lynam & Widiger, 2001; Samuel & Widiger, 2008).

Psychopathy. Psychopathy was negatively associated with agreeableness (r_c = -.42) and conscientiousness (r_c = -.31) but showed positive (albeit very small) relations to extraversion (r_c = .04), neuroticism (r_c = .05), and openness (r_c = .04). As with Machiavellianism, there was strong evidence of moderation, possibly indicating that the multifaceted nature of each FFM trait requires a more nuanced view of the FFM-DT interface.

Relative importance: Trait-level. In addition to providing the bivariate relations between the global traits of the DT and FFM, we also conducted relative importance analyses for each DT trait. For these analyses, we also used the corrected effect sizes (r_c) and report the weights and variance explained based on these disattenuated effect sizes. In order to calculate the collective effects of the FFM in explaining the DT, we first needed to calculate the relations within the FFM (e.g., agreeableness-neuroticism). Using only studies included in the present research, we coded the global FFM relations[2]. Although some have meta-analyzed the FFM interrelations in the past (e.g., Mount, Barrick, Scullen, & Rounds, 2005), our decision to code only FFM relations in our existing pool of studies helps to address the issue of potential asymmetry between the samples included in the current work versus those included in previous systematic reviews. We present these analyses on the right side of Table 1.

The FFM traits explain approximately a third of the variance in Machiavellianism (R_c^2 = .30). Within this model, the variable with the greatest relative importance was agreeableness,

[2] A complete list of these effect sizes and accompanying analyses are available from the first author.

with a raw weight (i.e., the amount of variance explained by the predictor in the presence of the other variables) of .23 that corresponds to 77% of the total variance explained in the model. Conscientiousness explained an additional 4% of the variance in Machiavellianism and the remaining three traits combined to explain 3%. For narcissism, the FFM collectively explained 63% percent of the variance (R_c^2 = .63) and of that percentage, extraversion contributed most (RW_c = .27, RI_c = 42.2%), followed closely by agreeableness (RW_c = .25, RI_c = 39.6%), with conscientiousness, neuroticism, and openness collectively contributing 12% of the explained variance. Finally, the FFM explained 41% of variance in psychopathy (R_c^2 = .41) through a different pattern of correlates, primarily agreeableness (RW_c = .26, RI_c = 62.8%) and conscientiousness (RW_c = .11, RI_c = 26.6%).

The mean estimates across the DT-FFM relations were mostly consistent with those found in the literature, but as noted in previous analyses, the variance in effect sizes was substantial. Wide credibility intervals and small amounts of variance attributable to sampling error suggest significant moderators may be operating on these effects. One possible source of this variance may be the multifaceted nature of the FFM global traits[3].

FFM Facets and Global DT Traits

The relations between FFM facets and two of the three DT traits--narcissism and psychopathy--are presented in Tables 2 and 3. Our review did not identify enough studies of Machiavellianism and FFM facets to conduct a facet-level analysis for this variable.

[3]One additional source of variance in effect sizes is the multifaceted nature of the DT constructs, particularly psychopathy and narcissism. For example, Miller, Dir, Gentile, Wilson, Pryor, and Campbell (2010) showed that both narcissism (grandiose vs. vulnerable) and psychopathy (factor 1 vs. 2) have different components that will manifest differential relations to the FFM. Ideally, we could compare DT facets (e.g., callous affect) to FFM facets (e.g., straightforwardness), but unfortunately the extant literature has not developed to this point and in the case of Machiavellianism, there is still substantial dispute about its underlying factor structure (Hunter, Gerbing, & Boster, 1982). As such, we can only provide estimates for the relations between global DT traits and FFM facets.

As shown in Table 2, narcissism demonstrated strong negative relations with agreeableness facets, most notably compliance, modesty, and straightforwardness ($|r_c| \geq .37$). The strongest positive relations were found among the extraversion facet of assertiveness (r_c = .31) and the neuroticism facet of anger/hostility (r_c = .33). Weak to null relations were found among the conscientiousness and openness to experience facets ($|r_c| < .10$) with the exceptions of conscientiousness facets, deliberation and dutifulness (small, negative correlations), and the openness facets of fantasy and ideas (small, positive correlations).

----------INSERT TABLE 2 ABOUT HERE---------

Psychopathy (Table 3) showed the strongest negative relations to the agreeableness facets of compliance, straightforwardness, trust, tendermindedness, and altruism ($|r_c| \geq .35$) and to the conscientiousness facets of deliberation, dutifulness, and self-discipline ($|r_c| \geq .30$). The strongest positive relations were found with the extraversion facet of excitement seeking (r_c = .28) and the neuroticism facets of anger/hostility and impulsiveness (r_c = .37 and .38, respectively). The relations to the openness to experience facets were negligible ($|r_c| \leq .10$).

The results of the facet-level analyses may help to explain the large amount of variance found at the global trait level. For example, some of the widest credibility intervals at the global trait level were among the neuroticism correlates. An examination of the six facets of neuroticism shows that the relations between the DT traits and neuroticism are largely a function of two facets, anger-hostility and impulsiveness. As different measures, contexts, scale properties, etc. emphasize or deemphasize the anger-hostility and impulsiveness dimensions of neuroticism, this could explain why the relations between the DT and neuroticism vary. For example, researchers often conduct factor analyses on their measures before engaging in multivariate tests. If several items from the impulsiveness dimension did not load onto the

neuroticism factor, then a common, but not necessarily recommended, practice is to drop those items, and this would change the neuroticism relationships to other variables, including the DT. For traits where the facet relations are more consistent in terms of magnitude and direction, like openness to experience, we see narrower credibility intervals at the global trait level. Once again, these results support the contention that when examining the relations between the DT and FFM, the details matter and the facets provide a more nuanced and complete picture of the convergence and divergence of these two taxonomies.

----------INSERT TABLE 3 ABOUT HERE---------

FFM Facet Models of Narcissism and Psychopathy

As with the FFM global relations, the collective effect of the facets provides a deeper understanding of the overlap. Once again, we turn to relative importance analysis for our tests of redundancy, but given the scope of the analysis (30 facets versus 5 global traits) as well as previous theoretical and empirical work on facet level overlap, we tested only those relationships identified in previous models of the FFM-DT relationships.

For the FFM facet model of narcissism, we relied on Glover et al.'s (2012) model, which proposes 13 FFM facets (bolded in Table 2) as converging to yield the global trait of narcissism. With the exceptions of the neuroticism facets, self-consciousness and vulnerability, and the conscientiousness facet of achievement striving, all are statistically significant with absolute magnitudes ($|r_c|$) ranging from .08 to .49. For psychopathy, we used the Lynam et al. (2011) proposed FFM translation of psychopathy that posits that psychopathy maps onto 18 FFM facets (bolded in Table 3). Three facets identified by the Lynam et al. model of psychopathy (assertiveness, anxiety, and self-conscious) were not associated with global psychopathy measures, but the 15 remaining facets were, with absolute magnitudes ($|r_c|$) ranging from .08 to

.56.

For both relative importance analyses, a full matrix of correlations is needed. As there exists no meta-analysis of the FFM facet intercorrelations and the pool of studies in the current work provided an insufficient number of studies to conduct this analysis, we used the normative data reported in the NEO-PI-R (Costa & McCrae, 1992a). This decision comes with two important caveats. First, to the extent that the normative sample differs in meaningful ways from those samples included in the current meta-analysis is the extent to which these results will be robust. The normative sample for the NEO-PI-R consisted of 1539 subjects and at face value appears to be similar to the majority of the samples used in our meta-analysis (i.e., general population students and workers hailing from North America), but we cannot rule out some unforeseen differences. The second caveat is that if the intercorrelations for the normative sample are influenced by sampling error or some measurement artifact, then the results may be similarly biased. That said, we contend that the value added of the relative importance analyses outweighs these two caveats, but we will revisit this issue in the discussion as an avenue of future research.

The results of the relative importance analyses for psychopathy and narcissism are presented in Table 4. The facet intercorrelations are corrected for unreliability in the NEO-PI-R test manual to match the corrected estimates between facets and the two DT traits. For psychopathy, the model was dominated by straightforwardness (RI_c= 16.7%), anger/hostility (RI_c = 11.1%), lack of deliberation (RI_c = 9.5%), and impulsiveness (RI_c = 8.5%). Collectively, the 18 facets of the FFM collectively explaining a staggering 88% of the variance in psychopathy. With such a large amount of the variance attributable to FFM facets, we contend that the Lynam et al. (2011) FFM facet model maps exceptionally well onto psychopathy.

FFM facets do not explain narcissism to the same degree as psychopathy, but that the 13 FFM facets collectively explained 42% of the variance in narcissism is still quite impressive. Not surprisingly, the model was dominated by a lack of modesty (RI_c = 24.0%), but high anger (RI_c = 21.1%) and low straightforwardness (RI_c = 15.1%) also played important roles. We conclude that the proposed FFM facet model explains a great deal of the variance in narcissism, but we cannot rule out that some of the unexplained variance is attributable to factors beyond the FFM.

----------INSERT TABLE 4 ABOUT HERE---------

Discussion

This research examined the relations between the DT and the FFM to determine their redundancies and singularities through a quantitative, meta-analytic review. That analysis indicated that, despite the FFM's focus on normative levels of personality versus the DT's focus on socially aversive levels, the global traits of the FFM were consistently and meaningfully associated with the DT. The FFM explained between 30 and 63 percent of the variance in DT traits and every global trait of the FFM showed at least one correlation (r_c) greater than .20 with a DT trait. Agreeableness, in particular, proved to be a key predictor of DT qualities, with the most overlap in psychopathy and Machiavellianism and the second most overlap with narcissism. Global neuroticism, on the other hand, was relatively unrelated to the DT, particularly in the relative importance analyses.

We also found that the FFM profile of Machiavellianism and psychopathy were remarkably similar with each point estimate existing in the 95% confidence interval of the other construct. This coupled with the strong positive relation between the two constructs (r_c = .59; O'Boyle et al., 2011) raises concerns about whether these constructs are two sides of the same coin (i.e., jangle fallacy; Kelly, 1927). If so, our contention is that Machiavellianism is more

likely to be subsumed under psychopathy than vice versa. Many of the proposed factor structures for psychopathy possess clear components of Machiavellianism (e.g., callous affect, egocentricity, interpersonal manipulation), but other psychopathy facets such as carefree nonplanfullness and stress immunity are unlikely to be tapped by current Machiavellianism measures. In fact, there is some evidence that these two constructs share specific genes as demonstrated by a study that used a behavioral genetics approach (Vernon, Villani, Vickers, & Harris, 2008). We encourage researchers to explore the convergent validity of these two constructs and determine if these are unique traits or a case of construct proliferation (Harter & Schmidt, 2008; Le, Schmidt, Harter, & Lauver, 2010).

Beyond providing mean effect sizes, our research demonstrates that most of the relations between the DT and FFM are moderated ones. For example, the relation between neuroticism and psychopathy showed an 80% credibility interval ranging from -.22 to .32, which indicates that in certain settings or within certain subpopulations, those high in psychopathy may be exceedingly neurotic, whereas in other situations the relationship could reverse. Identifying not only substantive moderators but methodological moderators as well is a natural extension of this work. Regarding the latter concern, one of the more promising and most pressing areas is the dimensionality and factor structure of the DT, particularly narcissism and psychopathy. Psychopathy has been posited as ranging from between two to eight factors (e.g., Lilienfield & Andrews, 1996; Wu & LeBreton, 2011) and narcissism shows a similar range of possibilities (e.g., Ackerman et al., 2011). In addition to better understanding the structure of the DT traits, non-linear relations may play a key role in understanding how and why the relations between the FFM and DT change in magnitudes. For example, Le, Oh, Robbins, Ilies, Holland, and Westrick (2011) found that at the tails of certain personality trait distributions, the relations to job

performance change substantially from the overall linear magnitude. We encourage future research to examine how the relations between FFM and DT traits change across their full distributions.

At the FFM facet level, a number of interesting findings and future research direction emerged. Disattenuated correlations to psychopathy and narcissism were as high as -.56 and -.49, respectively. Once again, even though the FFM's focus is on normal behavior, its components do quite well in explaining the abnormal. For both facet level examinations, the correlates for agreeableness showed consistent negative and moderate to strong effect sizes while the facets of openness showed consistent small to non-existent effect sizes. Perhaps the more interesting findings are those where the facets differed in effect direction and magnitudes. The strong positive relation between narcissism and extraversion relies primarily on assertiveness and excitement seeking while positive emotions and warmth are negatively related. Meanwhile, the weak psychopathy-neuroticism relation belies the strong positive relations of both anger/hostility and impulsiveness. Patterns of mixed effects can also be seen across psychopathy's relations to the facets of extraversion and openness. Given the differing effect sizes and directions within the facets of the Big Five, we encourage future research to utilize the FFM facets more frequently than the global traits when examining the DT. That said, we found substantial variation for the within facet effects sizes. In other words, there was still strong indication the FFM facet-DT relations depend on contextual, personal, and methodological factors. For example, the depressive component of neuroticism had no overall relation to narcissism, but the credibility interval ranged from -.33 to .32. This would suggest that for certain subpopulations (e.g., CEOs of successful companies) the relation to depression is moderately to strongly negative. In other circumstances, perhaps when the grandiosity and self-importance is shattered by the reality of

continued failure (e.g., a sample of prisoners), narcissism may exhibit a strong positive relation to the depressive component of neuroticism.

Overall, the proposed FFM facet models performed very well with each accounting for the variance in narcissism and psychopathy. We found that psychopathy is almost entirely subsumed under the Lynam et al., (2011) model (R^2_c = .88) and that nearly half of the variance in narcissism is attributable to the Glover et al., (2012) model (R^2_c = .42). We contend that as the DT-FFM literature matures, not only will these FFM facet models grow in terms of variance accounted for, they will also increase their efficiency/parsimony. That is, they will require fewer items to map onto the DT construct. To facilitate this efficiency, we encourage researchers to pursue item response theory (Embretson & Reise, 2000) as a means to maximize the FFM's coverage of dark traits. In addition to "drilling down" at the item level, we would also encourage new and amended models of the FFM-DT interface. For example, the Glover et al. (2011) model included both achievement striving and fantasy, which possessed both small bivariate relations to narcissism (.07 and .08, respectively) and had no relative importance in the overall model (collectively 2.2%). This finding could lead to (a) replacing these two facets with more promising facets such as compliance and impulsiveness, (b) developing an achievement striving or fantasy measure that better maps onto narcissism, and (c) applying these two FFM facets to one or more of the narcissism factor models to assess where it converges and diverges from the components of narcissism.

Limitations

There are some general limitations when using meta-analyses that warrant mentioning as well as some specific limitations to the current work. We fashion these limitations into a framework that can be used as an agenda for future research. First, the quality of the meta-

analysis is constrained by the quality of the studies that go into it. For many years, the DT languished in journals that may not apply the same rigor to methods and reporting practices that are insisted upon in higher tier outlets. As the DT gains popularity and appears in more prestigious journals, population estimates may change. Our hope is that with better measurement, more rigorous methodology, and increased usage, we will achieve a more accurate picture of the DT's validity.

Second, we echo the concern of O'Boyle et al. (2012) that the measures of the DT are in some cases not ideal and new and better measures are needed. For example, much like the FFM whose reliabilities are on average less than .80 (Viswesvaran & Ones, 2000), Machiavellianism failed to meet the normatively accepted minimum cutoff for field surveys of .80 (Lance, Butts, & Michels, 2006) and none of the DT traits meet Nunnally and Bernstein's (1994) .90 or more criterion. This concern is beginning to be addressed as a number of psychometrically oriented researchers have begun to focus on the DT. For example, Dahling, Whitaker, and Levy (2009) offer a revised measure of Machiavellianism that addresses many of the validity concerns (e.g., Hunter, Gerbing, & Boster 1982; Ray, 1983) that plagued Christie and Geis' MACH-IV scale. LeBreton and colleagues (e.g., LeBreton, Binning, & Adorno, 2006) are in the process of developing new measures of psychopathy using conditional reasoning tests. The issue of low reliabilities and their attenuating effects on the DT-FFM relations is compounded when looking at the FFM facets. A large number of the facets reported in our artifact distribution fell below the .70 threshold and 3 of the 30 even fell below .60. Some of this certainly has to do with fewer items in the facets than the global traits, but the low reliabilities in our artifact distribution are consistent with normative samples (e.g., Costa & McCrae, 1992a), thus we encourage researchers to continue to hone and improve the reliability of not only DT measures, but also

personality measures in general.

Alternatively, measurement could be improved by relying on more than just self-report. For example, Raskin and Shaw (1988) developed the personal pronoun test as an indirect measure of narcissism. Drawing upon socioanalytic theory (Hogan & Holland, 2003), we suggest researchers and practitioners consider the use of observer ratings of personality to measure DT traits. Not only can this help to mitigate response distortion of the self-report, meta-analytic research has provided evidence the predictive validity of observer ratings increments self-reports (Oh, Wang, & Mount, 2011).

An additional limitation is that although we were able to assess the FFM's traits and facets ability to explain the global traits of the DT, we were unable to assess facet-to-facet relations. That is, it is possible, in fact, probable, that the pattern of relations varies substantially when one moves from trying to explain the global trait of psychopathy, and instead to trying to explain a single aspect of psychopathy such as callous affect. A final limitation is that our search was very specific and did not include measures that diverged even slightly from the DT and FFM. Although this helps to prevent a contamination bias, it introduces a potential deficiency bias. Future systematic reviews may wish to cast a wider net for studies that might include closely related proxies of both the FFM and DT.

Conclusion

Le, Schmidt, Harter, and Lauver (2010, p. 6) recently stated that "a science that ignores the mandate for parsimony cannot advance its knowledge base and achieve cumulative knowledge." Construct proliferation impedes science as the development of two constructs that measure the same phenomena requires twice the effort to establish a nomological net. Commenting on the construct proliferation in psychological measurement, Kelley (1927) coined

the term “jangle fallacy” where constructs with different names are assumed to measure different traits. In exploring the jangle of the Dark Triad traits and the Five Factor Model of personality, we identified substantial overlap between the two theoretical perspectives. We also found that in most cases large degrees of variance were suggestive of moderation. We concluded with a number of future directions for researchers and practitioners interested in reducing the jangle.

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Table 1. Relations between Dark Triad traits and Global FFM traits

DT	FFM	k	N	*r*	80% CV	95% CI	%-acc	r_c	RW_c	RI_c	R^2_c
Mach	A	40	11326	-.39	-.57; -.21	-.44; -.34	11	-.50	.23	77.1%	.30
	C	42	12131	-.21	-.36; -.07	-.25; -.18	20	-.27	.04	14.7%	
	E	46	13187	-.01	-.24; .21	-.07; .04	11	-.01	.02	5.4%	
	N	47	13977	.09	-.10; .29	.05; .14	12	.11	.01	2.3%	
	O	40	11427	-.04	-.17; .09	-.08; .00	26	-.05	.00	0.6%	
Narc	A	84	44480	-.29	-.48; -.10	-.33; -.26	7	-.36	.25	39.6%	.63
	C	79	43707	.09	-.01; .18	.07; .11	25	.11	.03	4.1%	
	E	85	44237	.40	.21; .59	.36; .43	6	.49	.27	42.2%	
	N	93	45885	-.16	-.31; -.02	-.19; -.14	13	-.20	.03	4.8%	
	O	82	42936	.20	.10; .30	.18; .22	24	.25	.06	9.3%	
Psyc	A	77	23216	-.42	-.61; -.23	-.45; -.38	9	-.53	.26	62.8%	.41
	C	76	23528	-.31	-.45; -.17	-.34; -.28	19	-.39	.11	26.6%	
	E	80	25060	.04	-.14; .23	.01; .08	13	.05	.03	7.8%	
	N	86	25465	.05	-.22; .32	.00; .09	7	.06	.00	1.1%	
	O	76	23414	.04	-.08; .16	.01; .06	27	.05	.01	1.8%	

Note: Mach: Machiavellianism, Narc: narcissism, Psyc: Psychopathy, k: number of included studies, N: sample size, *r*: weighted mean correlation, SD_{true}: true score standard deviation, 80% CV: 80 percent credibility interval, 95% CI: 95 percent confidence interval, SE: standard error, %-acc: percent of variance attributable to sampling error, r_c: correlation corrected for unreliability, RW_c: raw weight of disattenuated coefficient, RI_c: relative importance of disattenuated coefficient, R^2_c: variance explained of disattenuated model.

Table 2. Relations between narcissism and FFM facets

facet	k	N	*r*	80% CV	95% CI	% acc	r_c
A: Altruism	12	2708	-.19	-.36; -.03	-.27; -.11	19	-.26
A: Compliance	12	2708	-.27	-.44; -.10	-.35; -.19	17	-.37
A: Modesty	12	2708	-.37	-.64; -.11	-.49; -.25	7	-.49
A: Straightforward	12	2708	-.33	-.49; -.17	-.41; -.25	18	-.45
A: Tendermindedness	14	2990	-.18	-.32; -.04	-.25; -.11	27	-.27
A: Trust	12	2708	-.15	-.35; .05	-.25; -.05	15	-.19
C: Ach. Striving	12	2754	.07	-.11; .25	-.02; .16	18	.09
C: Competence	11	2627	.06	-.13; .25	-.04; .16	16	.08
C: Deliberation	11	2627	-.10	-.16; .04	-.15; -.05	69	-.13
C: Dutifulness	12	3171	-.09	-.27; .10	-.18; .00	15	-.13
C: Order	12	3171	-.05	-.14; .04	-.10; .00	45	-.07
C: Self-Discipline	11	2627	-.03	-.19; .13	-.11; .05	21	-.04
E: Activity	11	2627	.14	-.02; .31	.05; .23	19	.19
E: Assertiveness	13	2766	.24	-.01; .50	.13; .35	10	.31
E: Excite. Seeking	11	2627	.16	.07; .26	.10; .22	43	.23
E: Gregarious	15	4110	.13	-.04; .30	.06; .20	17	.17
E: Pos. emotions	11	2627	-.05	-.24; .14	-.15; .05	16	-.07
E: Warmth	16	3845	-.02	-.16; .13	-.08; .04	25	-.03
N: Anger/Hostile	16	4350	.25	.03; .48	.16; .34	9	.33
N: Anxiety	19	4733	.03	-.21; .28	-.06; .12	10	.04
N: Depressive	11	2627	.00	-.33; .32	-.15; .15	6	.00
N: Impulsiveness	11	2627	.13	.01; .25	.06; .20	31	.18
N: Self-conscious	11	2627	-.11	-.39; .16	-.24; .02	8	-.15
N: Vulnerability	11	2627	-.06	-.26; .15	-.16; .04	14	-.08
O: Actions	11	2627	.05	-.05; .14	-.01; .11	43	.08
O: Aesthetics	12	3171	.00	-.13; .13	-.07; .07	27	.00
O: Fantasy	12	3171	.08	-.02; .17	.03; .13	41	.11
O: Feelings	11	2627	.03	-.04; .10	-.02; .08	57	.04
O: Ideas	12	3171	.08	-.04; .20	.02; .14	29	.11
O: Values	11	2627	.02	--	-.02; .06	*100*+	.03

Note: A: agreeableness, C: conscientiousness, E: extraversion, O: openness, N: neuroticism, k: number of included studies, N: sample size, *r*: weighted mean correlation, 80% CV: 80 percent credibility interval, 95% CI: 95 percent confidence interval, %-acc: percent of variance attributable to sampling error, r_c: correlation corrected for unreliability. Bolded facets are those proposed to underlie narcissism.

Table 3. Relations between psychopathy and FFM facets

facet	k	N	*r*	80% CV	95% CI	% acc	r_c
A: Altruism	17	3969	-.30	-.44; -.17	-.36; -.24	24	-.40
A: Compliance	18	4118	-.34	-.48; -.20	-.40; -.28	23	-.47
A: Modesty	17	3969	-.19	-.31; -.06	-.25; -.13	29	-.25
A: Straightforward	18	4118	-.41	-.58; -.24	-.48; -.34	14	-.56
A: Tendermindedness	18	4513	-.24	-.33; -.15	-.28; -.20	42	-.36
A: Trust	17	3969	-.27	-.36; -.19	-.31; -.23	46	-.35
C: Ach. Striving	18	4095	-.19	-.31; -.08	-.24; -.14	33	-.25
C: Competence	16	3888	-.17	-.33; -.02	-.24; -.10	20	-.23
C: Deliberation	16	3888	-.35	-.48; -.22	-.41; -.29	23	-.46
C: Dutifulness	17	4432	-.29	-.38; -.20	-.33; -.25	39	-.41
C: Order	17	4432	-.18	-.27; -.10	-.22; -.14	44	-.25
C: Self-Discipline	16	3888	-.24	-.34; -.13	-.29; -.19	34	-.31
E: Activity	18	4259	.04	-.11; .20	-.02; .10	22	.06
E: Assertiveness	16	3643	.07	-.12; .25	-.01; .15	17	.09
E: Excite. Seeking	16	3643	.20	.06; .33	.14; .26	27	.28
E: Gregarious	18	4259	.00	-.08; .07	-.04; .04	56	.00
E: Pos. emotions	17	3701	-.13	-.23; -.02	-.18; -.08	40	-.17
E: Warmth	16	3643	-.18	-.28; -.08	-.23; -.13	41	-.24
N: Anger/Hostile	24	6161	.28	.19; .37	.24; .32	39	.37
N: Anxiety	22	5196	-.02	-.20; .17	-.09; .05	17	-.03
N: Depressive	17	3914	.08	-.08; .24	.01; .15	22	.10
N: Impulsiveness	20	4700	.28	.10; .45	.21; .35	16	.39
N: Self-conscious	18	4084	-.01	-.15; .12	-.07; .05	29	-.01
N: Vulnerability	18	4084	.06	-.08; .20	.00; .12	28	.08
O: Actions	15	3429	.06	-.06; .18	.00; .12	35	.09
O: Aesthetics	16	3973	-.03	-.15; .08	-.08; .02	35	-.04
O: Fantasy	16	3973	.07	.00; .14	.03; .11	55	.09
O: Feelings	15	3429	-.05	-.16; .05	-.10; .00	38	-.07
O: Ideas	15	3429	.03	-.08; .13	-.02; .08	40	.04
O: Values	15	3429	.04	--	.01; .07	*100+*	.06

Note: A: agreeableness, C: conscientiousness, E: extraversion, O: openness, N: neuroticism, k: number of included studies, N: sample size, *r*: weighted mean correlation, 80% CV: 80 percent credibility interval, 95% CI: 95 percent confidence interval, %-acc: percent of variance attributable to sampling error, r_c: correlation corrected for unreliability. Bolded facets are those proposed to underlie psychopathy.

Table 4. Relative importance analysis of proposed models of psychopathy and narcissism

Psychopathy	r_c	RW_c	RI_c	R^2_c
A: Altruism	-.40	.04	5.0%	.88
A: Compliance	-.47	.07	7.9%	
A: Modesty	-.25	.02	2.2%	
A: Straightforwardness	-.56	.15	16.7%	
A: Tendermindedness	-.36	.03	3.5%	
A: Trust	-.35	.05	5.9%	
C: Deliberation	-.46	.08	9.5%	
C: Dutifulness	-.41	.03	3.7%	
C: Self-Discipline	-.31	.04	4.7%	
E: Assertiveness	.09	.01	1.5%	
E: Excitement seeking	.28	.04	4.6%	
E: Warmth	-.24	.03	3.5%	
N: Angry/hostility	.37	.10	11.1%	
N: Anxiety	-.03	.03	3.2%	
N: Depression	.10	.03	3.4%	
N: Impulsiveness	.39	.07	8.5%	
N: Self-consciousness	-.01	.03	3.0%	
N: Vulnerability	.08	.02	2.3%	

Narcissism	r_c	RW_c	RI_c	R^2_c
A: Altruism	-.26	.03	6.7%	.42
A: Modesty	-.49	.10	24.0%	
A: Straightforwardness	-.45	.06	15.1%	
A: Trust	-.19	.01	3.2%	
A: Tendermindedness	-.27	.02	3.8%	
C: Achievement striving	.09	.01	1.1%	
E: Assertiveness	.31	.02	5.2%	
E: Excitement seeking	.23	.01	2.1%	
E: Gregariousness	.17	.03	5.8%	
N: Angry/hostility	.33	.09	21.1%	
N: Self-consciousness	-.15	.02	5.4%	
N: Vulnerability	-.08	.02	5.4%	
O: Fantasy	.11	.01	1.1%	

Note: A: agreeableness, C: conscientiousness, E: extraversion, O: openness, N: neuroticism, r_c: corrected weighted mean correlation, RW_c: corrected raw weight of coefficient, RI_c: corrected relative importance of coefficient, R^2_c: variance explained of corrected model.

Appendix A. Reliability distribution of included constructs

Construct	k	N	r_{xx}
Machiavellianism	106	28493	.76
Narcissism	161	44237	.80
Psychopathy	120	35727	.80
Agreeableness	113	32204	.79
Altruism	10	3095	.69
Compliance	10	3095	.65
Modesty	10	3095	.70
Straightforwardness	10	3095	.68
Tendermindedness	12	3704	.56
Trust	10	3095	.74
Conscientiousness	108	31219	.81
Achievement striving	11	3222	.72
Competence	10	3095	.68
Deliberation	10	3095	.73
Dutifulness	12	4183	.63
Order	12	4183	.64
Self-Discipline	10	3095	.76
Extraversion	110	32132	.83
Activity	10	3232	.66
Assertiveness	9	2803	.74
Excitement seeking	9	2803	.62
Gregariousness	11	3776	.72
Positive emotions	9	2803	.73
Warmth	10	2868	.72
Neuroticism	117	33867	.83
Anger/Hostility	14	5519	.72
Anxiety	15	5221	.64
Depression	10	3095	.75
Impulsiveness	11	3524	.66
Self-consciousness	10	3095	.69
Vulnerability	10	3095	.73
Openness	99	29216	.78
Actions	8	2589	.53
Aesthetics	10	3677	.68
Fantasy	10	3677	.70
Feelings	8	2589	.67
Ideas	10	3677	.67
Values	8	2589	.54

K: number of included studies, N: total sample size, r_{xx}: mean weighted reliability

Appendix B.

Studies Included in Meta-Analyses

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