



The Dark Triad and an expanded framework of personality

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ABSTRACT

Presently the conventional structure of personality, the Five-Factor Model (FFM), has faced criticism for inadequately capturing the full range of existing traits, particularly those reflecting antisocial behavior. The FFM has also not received sufficient application of genetically informed analyses to its extraction and validation. We explored these criticisms, and carried out four behavioral genetic studies which employed the Dark Triad personality cluster as a microcosmic representation of the antisocial personality domain, to assess the comprehensiveness of the FFM and the fit of socially malevolent traits within it. Results from these studies revealed significant phenotypic, genetic, and environmental correlations between the Dark Triad traits and variables measured by the NEO Personality Inventory, the Supernumerary Personality Inventory, the Defining Issues Test-Version 2, and the Trait Emotional Intelligence Questionnaire. It is concluded that the FFM does not provide a complete model of personality and that behavior genetic approaches to the study of individual differences can contribute to a more comprehensive theory.

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1. Introduction

A prevalent theme in personality research has been the pursuit of a sound framework of human traits. To date, numerous structures and hierarchies have been proposed, each offering a unique perspective on the potential manner in which traits can be organized (Allport, 1937; Cattell, 1946; DeYoung, Peterson, & Higgins, 2002; Digman, 1997; Eysenck & Eysenck, 1976; Lee & Ashton, 2004; Musek, 2007). The Five-Factor Model (FFM; Costa & McCrae, 1992), a variation on the Big Five model of personality (Goldberg, 1990), is currently the most popular of the proposed frameworks, and the conventional means by which the structure of personality is presently understood. According to the FFM, five orthogonal dimensions – Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness – can account for all individual differences in human personality traits, and behavioral genetic studies of the framework have shown that variance in these dimensions is almost exclusively attributable to genetic and non-shared environmental factors (Johnson, Vernon, & Feiler, 2008; Plomin & Caspi, 1999).

Despite the considerable volume of empirical evidence supporting the FFM (e.g., McCrae & Costa, 1997; McCrae, Costa, del Pilar, Rolland, & Parker, 1998; Ones & Viswesvaran, 1996; Saucier & Goldberg, 1998), critical investigations of this model have raised two key issues that call into question its validity as a sound

personality structure. First, the model has been deemed to be limited: failing to account for the full range of personality traits that exist, and therefore falling short of its goal to provide a comprehensive summary of all individual personality differences (Ashton & Lee, 2007; Paunonen & Jackson, 2000). Noticeably absent from the model are socially malevolent traits that may have once been considered impolite, and which were therefore not sufficiently captured in the lexical taxonomies upon which the FFM is based (Block, 2010). Furthermore, it has been argued that there is an overreliance on factor analytic methodology in deriving and replicating the FFM, and simultaneously an insufficient application of genetically informed analyses to these investigations (Bouchard & Loehlin, 2001; Boyle, 2008; Boyle, Stankov, & Cattell, 1995; Heath, Madden, Cloninger, & Martin, 1999; Johnson & Krueger, 2004). This supposed analytical rut has resulted in a poor understanding of the inherited structure of personality and of its etiological underpinnings, as well as in the potential popularization of an incomplete framework of personality (Heath, Cloninger, & Martin, 1994).

In the present review, we discuss several studies that we have conducted in an effort to begin to address the outlined limitations of the FFM, and to move toward a revision of the conventional personality model. As a focal point within these investigations we have used the Dark Triad personality cluster (Paulhus & Williams, 2002), which comprises Machiavellianism, narcissism, and psychopathy. This group of sub-clinical traits appears in the personality literature as a valid collection of unique but overlapping antisocial dimensions that can be tested in conjunction with other

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models and variable sets. As a result, it is ideal in the assessment of socially malevolent constructs in the FFM. Furthermore, behavioral genetic analyses were carried out in all investigations to allow for both a phenotypic and an etiological perspective on the assessed models and associations. By jointly examining antisocial personality traits and genetic and environmental influences in a broader investigation of the FFM, we contribute to a systematic analysis of the gray area between supposedly normal functioning and psychopathology, thereby adding to the growing body of work on a dimensional understanding of human behavior (Cloninger, 2002; Jang & Livesley, 1999; Livesley, 2005; Markon, Krueger, Bouchard, & Gottesman, 2002; Widiger & Trull, 1992).

2. Challenging the conventional Five-Factor Model of personality

2.1. *The Five-Factor Model: sufficiently broad or broadly insufficient?*

Although studies proposing the comprehensive nature of the FFM do exist (e.g., McCrae & Costa, 1997; McCrae et al., 1998), an increasing number of researchers are making the argument that the lexical approach employed in the original extraction of the FFM's five factors was not appropriately inclusive. Specifically, this approach did not take into consideration evaluative terms, words describing temporary states, common-language adjectives that were being infrequently employed, and terms considered impolite (Almagor, Tellegen, & Waller, 1995; Block, 2010). Empirical investigations of less conservative methods of deriving a personality framework through this same lexical approach have predominantly shown that not only can additional traits and dimensions be meaningfully added to the present FFM, but also that the nature of these additional constructs is in line with contemporary definitions of socially malevolent behavior (Almagor, Tellegen, & Waller, 1995; Lee & Ashton, 2004; Paunonen & Jackson, 2000).

Ashton et al. (2004) proposed a six-factor HEXACO model after analyzing cross-cultural lexical data. Five of the model's dimensions were conceptually similar to those of the FFM, while the sixth factor of Honesty–Humility was included to implicate traits such as deceit, hypocrisy, conceit, slyness, pretentiousness, and greed. This Honest–Humility factor has exhibited significant correlations with numerous socially malevolent traits (de Vries, de Vries, de Hoogh, & Feij, 2009; Lee & Ashton, 2005; Lee, Ashton, & de Vries, 2005), and therefore appears not only to capture variables missing from the FFM model, but also helps to identify these variables as relevant to prosocial versus antisocial behavior.

Paunonen and Jackson (2000) assessed the data originally used by Saucier and Goldberg (1998) to validate the comprehensiveness of the FFM in order to determine whether important traits were missing from the model. Using a less conservative cut-off score for the inclusion of variables than did Saucier and Goldberg, the researchers identified ten broad dimensions of traits not previously incorporated into the FFM sample space: conventionality, seductiveness, manipulateness, thriftiness, humorousness, integrity, femininity, religiosity, risk-taking, and egotism. Of these ten traits, integrity, manipulateness, egotism, and seductiveness have been linked to the Honesty–Humility dimension of the HEXACO model (Lee & Ogunfowora, 2005), while additional traits have been correlated with negative outcomes (Hong & Paunonen, 2009; O'Neill & Hastings, 2011). Once again, these elements of personality, untapped by the FFM but identified by Paunonen and Jackson, appear relevant to social malevolence, suggesting that, at present, the FFM may not sufficiently account for individual differences in antisocial traits.

2.2. *The Five-Factor Model: organizing phenotypes or clarifying genotypes?*

Most existing personality models have been derived through factor analytic approaches using samples of unrelated participants (Digman, 1990; Heath et al., 1999; Johnson & Krueger, 2004). The Five-Factor structure of traits is no exception to this general trend (e.g., Borkenau & Ostendorf, 1990; Boyle, 2008; Digman, 1997; Goldberg, 1992). Due to this method of extraction, the FFM can be said to comprise dimensions that represent a set of observable characteristics rather than the underlying structure of these characteristics (Heath et al., 1999; Johnson & Krueger, 2004). That is, the model's five factors presently reflect a collection of phenotypes summarizing variance in lexical studies of adjectives used to describe personality across cultures, but not offering a genetically informed picture of the organization of human traits. Despite this limitation, however, Costa and McCrae (1995) have presented the FFM's dimensions as biological entities that cannot be observed directly or accessed fully via introspection.

In efforts to move beyond the phenotypic restrictions of the FFM, numerous studies employing behavioral genetic methodology have reported that individual differences in the five dimensions of the FFM are primarily attributable to genetic and non-shared environmental factors (e.g., Johnson et al., 2008; Plomin & Caspi, 1999; Riemann, Angleitner, & Strelau, 1997). As a result, a clearer sense of the origin of broad personality traits can be deduced from these findings. More rigorous analyses, however, that have assessed directly the genetic and environmental structure of the five-factor framework of personality have cast doubt on the presentation of the FFM as a coherent model of genetic and environmental influences on personality (e.g., Jang, Livesley, Angleitner, Riemann, & Vernon, 2002; Loehlin, McCrae, Costa, & John, 1998; McCrae, Jang, Livesley, Riemann, & Angleitner, 2001). Johnson and Krueger (2004), for instance, employed multivariate models to assess the coherence of the FFM dimensions through an analysis of adjectives describing its five domains. Results of this study revealed that each domain had multiple underlying environmental and genetic determinants, and was therefore complex, calling into question the construct validity of the five-factor framework of personality. Taken together, these behavioral genetic investigations have revealed that although some conclusions about genetic and environmental influences on personality can be drawn from the FFM model, the strengths of these conclusions are hindered by the lack of construct coherence that currently exists in the model, reinforcing the need to re-assess and revise the prevailing framework of individual differences in personality.

Moving forward in analyses and revisions of the FFM, there is a recommendation to incorporate behavioral genetic methodology in general, and multivariate behavioral genetic approaches in particular, into investigations of these models, rather than simply relying on phenotypic factor analysis (Heath & Martin, 1990; Heath et al., 1999). Specifically, if the goal is to work toward an understanding of the manner in which normal and pathological traits are mediated genetically and environmentally – a possibility if antisocial traits are to be incorporated into the FFM – then multivariate genetic methods are especially applicable to this domain (Bouchard & Loehlin, 2001; Livesley, 2005; Markon et al., 2002).

2.3. *The Dark Triad and the microcosmic study of antisocial traits in the Five-Factor Model*

Based on the findings outlined thus far, it seems reasonable to propose that there may exist personality variables that are presently not incorporated within the FFM structure, and further to suggest that these unrepresented variables may be particularly relevant to social malevolence. To assess empirically the roles of

socially malevolent traits within the FFM and in relation to other existing variable sets, while working toward a dimensional understanding of human behavior, we propose to study a collection of variables that not only represent individual differences in several realms of antisocial behavior, but that also possess clinical counterparts. The Dark Triad of personality, a sub-clinical personality cluster introduced by Paulhus and Williams (2002), is an ideal candidate for these analyses which has been investigated in a number of studies to date (Campbell et al., 2009; Petrides, Vernon, Schermer, & Veselka, 2011; Vernon, Villani, Vickers, & Harris, 2008; Veselka, Schermer, Martin, & Vernon, 2010; Veselka, Schermer, & Vernon, 2011).

The Dark Triad of personality comprises three socially malevolent traits that may be described in a general sense as comprising duplicity, self-promotion, and aggressiveness (Paulhus & Williams, 2002). More specifically, Machiavellianism is characterized by interpersonal coldness and a tendency to manipulate others (Christie & Geis, 1970); narcissism entails a sense of grandiosity, entitlement, and superiority (Raskin & Hall, 1979); and psychopathy is exhibited through thrill-seeking behaviors paired with low empathy and anxiety (Hare, 1985). In literature on psychopathology, community-level narcissism has been associated with the Narcissistic Personality Disorder (e.g., Auerbach, 1984; Emmons, 1987), whereas sub-clinical psychopathy and Machiavellianism both show correlations with clinical psychopathy (e.g., Fehr, Samson, & Paulhus, 1992; LeBreton, Binning, & Adorno, 2006).

In their initial analysis of these traits, Paulhus and Williams (2002) reported small to moderate correlations among the three variables, as well as unique associations between each of the Dark Triad traits and such other variables as self-enhancement and cognitive ability. In doing so, they showed the Dark Triad traits to be overlapping but still very much distinct constructs. Researchers aiming to clarify the empirical links between the Dark Triad traits have obtained similar results to those of Paulhus and Williams by noting significant but moderate links among Machiavellianism, narcissism, and psychopathy (e.g., Jakobwitz & Egan, 2006; Lee & Ashton, 2005). A behavioral genetic analysis of the Dark Triad traits carried out by Vernon et al. (2008) reported that variance in the Dark Triad traits was largely attributable to genetic and non-shared environmental factors, although some shared environmental effects were noted for Machiavellianism.

3. The Dark Triad and existing models of personality

As a first step in potentially expanding the FFM to be more inclusive of socially malevolent traits, we assessed the sub-clinical Dark Triad variables in conjunction with existing models of personality, including the FFM. In doing so, our goal was to examine the antisocial cluster's fit within conventional and alternative personality structures. Behavioral genetic analyses were carried out in all of these studies to allow for a genetically informed understanding of the noted relations.

3.1. The Dark Triad and the Five-Factor Model

A behavioral genetic study of the Dark Triad and the FFM was conducted in order to determine whether the Dark Triad traits could be incorporated into the FFM sampling space (Vernon et al., 2008). A total of 139 adult twin pairs (75 MZ pairs, 64 same-sex DZ pairs) from Canada and the United States took part in the study. To obtain measures of the Dark Triad traits, participants completed the MACH-IV (Christie & Geis, 1970), the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979), and the Self-Report Psychopathy Scale (SRP-III, Hare, 1985) assessing Machiavellianism, narcissism, and psychopathy, respectively. They also completed the NEO Personality Inventory-Revised (NEO-PI-R;

McCrae & Costa, 1987) so that individual differences in the dimensions of the FFM could be assessed.

Results revealed significant phenotypic correlations between each of the Dark Triad variables and some of the Big Five dimensions (Table 1). Specifically, Machiavellianism exhibited positive associations with Neuroticism and negative associations with Conscientiousness, narcissism correlated positively with Extraversion, and there was a negative relation between psychopathy and Conscientiousness. Furthermore, all three Dark Triad traits correlated negatively with Agreeableness. These correlations were moderate in magnitude, with the exception of that between psychopathy and Agreeableness, which was large ($r = -.59$), and that between Machiavellianism and Neuroticism, which was small ($r = .23$). The pattern of the correlations that emerged predominantly confirmed the antisocial nature of the Dark Triad cluster. That is, overall, higher scores on the Dark Triad variables were linked to greater antagonism (lower Agreeableness), greater anxiety (Neuroticism), and more carelessness (low Conscientiousness).

Multivariate behavioral genetic analyses of the variables under consideration revealed that, to the extents that these variables were correlated at the phenotypic level, their relations were largely

Table 1

Phenotypic correlations between the Dark Triad traits and the measures assessing the dimensions of the Five-Factor Model (NEO-PI-R), the traits of the supernumerary personality inventory (SPI), moral schemas (DIT-2), and factor- and global-level trait emotional intelligence (TEIQue).

	Dark Triad measures		
	MACH-IV	NPI	SRP-III
<i>NEO-PI-R^a</i>			
Neuroticism	.23**	.15	.13
Extraversion	-.06	.36**	.05
Openness to experience	.06	.30	.01
Agreeableness	-.49**	-.37**	-.59**
Conscientiousness	-.32**	-.03	-.37**
<i>SPI^b</i>			
Conventionality	-.02	-.02	.04
Seductiveness	.32**	.41**	.45**
Manipulativeness	.48**	.43**	.52**
Thriftiness	-.16**	-.22**	-.24**
Humorousness	.15**	.27**	.32**
Integrity	-.52**	-.27**	-.59**
Femininity	-.24**	-.11**	-.43**
Religiosity	-.28**	-.04	-.16**
Risk-taking	.20**	.22**	.40**
Egotism	.13**	.52**	.22**
<i>DIT-2^c</i>			
DIT-PI	.20**	.06	.14*
DIT-MN	-.12	-.13	.10
DIT-PC	-.04	.06	-.21**
<i>TEIQue^d</i>			
Emotionality	-.37**	.13	-.29**
Self-control	-.32**	.01	-.29**
Sociability	-.13	.43*	.10
Wellbeing	-.32**	.19*	-.20**
Global trait EI	-.37**	.20*	-.21**

* $p < .05$ (two-tailed).

** $p < .01$ (two-tailed).

^a Results are from "A Behavioural Genetic Investigation of the Dark Triad and the Big Five," by Vernon et al. (2008), *Personality and Individual Differences*, 44, p. 448. Adapted with permission of the author.

^b Results are from "Beyond the Big Five: The Dark Triad and the Supernumerary Personality Inventory," by Veselka et al. (2011), *Twin Research and Human Genetics*, 14, p. 163. Adapted with permission of the author.

^c Results are from "A Behavioral Genetic Study of the Dark Triad of Personality and Moral Development," by Campbell et al. (2009), *Twin Research and Human Genetics*, 12, p. 134. Adapted with permission of the author.

^d Results are from "Trait Emotional Intelligence and the Dark Triad of Personality," by Petrides et al. (2011), *Twin Research and Human Genetics*, 14, p. 38. Adapted with permission of the author.

attributable to common genetic factors and, to a lesser extent, to common non-shared environmental factors (Table 2). Especially large genetic correlations ($rg > .40$) were reported between Agreeableness and all of the Dark Triad variables, as well as between low Conscientiousness and the antisocial traits of psychopathy and narcissism. These results indicate that there may be considerable overlap in the genes influencing the co-occurrence of the Dark Triad traits and the FFM dimensions. Paired with the phenotypic results, these findings help to situate the Dark Triad within the FFM, to some extent. Specifically, the study shows that not only are there significant associations between the two variable sets, but that these associations stem from common genetic effects. That being said, the moderate magnitudes of the obtained correlations, paired with the fact that over half of the assessed relations were not significant, lends support to the argument that, although the FFM may be accounting for individual differences in antisocial traits to some degree, it is not fully capturing them within its

present structure (e.g., Almagor et al., 1995; Lee & Ashton, 2004; Paunonen & Jackson, 2000).

3.2. The Dark Triad and the Supernumerary Personality Inventory

Given the few correlations observed between the Dark Triad traits and the FFM, a subsequent behavioral genetic study was carried out (Veselka et al., 2011) to assess associations between the Dark Triad traits and the traits assessed by the Supernumerary Personality Inventory (SPI; Paunonen, 2002). The SPI was designed to measure individual differences in ten traits that lie outside of the FFM framework, as identified by Paunonen and Jackson (2000): conventionality, seductiveness, manipulativeness, thriftiness, humorousness, integrity, femininity, religiosity, risk-taking, and egotism. Consequently, it taps into a sampling space distinct from that of the FFM, thereby providing the opportunity to test

Table 2
Genetic and environmental correlations between the Dark Triad traits and the measures assessing the dimensions of the Five-Factor Model (NEO-PI-R), the traits of the supernumerary personality inventory (SPI), moral schemas (DIT-2), and factor- and global-level trait emotional intelligence (TEIQue).

	Dark Triad measures		
	MACH-IV	NPI	SRP-III
<i>NEO-PI-R</i> ^a			
Neuroticism	$re = .32 (.07-.52)$		
Extraversion		$rg = .42 (.16-.65)$	
Openness to experience			
Agreeableness	$rg = -.70 (-.52 \text{ to } -.85)$	$rg = -.42 (-.20 \text{ to } -.42)$ $re = -.13 (-.12 \text{ to } -.14)$	$rg = -.78 (-.61 \text{ to } -.91)$ $re = -.33 (-.09 \text{ to } -.54)$
Conscientiousness	$rg = -.43 (-.18 \text{ to } -.67)$		$rg = -.50 (-.24 \text{ to } -.72)$
<i>SPI</i> ^b			
Conventionality			
Seductiveness	$rc = .55 (.41-.68)$ $re = .14 (.03-.24)$	$rg = .44 (.33-.55)$ $re = .36 (.26-.46)$	$rg = .55 (.42-.65)$ $re = .35 (.24-.44)$
Manipulativeness	$rc = .62 (.49-.73)$ $re = .35 (.25-.44)$	$rg = .45 (.34-.56)$ $re = .47 (.38-.56)$	$rc = .64 (.52-.74)$ $re = .39 (.30-.48)$
Thriftiness		$rg = -.35 (-.21 \text{ to } -.48)$	$rg = -.40 (-.25 \text{ to } -.54)$
Humorousness	$rg = .23 (.07-.38)$	$rg = .34 (.21-.46)$ $re = .16 (.05-.27)$	$rg = .39 (.25-.51)$ $re = .19 (.08-.30)$
Integrity	$rc = -.72 (-.62 \text{ to } -.82)$ $re = -.31 (-.22 \text{ to } -.40)$	$rg = -.36 (-.24 \text{ to } -.48)$ $re = -.13 (-.02 \text{ to } -.24)$	$rc = -.74 (-.64 \text{ to } -.82)$ $re = -.39 (-.30 \text{ to } -.48)$
Femininity	$rc = -.36 (-.21 \text{ to } -.50)$ $re = -.11 (-.01 \text{ to } -.21)$	$rg = -.21 (-.08 \text{ to } -.34)$	$rg = -.56 (-.44 \text{ to } -.67)$ $re = -.18 (-.07 \text{ to } -.29)$
Religiosity	$rc = -.42 (-.29 \text{ to } -.54)$ $re = -.14 (-.04 \text{ to } -.24)$		$rg = -.17 (-.04 \text{ to } -.29)$ $re = -.19 (-.07 \text{ to } -.30)$
Risk-taking	$rg = .19 (.04-.34)$ $re = .17 (.06-.28)$	$rg = .26 (.12-.38)$ $re = .17 (.06-.28)$	$rg = .42 (.28-.54)$ $re = .34 (.23-.43)$
Egotism	$rg = .25 (.10-.40)$ $re = -.01 (-.13 \text{ to } .10)$	$rg = .60 (.49-.69)$ $re = .38 (.27-.47)$	$rg = .30 (.16-.44)$ $re = .12 (.01-.23)$
<i>DIT-2</i> ^c			
DIT-PI	$rc = .68 (.34-1.00)$		$rc = .58 (.19-.99)$
DIT-MN			
DIT-PC			
<i>TEIQue</i> ^d			
Emotionality	$re = -.37 (-.23 \text{ to } -.49)$		$rg = -.61 (-.41 \text{ to } -.80)$
Self-control	$rg = -.48 (-.25 \text{ to } -.71)$		$rg = -.48 (-.26 \text{ to } -.69)$
Sociability		$rg = .50 (.32-.66)$ $re = .35 (.20-.47)$	
Wellbeing	$rg = -.31 (-.03 \text{ to } -.56)$ $re = -.26 (-.11 \text{ to } -.39)$	$re = .29 (.15-.43)$	$rg = -.36 (-.10 \text{ to } -.62)$
Global trait EI	$rg = -.37 (-.11 \text{ to } -.60)$ $re = -.30 (-.15 \text{ to } -.43)$	$re = .28 (.13-.42)$	$rg = -.49 (-.25 \text{ to } -.74)$

Note. rg = genetic correlation. rc = Shared environmental correlation. re = Non-shared environmental correlation. Numbers appearing in parentheses represent the 95% confidence interval values. Only significant genetic/environmental correlations ($p < .05$) that were paired with significant phenotypic correlations are shown.

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empirically the possibility that antisocial traits have been overlooked in the construction of the FFM.

Participants in this study were 456 adult twin pairs (358 MZ pairs, 98 same-sex DZ pairs) from Canada and the United States. They completed the MACH-IV, the NPI, and the SRP-III and also completed the SPI.

The results of this study revealed significant correlations between the Dark Triad variables and most of the SPI traits (Table 1). Specifically, all of the Dark Triad traits correlated positively with the SPI traits of seductiveness, manipulateness, humorousness, risk-taking, and egotism. They also correlated negatively with thriftiness, integrity, and femininity. No significant relations were observed with the SPI trait of conventionality, nor between narcissism and the SPI trait of religiosity. Particularly large correlations were noted between psychopathy and the SPI traits of manipulateness ($r = .52$) and integrity ($r = -.59$), as well as between narcissism and SPI's egotism variable ($r = .52$). The remaining significant correlations were small to moderate in magnitude. These associations, for the most part, confirmed that the Dark Triad, as a whole, entailed malevolent behaviors aimed at interpersonal manipulation, self-promotion, and overall thrill seeking.

Multivariate behavioral genetic analyses revealed that the reported phenotypic correlations between psychopathy and the SPI traits as well as between narcissism and the SPI variables were primarily attributable to common genetic and common non-shared environmental factors (Table 2). Particularly large genetic correlations ($rg > .40$) were noted between psychopathy and the SPI traits of seductiveness, low thriftiness, masculinity, and risk-taking, as well as between narcissism and the SPI scales of seductiveness, manipulateness, and egotism. These results suggested the presence of a substantial overlap in the genes contributing to individual differences in these two Dark Triad traits and the SPI variables. In addition to these genetic effects, correlated shared environmental effects were also observed, most notably between the Dark Triad trait of Machiavellianism and the SPI constructs assessed within the study. Although unusual in personality research, where genetic and non-shared environmental factors tend to be ubiquitous, these results were in line with the shared environmental effects reported for Machiavellianism at the univariate level (Vernon et al., 2008).

Overall, these findings revealed a strong link between the Dark Triad and the SPI variable sets. The strength of this link was evident through the many significant phenotypic correlations observed between the two sets, as well as through the heritable component underlying a large proportion of these associations. When compared to the results obtained from a joint analysis of the Dark Triad traits and the dimensions of the FFM (Vernon et al., 2008), these present findings pointed to a stronger link between the Dark Triad and the constructs not presently captured by the FFM. Such findings suggested that contemporary personality models may not adequately capture the complexity of antisocial human behavior, providing justification for the refinement of the current framework of personality so that it is better able to capture the full range of human individual differences in personality.

3.3. *The Dark Triad and relevant personality measures*

Given the finding that the FFM, as it is presently defined, may not be comprehensive in its ability to account for individual differences in antisocial behavior, a revision of the model seems suitable. Prior to conducting this revision, however, an appropriate first step is to assess relations between the Dark Triad traits and other dimensions of personality. Ideally, this expansion can be done with traits and trait sets that have been shown to fall soundly within the realm of the FFM, thereby bridging the gap between the FFM's current scope and the sampling space for which it cannot fully account at present. A further benefit of this preliminary stage of analysis is

that it allows for a clearer understanding of the Dark Triad traits, while also identifying any problems that may presently be inherent in the study or measure of these socially aversive variables. In other words, such initial investigations are, in essence, a safeguard against pursuing a considerable refinement of personality theory on the basis of measures that could later prove problematic.

To date, we have conducted two additional behavioral genetic studies that assess the Dark Triad cluster in relation to existing trait sets. These trait sets – moral development schemas and dimensions of trait emotional intelligence – are particularly relevant to antisocial behavior. As a result, they offer a richer understanding of the Dark Triad variables.

3.4. *The Dark Triad and moral development*

A behavioral genetic investigation was carried out to assess the associations between scores on the Dark Triad traits and tendencies to endorse particular schemas of moral development (Campbell et al., 2009). This combination of variables was of interest given that results had the potential to clarify whether the Dark Triad traits are, in fact, reflective of antisocial leanings. In addition, the analysis explored a potential overlap of genetic influences on morality and three manifestations of manipulative behavior as epitomized by the Dark Triad constructs.

Participants in this were 236 adult twin pairs (154 MZ pairs, 82 same-sex DZ pairs) residing in Canada and the United States. As in the previous studies, the Dark Triad variables of Machiavellianism, narcissism, and psychopathy were measured via the MACH-IV, the NPI, and the SRP-III, respectively. To assess individual differences in moral development, the Defining Issues Test, Version 2 (DIT-2; Bebeau & Thoma, 2003) was employed. This test was developed based on Kohlberg's theory of moral development (Kohlberg, 1984), and categorizes responses regarding moral scenarios as fitting into one of three schemas. The Personal Interest Schema (DIT-PI) is employed by those who emphasize personal gain when faced with moral questions. The Maintaining Norms Schema (DIT-MN) is endorsed by participants who place emphasis on existing institutions and legal systems in their moral decision-making. Lastly, the Post-Conventional Schema (DIT-PC) is applicable to those who focus on abstract concepts such as justice and basic rights when contemplating moral problems.

Results from the study (Table 1) revealed that the lowest level of moral development – represented by the Personal Interest Schema – exhibited positive correlations with Machiavellianism and psychopathy. In addition, psychopathy showed a significant negative association with the highest level of moral development – the Post-Conventional Schema. Narcissism, however, showed no significant correlations with any of the schemas assessed. Results from behavioral genetic analyses (Table 2) revealed that, to the extent that these variables were correlated at the phenotypic level, their relations were largely attributable to common shared environmental effects. From these findings, it can be posited that experiences shared by family members co-contributed to the moral development of individuals, as well as to their exhibited levels of Machiavellianism and psychopathy – conclusions that are interestingly in line with previous findings noting the role of shared environmental effects on the development of antisocial behavior and psychopathology (e.g., Eaves et al., 1997; Nigg & Goldsmith, 1998; Rhee & Waldman, 2002).

With regard to the development of our understanding of the Dark Triad variables, it is evident from these findings that while Machiavellianism and psychopathy exhibited a pattern of correlations that is to be expected with measures of social malevolence, narcissism did not follow suit. The absence of significant correlations between this Dark Triad trait and all moral schemas may have suggested that individuals scoring high on narcissism hold

amoral worldviews – unconcerned with the differentiation between right or wrong. On the other hand, emerging research regarding sub-clinical narcissism has suggested that the construct is presently not adequately measured by existing tests, as these tests do not take into account its multidimensional nature (Brown, Budzek, & Tamborski, 2009). Consequently, the results regarding narcissism obtained in the study of Dark Triad and moral development may not reflect fully the relations that exist between the trait and moral decision-making.

3.5. The Dark Triad and trait emotional intelligence

Given the importance of interpersonal behavior in the definition of each of the Dark Triad traits (Christie & Geis, 1970; Hare, 1985; Raskin & Hall, 1979), a behavioral genetic study was carried out to assess these variables jointly with a measure of trait emotional intelligence (Petrides, Vernon, Schermer, & Veselka, 2011). Trait emotional intelligence, or trait EI, is a relatively novel construct in personality psychology that captures variation in individuals' emotion-related abilities (Petrides, Pita, & Kokkinaki, 2007). Through its multidimensional structure, trait EI can provide a snapshot of participants' perceived capacity to understand, process and use information about emotions in everyday life, and is therefore a relevant construct to consider in developing an understanding of the Dark Triad variables.

To conduct the study, 214 adult twin pairs (156 MZ pairs, 58 same-sex DZ pairs) from Canada and the United States were assessed. Participants again completed the MACH-IV, the NPI, and the SRP-III. Participants also completed the Trait Emotional Questionnaire (TEIQue; Petrides, 2009), which measures individual differences in 15 facets and 4 factors of trait EI, in addition to providing a single global score on the construct.

With regards to phenotypic correlations (Table 1): results revealed that while Machiavellianism and psychopathy correlated negatively with global trait EI, narcissism exhibited a significant positive association with the overall score. This same pattern of correlations was echoed at the factor and facet levels of the TEIQue, where significant positive relations were observed between the trait EI variables and narcissism, and significant negative associations were noted between the remaining two Dark Triad traits and various elements of the trait EI construct. Only the global and factor-level correlations are presented in Table 1 given the similarity of these correlations to the facet-level results. Facet-level correlations are outlined in the original publication by Petrides et al. (2011).

Overall, these results suggested that individuals scoring high on measures of Machiavellianism and psychopathy tended to exhibit a deficient ability to express and understand emotional information. These tendencies did not generalize to the narcissism domain, however, where narcissistic individuals appeared to be socially aware and adept at perceiving clearly their own emotions as well as the emotions of others. To account for this unique pattern of associations, Petrides et al. (2011) suggested that the positive associations between trait EI and narcissism were in line with the tendency of high-trait EI individuals to exhibit hubristic behavior, as also shown in other investigations of the variable (Petrides, 2009, 2010).

Bivariate behavioral genetic analyses of these relations revealed that nearly all of the significant phenotypic correlations were attributable to common genetic and common non-shared environmental factors. That is, the results suggested a considerable overlap in the genes influencing emotion-related abilities and the Dark Triad traits.

The results of this study were reminiscent of the findings obtained in the analysis of the Dark Triad traits and moral development (Campbell et al., 2009). That is, we again saw a divergence

in the relations noted for narcissism from those observed with Machiavellianism and psychopathy. Specifically, the pattern of associations once again revealed prosocial tendencies exhibited by narcissistic individuals.

4. General discussion and future directions

Two major criticisms regarding the FFM have been outlined, which call into question its completeness and its ability to reflect latent personality dimensions. Specifically, it has been suggested that the model does not fully account for all individual differences in human personality functioning, overlooking antisocial personality traits in particular (e.g., Block, 2010; Boyle, 2008). Furthermore, the argument has been put forth that the majority of work on proposing, revising, and validating personality models has relied on factor analytic approaches that do not adequately provide insight into the genetic and environmental structure of individual differences (e.g., Jang et al., 2002; Johnson & Krueger, 2004; Loehlin et al., 1998; McCrae et al., 2001). Behavioral geneticists in particular express the need for more genetically informed practices in the testing of personality models.

Taking these critiques into consideration, four studies were reviewed in an effort to contribute to the growing discourse on the inadequacies of the FFM. Adhering to the suggestion to consider genetic and environmental influences in investigations of personality structures, each of these studies employed behavioral genetic methodology to explore the common genetic and/or common environmental influences contributing to the noted relations. The results that have emerged have the potential not only to add to the existing body of research exploring the possible insufficiency of the FFM in organizing personality, but also to inspire further thought in the areas of construct validity in the measurement of antisocial traits and etiological factors relevant to discussions of personality in a dimensional context.

4.1. The scope of the Five-Factor Model

Through the assessment of the Dark Triad traits in relation to the FFM (Vernon et al., 2008) and the traits measured by the SPI (Veselka et al., 2011), it appears evident that the ability of the FFM to fully account for all individual differences in personality-related human behavior is limited. In the reviewed analyses, we observed a stronger link between the Dark Triad and the SPI variables, which define a sample space distinct from that of the FFM, than between the Dark Triad and the FFM itself. Although a direct empirical assessment to compare these two sets of associations is warranted and should be carried out in subsequent analyses, the pattern and magnitude of the relations observed in the two studies provided an initial indication that the complexity of the Dark Triad traits are better captured by the SPI sample space. To further explore this idea, it may be beneficial to conduct additional studies examining sub-clinical antisocial variables in relation to existing and alternative models of personality.

To account for this suggested inability of the FFM to capture the full range of antisocial tendencies exhibited in human populations, the explanation provided by Block (2010) seems most fitting. That is, it may be the case that in the original extraction of the FFM using the lexical approach, words indicative of socially aversive behaviors were excluded from adjective lists intended for further analysis. If true, this suggestion illustrates the cultural, social, and empirical limitations of solely lexical examinations of human personality, or at least the choices of words that these included. It also supports the suggestion that more rigorous and objective statistical approaches – such as those employed in behavioral genetic assessment – be used in future investigations of personality

frameworks, while acknowledging that these approaches cannot be applied until the traits have been defined.

4.2. *The measurement of sub-clinical narcissism*

In the discussed efforts to expand the nomological network of the Dark Triad traits, it was noted that, in comparison with Machiavellianism and psychopathy, narcissism exhibited a unique pattern of correlations with the trait sets that we studied. In particular, Machiavellianism and psychopathy were significantly and negatively correlated with many of the factors and facets defining trait EI (Petrides et al., 2011), and showed significant positive correlations with the Personal Interest schema – the lowest level of moral development (Campbell et al., 2009). In contrast, narcissism was significantly and positively related to trait EI (Petrides et al., 2011), and showed no significant ties to moral development (Campbell et al., 2009). That is, narcissism consistently demonstrated relations that were unlike those of the other antisocial measures. As previously suggested, these noted associations may be, either entirely or in part, reflective of the true nature of sub-clinical narcissism. After all, research in the area has often concluded that narcissistic individuals are optimistic, likeable, and popular (e.g., Back, Schmukle, & Egloff, 2010; Paulhus, 1998; Veselka et al., 2010).

On the other hand, the obtained associations may indicate that the measure presently being used to assess sub-clinical narcissism – that is, the Narcissistic Personality Inventory (NPI; Raskin & Hall, 1979) – may not be capturing sufficiently the socially malevolent tendencies of narcissistic individuals. Instead, it may be that it is tapping more into the prosocial and adaptive features of the trait. Indeed, in a study by Watson and Morris (1991), the researchers noted that while the Exploitativeness/Entitlement sub-scale of the NPI predicted lower empathy and heightened interpersonal distress, the remaining sub-scales exhibited more adaptive associations. This finding is in line with the multidimensional perspective on narcissism introduced by Brown et al. (2009), which proposes that the construct may be characterized by two distinct factors – the interpersonal Grandiosity dimensions, and the intra-personal Entitlement dimensions – both of which need to be considered in a complete assessment of narcissism. Taken together, these findings suggest that, due to the over-representation of positive or prosocial items reflecting the Grandiosity domain of narcissism in the NPI, the more maladaptive features of the construct may not be sufficiently captured. As a result, a revision of the measure may be necessary, especially if it is to be used in further analyses of the abilities of personality models to account for individual differences in socially aversive traits.

4.3. *Shared environmental effects and antisocial traits*

Across a number of the studies reviewed, it was observed that although genetic and non-shared environmental factors accounted for the majority of the observed variance and covariance, shared environmental effects were also sometimes present. Specifically, shared environmental influences underscored many relations between the Dark Triad cluster and the variables measured by the SPI (Veselka et al., 2011) and the DIT-2 (Campbell et al., 2009). This appearance of shared environmental effects in the analyses was considered unusual, given the general finding that individual differences in nearly all personality traits are attributable to genetic and non-shared environmental factors (e.g., Bouchard & Loehlin, 2001). While shared environmental influences may occasionally be noted, they are typically negligible, making no strong contribution to the variance in traits and their relations with other constructs. This ubiquitous presence of genetic and non-shared environmental influences in personality research is in contrast to

the behavioral genetic findings reported in the clinical psychology domain, where the influences of the shared environment are quite prominent in assessments of psychopathology (e.g., Eaves et al., 1997; Nigg & Goldsmith, 1998; Rhee & Waldman, 2002). For example, although individual differences in narcissism have been attributed to genetic and non-shared environmental factors in community samples (Vernon et al., 2008), both shared and non-shared environmental effects were found to account for variance in the clinical-level Narcissistic Personality Disorder (Coolidge, Thede, & Jang, 2004).

This disconnect among kinds of influences is interesting, particularly in light of the growing popularity of a dimensional view of human behavior that places traits on a continuum from the supposedly adjusted to the pathological (e.g. Cloninger, 2002; Jang & Livesley, 1999; Livesley, 2005; Markon et al., 2002; Widiger & Trull, 1992). If, as the dimensional perspective suggests, sub-clinical and clinical constructs exist on the same spectrum, representing more or less extreme manifestations of similar variables, then one may be surprised to note that comparable etiological factors are not responsible for influencing variation in these traits. Rather than using this observation to discount the validity of the dimensional perspective on human functioning, however, which has received considerable empirical support (e.g., Cloninger & Svrakic, 1994; DiLalla, Gottesman, Carey, & Vogler, 1993; Schroeder, Wormworth, & Livesley, 1994), perhaps a better alternative is to look to the model that we are presently using to validate and define personality traits. Because, as the present review suggests, the FFM is not able to capture the full complexity of socially malevolent traits adequately, it is possible that clinically-relevant personality variables affected by shared environmental influences are fully excluded from the model and therefore not considered in generalizations about personality etiology. That is, the use of a restricted model and the subsequent omission or at least under-representation of important antisocial traits from this model could be obscuring the importance of the shared environment in individual differences. To explore this idea, it is important to subject personality traits believed to exist beyond the FFM model to careful behavioral genetic investigation, particularly as we move toward a revision of present personality structures. To do this will allow a greater understanding of the etiology of individual traits and of the correlations that exist between them.

5. Conclusion

The present review summarized a series of preliminary steps that have been taken to address some of the criticisms put forth regarding the conventional FFM. In particular, it stressed the importance of using more rigorous analyses in revising the present framework of personality, in order to ensure that it is capable of capturing the full complexity of individual differences in sub-clinical manifestations of antisocial behavior. Specifically, the review noted the importance of behavioral genetic methodology in driving this refinement, and in offering the statistical means by which to understand the influences on personality traits and to test the coherence of personality models. Additionally, if the ultimate goal is to provide a comprehensive dimensional model of human personality, behavioral genetic methodology is an important means through which to ensure that this model can go beyond being simply phenotypic in nature.

Although no absolute conclusions can be derived from the series of investigations examined in the review, recommendations for further endeavors into personality-model assessment were offered in hopes of encouraging further systematic analyses of not only the FFM, but also the potential to understand human personality-related behavior in a dimensional manner. In particular, these

recommendations are tailored toward improving the means by which we measure antisocial traits, and toward an improved understanding of the factors effecting variation in these traits.

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